The content in this final program was generated on March 5, 2021. Please refer to the online session sheets for the most up-to-date information.

All times listed in this Final Technical Program are in EDT time zone (UTC-4:00).
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# PROGRAM AT-A-GLANCE

All times listed are in EDT time zone (UTC-4:00).

## FINAL TECHNICAL PROGRAM

**Bulk Metallic Glasses XVIII**

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## High Entropy Alloys IX: Alloy Development and Properties

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## High Entropy Alloys IX: Structures and Modeling

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- **Multiscale Modeling Approaches to Improve Fatigue Predictions** (THU AM), **Time**: 8:30 AM, **Page 150**
- **Data-Driven Investigations of Fatigue** (THU PM), **Time**: 2:00 PM, **Page 164**

### Hume-Rothery Symposium: Accelerated Measurements and Predictions of Thermodynamics and Kinetics for Materials Design and Discovery
- **Session I** (MNN AM), **Time**: 8:30 AM, **Page 16**
- **Session II** (MNN PM), **Time**: 2:00 PM, **Page 41**
- **Session III** (TUE AM), **Time**: 8:30 AM, **Page 64**
- **Session IV** (TUE PM), **Time**: 2:00 PM, **Page 88**
- **Session V** (WED AM), **Time**: 8:30 AM, **Page 111**
- **Session VI** (WED PM), **Time**: 2:00 PM, **Page 135**

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All times listed are in EDT time zone (UTC-4:00).
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<td>Metal Matrix Composites</td>
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<td>NanoComposites [Nanoscale + Nanoreinforcements]</td>
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<td>Novel Composites and Coatings</td>
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<td>Environmental Embrittlement, Fracture, and Fatigue</td>
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All times listed are in EDT time zone (UTC-4:00).

TMS2021 VIRTUAL FINAL TECHNICAL PROGRAM

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**ADDITIVE TECHNOLOGIES**

Additive Manufacturing Fatigue and Fracture V: Processing-Structure-Property Investigations and Application to Qualification — Aluminum

**Sponsored by:** TMS Structural Materials Division, TMS: Additive Manufacturing Committee, TMS: Mechanical Behavior of Materials Committee

**Program Organizers:** Nik Hrabe, National Institute of Standards and Technology; John Lewandowski, Case Western Reserve University; Nima Shamsaei, Auburn University; Mohsen Seifi, ASTM International/Case Western Reserve University; Steve Daniewicz, University of Alabama

**Monday AM**

**March 15, 2021**

**Session Chair:** Nima Shamsaei, Auburn University

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8:30 AM Invited
Mechanical Behavior of Induced Lack of Fusion Flaws in AlSi10Mg: John Lewandowski1; Brett Conner2; Austin Ngo3; Varthula De Silva Jayasekera1; Griffin Jones1; Kenneth Meinert1; 1Case Western Reserve University; 2DOE KC National Security Campus; 3Youngstown State University; 4Penn State University

9:00 AM
Cold Spray of Al and 6061 Al Alloy Powders: Effects of Oxide Thickness: Trevor Bond1; Mobin Vandadi2; Arvand Navabi1; Vahid Rahneshin1; Ridwan Ahmed1; Nima Rahbar1; Vic Champagne2; W.O. Soboyejo3; 1Worcester Polytechnic Institute; 2Army Research Laboratory

9:20 AM
Critical Fracture Toughness of Al 6061 Cold Spray Deposits: Scott Julien1; Sinan Muftu1; 1Northeastern University

9:40 AM
Notch Sensitivity of AlSi10Mg Aluminum Alloy Produced by Laser Powder Bed Fusion Process: Avinesh Ojha1; Wei-Jen Lai1; Carlos Engier-Pinto1; Xuming Su1; 1Ford Motor Company

10:00 AM Invited
Interplay between Geometry, Defects, and Porosity on the Mechanical Behavior of AM Components: Garrett Pataly1; Benjamin Smith1; Christopher Laursen2; Jody Bartanus2; Jay Carroll2; 1Clemson University; 2Sandia National Laboratories

10:30 AM

10:50 AM
Using Post Build Porosity Analysis to Inform Future Build Strategies: Connor Varney1; Robert Quammen1; Nicholas Telesz2; John Balk1; Andrew Wessman1; Paul Rottmann1; 1University of Kentucky; 2University of Arizona

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**NANOSTRUCTURED MATERIALS**

100 Years and Still Cracking: A Griffith Fracture Symposium — Fracture in Complex Alloys

**Sponsored by:** TMS Materials Processing and Manufacturing Division, TMS: Nanomechanical Materials Behavior Committee

**Program Organizers:** Megan Cordill, Erich Schmid Institute of Materials Science; William Gerberich, University of Minnesota; David Bahr, Purdue University; Christopher Schuh, Massachusetts Institute of Technology; Daniel Kiener, Montanuniversität Leoben; Neville Moody; Nathan Mara, University of Minnesota; Erica Lilleodden, Helmholtz-Zentrum Geesthacht

**Monday AM**

**March 15, 2021**

**Session Chair:** David Bahr, Purdue University

---

8:30 AM
Introductory Comments: 100 Years and Still Cracking: A Griffith Fracture Symposium: Megan Cordill1; 1Erich Schmid Institute of Materials Science

8:35 AM Invited
Designing Ductility in BCC High Entropy Alloys: Eleanor Mak1; Binglun Yin1; William Curtin1; 1Epfl Sti Igm Lamm

9:15 AM
2,000 Years and Still Getting Dull: Mechanisms of Blade Chipping: Gianluca Roscioli1; S. Mohadeseh Taheri-Mousavi2; Cemal Tasan3; 1Massachusetts Institute of Technology

9:35 AM
A Length-scale Independent Phase-Field Model for Quantitative Prediction of Ductile Fracture: William Huber1; Mohsen Asle Zaeem1; 1Colorado School of Mines

9:55 AM
Quantitative Phase-Field Modeling of Crack Propagation in Multi-Phase Material Based on Griffith’s Fracture Theory: Arezoo Emdadi1; Mohsen Asle Zaeem1; 1Missouri University of Science and Technology; 2Colorado School of Mines

10:15 AM Invited
On the Fracture of Multi-element Metallic Alloys: Bernd Gludovatz1; Robert Ritchie2; 1UNSW Sydney; 2Lawrence Berkeley National Laboratory

10:50 AM
On the Transition from Shear Banding to Fracture in Metals: In Situ Analysis of Plastic Flow and Deformation Fields: Shwetabh Yadav1; Harshit Chawla1; Dinakar Sagapuram1; 1Texas A&M University

11:15 AM
Probing Small-scale Fracture and Plasticity in Quasicrystals and High-entropy Alloys: Yu Zou1; 1University of Toronto
ADDITIVE TECHNOLOGIES

Additive Manufacturing for Energy Applications III — Characterization of Additive Manufactured Products

**Sponsored by:** TMS Structural Materials Division, TMS: Additive Manufacturing Committee, TMS: Nuclear Materials Committee

**Program Organizers:** Isabella Van Rooyen, Idaho National Laboratory; Indrajit Charit, University of Idaho; Subhashish Mehler, Idaho National Laboratory; Michael Kirka, Oak Ridge National Laboratory; Kumar Sridharan, University of Wisconsin-Madison; Xiaoyuan Lou, Auburn University

**Session Chair:** Subhashish Mehler, Idaho National Laboratory

8:30 AM Invited Session: Microstructural, Mechanical, and Corrosion Behavior of a High Entropy Alloy (HEA) Designed for Harsh Aqueous Environments: *Nikole Kuczko*; Martin Morra; Kosuke Kuwabara; GE Global Research; Global Research & Innovative Technology Center GRIT

8:50 AM Microstructural Stability and Creep Behavior of an Additively Manufactured Al-Ce-Ni-Mn Alloy: *Richard Michi*; Kevin Sisco; Sumit Bahl; Jonathan Poplawsky; Lawrence Allard; Ryan Dehoff; Alex Plotkowski; Amit Shyam; Oak Ridge National Laboratory; University of Tennessee, Knoxville

9:10 AM Microstructure-property of a Novel 9Cr Ferritic Martensitic Steel via Additive Manufacturing Directed Energy Deposition: *Weicheng Zhong*; Lizhen Tan; Kevin Field; Niyanth Sridharan; Ying Yang; Kurt Terrani; Oak Ridge National Laboratory; University of Michigan, Ann Arbor; Lincoln Electric Company

9:30 AM The Effect of Grain Orientation on Nanoindentation Behavior of Selective Laser Melted Austenitic Stainless Steel: *Sudhanshu Raman*; Matteo Seita; Nanyang Technological University

9:50 AM Quality Evaluation of As-printed Wire Arc Additively Manufactured 316L Stainless Steel Blocks: *Yuhiro Yamamoto*; Lizhen Tan; Ying Yang; Andrzej Nycz; Mark Noakes; Yousub Lee; Luke Meyer; William Carter; Thak Sang Byun; Ryan Dehoff; Kurt Terrani; Oak Ridge National Laboratory

10:10 AM Elevated Temperature Dip in Tensile Elongation of an Additively Manufactured Al-Cu-Fe-Mn Alloy: *Sumit Bahl*; Kevin Sisco; Jonathan Poplawsky; Richard Michi; Lawrence Allard; Ryan Dehoff; Alex Plotkowski; Amit Shyam; Oak Ridge National Laboratory; University of Tennessee-Knoxville

10:30 AM Microstructure and Properties Comparison for 316L Wire-fed Laser Metal Deposition AM Under Vacuum Conditions: *Nicholas Brubaker*; Nicolene van Rooyen; Hussam Ali; Mark Jaster; Indrajit Charit; Michael Maughan; University of Idaho; University of Idaho; Premier Technology

10:50 AM Advances in Digital Light Printing for Energy Applications: *Donna Guillen*; Patrick Moo; Michael Shaltry; Robert O’Brien; Idaho National Laboratory

ADDITIVE TECHNOLOGIES

Additive Manufacturing of Metals: Applications of Solidification Fundamentals — Continuum Scale Modeling and Experiments

**Sponsored by:** TMS Materials Processing and Manufacturing Division, TMS: Additive Manufacturing Committee, TMS: Solidification Committee

**Program Organizers:** Alex Plotkowski, Oak Ridge National Laboratory; Lang Yuan, University of South Carolina; Kevin Chaput, Northrop Grumman; Mohsen Asle Zaeem, Colorado School of Mines; Wenda Tan, University of Utah; Lianyi Chen, University of Wisconsin-Madison

**Session Chair:** Xiaoyuan Lou, Auburn University

8:30 AM Statistical Modeling of Microstructure Signatures in Laser Powder Bed Fusion: *Supriyo Ghosh*; Raiyan Seede; Jaylen James; Ibrahim Karaman; Alaa Elwany; Douglas Allaire; Raymundo Arroyave; Texas A&M University

8:50 AM Solidification Behavior of Martensitic Precipitation-hardenable Stainless Steels Produced via Additive Manufacturing: *Eric Lass*; University of Tennessee, Knoxville

9:10 AM 3D Characterisation of Cracks Formed in AA2024 and Implications for Alloy Design: *Giuseppe Del Guercio*; Marco Simonelli; Nesma Aboulkhair; Graham McCartney; Chris Tuck; University of Nottingham

9:30 AM Quantification and Propagation of Aleatoric Uncertainty Through Numerical Simulation of Laser Powder Bed Fusion Process for IN625: *Scott Wellis*; Purdue University

9:50 AM Quantifying Impact of Fluid Flow on Melt Pool Model Predictions Across AM Processing Regimes: *Gerald Knapp*; Matthew Rolchigo; Tarasankar DebRoy; Jim Belak; Alex Plotkowski; The Pennsylvania State University; Lawrence Livermore National Laboratory; Oak Ridge National Laboratory

10:10 AM Alternative Scan Strategies for Laser Powder Bed Additive Manufacturing to Expand Process Space: *Elizabeth Chang-Davidson*; Nicholas Jones; Jack Beuth; Carnegie Mellon University

10:30 AM Microstructure Control with Advanced Scan Strategies Developed via Fast Analytic Thermal Modeling of Additive Processes: *Benjamin Stump*; Patxi Fernandez; Matt Rolchigo; Alex Plotkowski; Jim Belak; ORNL; LLNL

10:50 AM Consistent Coupling between Melt Pool Heat Transfer and Grain-scale CA Calculations for Additive Manufacturing: *John Coleman*; Alex Plotkowski; Matt Rolchigo; Oak Ridge National Laboratory; Lawrence Livermore National Laboratory
ADDITIVE TECHNOLOGIES

Additive Manufacturing: Materials Design and Alloy Development III -- Super Materials and Extreme Environments — Fundamentals

**Sponsored by:** TMS Materials Processing and Manufacturing Division, TMS: Additive Manufacturing Committee

**Program Organizers:** Behrang Poorganji, University of Waterloo; Hunter Martin, HRL Laboratories LLC; James Saal, Citrine Informatics; Orlando Rios, Oak Ridge National Laboratory; Atieh Moridi, Cornell University; Jiadong Gong, Qusitek Innovations LLC

**Monday AM**

**March 15, 2021**

**Session Chairs:** Behrang Poorganji, Beehive3D; James Saal, Citrine Informatics

8:30 AM


8:35 AM Invited

AM Enabled Super Materials for Extreme Environments Applications: Youping Gao; John Porter; Cameron Schmidt; Castheon Inc

9:05 AM Invited

Development of a Rapid Alloy Selection Tool for Rapid Solidification Processing Conditions: Emma White; Ralph Napolitano; Timothy Prost; Duane Johnson; Samantha Tatai; Naren Raghavan; Michael Kirk; Andrew Kustas; Nicolas Argibay; Iver Anderson; Ames Laboratory; Kansas City National Security Campus; Oak Ridge National Laboratory; Sandia National Laboratories

9:35 AM

Additive Manufacturing and Characterization of High-density Materials for Aerospace Applications: Kristyn Kadota; Scott Smith; Lockheed Martin ATC

9:55 AM Invited

Computational Design and Additive Manufacturing-Enabled Fabrication of Functionally Graded Steel-to-Tungsten Joints for Fusion Energy Applications: Dana Frankel; Marie Thomas; Pin Lu; Olga Eliseeva; Tanner Kirk; Raymundo Arroyave; Ibrahim Karaman; Qusitek Innovations LLC; Texas A&M University

10:25 AM Invited

Rapid Exploration of Refractory Complex Concentrated Alloys via Additive Manufacturing and Molecular Dynamics: Andrew Kustas; Jonathan Pegues; Michael Melia; Raymond Puckett; Shaun Whetten; Morgan Jones; Nicolas Argibay; Michael Chandross; Sandia National Laboratories

10:55 AM

Application of Taguchi, Response Surface, and Artificial Neural Networks for Rapid Optimization of Laser-based Powder-Bed Fusion Process: Ebrahim Asadi; Behzad Fotovati; Faridreza Attarzadeh; University of Memphis

CHARACTERIZATION

Advanced Characterization Techniques for Quantifying and Modeling Deformation — Session I

**Sponsored by:** TMS Extraction and Processing Division, TMS Materials Processing and Manufacturing Division, TMS Structural Materials Division, TMS: Advanced Characterization, Testing, and Simulation Committee, TMS: Materials Characterization Committee

**Program Organizers:** Rodney McCabe, Los Alamos National Laboratory; Marko Knezevic, University of New Hampshire; Irene Beyerlein, University of California–Santa Barbara; Wolfgang Pantleon, Technical University of Denmark; C. Tasan, Massachusetts Institute of Technology; Arul Kumar Manyappan, Los Alamos National Laboratory; Olivia Underwood, Sandia National Laboratories

**Monday AM**

**March 15, 2021**

8:30 AM Invited

Mechanism of Hardening and Damage Initiation in Oxygen Embrittlement of Body-Centred-Cubic Niobium: Weizhong Han; Xi’an Jiaotong University

9:00 AM

Evaluation Method of Ductile-to-Brittle Transition Temperature Using Nano-indentation and Molecular Dynamics Simulation: Yeonju Oh; Won-Seok Ko; Nojun Kwak; Takahito Ohmura; Heung Nam Han; Seoul National University; University of Ulsan; National Institute for Materials Science

9:20 AM

Migration kinetics of twinning disconnections in nanotwinned Cu: an in situ HRTEM deformation study: Quan Li; Jian Song; GuiSen Liu; Yue Liu; XiaoQin Zeng; Shanghai Jiao Tong University

9:40 AM

High Angular Resolution EBSD From Spherical Harmonic Transform Indexing: Gregory Sparks; Mark Obstalecki; Paul Shade; Michael Uchic; Stephen Niezgoda; Michael Mills; Ohio State University; Air Force Research Laboratory

10:00 AM

Kinking in MAX Phases Studied via a Combined Experimental/Computational Approach: Gabriel Plummer; Garritt Tucker; Colorado School of Mines

10:20 AM

Studying Dislocation Interactions in the Bulk Using Dark Field X-ray Microscopy: Henning Friis Poulsen; DTU

10:40 AM

Interactions between Dislocations and a Low-angle Grain Boundary in a Single Crystalline CrCoNi Medium-entropy Alloy: Frederic Habiyaremye; Antoine Antoine Guilton; Florian Schaefer; Felicitas Scholz; Mike Schneider; Jan Frenzel; Guillaume Laplanche; Nabila Maloufi; Université de Lorraine–CNRS–Arts et Métiers ParisTech–LEM3; Saarland University; Institut für Werkstoffe, Ruhr–Universität Bochum, Universitätsstr. 150

11:00 AM

Electron Microscopy Assessment of the Role of Short Range Order on Deformation Behavior of High and Medium Entropy Alloys: Daniel Foley; James Hart; Elaf Anber; Robert Ritchie; Andrew Minor; Mark Asta; Flynn Walsh; Douglas Spearot; Mitra Taheri; Johns Hopkins University; Drexel University; University of California, Berkeley; Lawrence Berkeley National Laboratory; University of Florida

*All times listed are in EDT time zone (UTC-4:00).*

TMS2021 VIRTUAL FINAL TECHNICAL PROGRAM
ENERGY & ENVIRONMENT

Advanced Materials for Energy Conversion and Storage VII — Energy Conversion and Storage I

Sponsored by: TMS Functional Materials Division, TMS: Energy Conversion and Storage Committee

Program Organizers: Jung Pyung Choi, Pacific Northwest National Laboratory; Soumendra Basu, Boston University; Amit Pandey, Lockheed Martin Space; Paul Ohodnicki, University of Pittsburgh; Kyle Brinkman, Clemson University; Partha Mukherjee, Purdue University; Surojit Gupta, University of North Dakota

Monday AM March 15, 2021

8:30 AM Keynote
Infiltration Strategies to Improve the Performance of Solid Oxide Fuel Cell Anodes: Soumendra Basu; Boshan Mo; Jillian Rix; Srikanth Gopalan; Uday Pal; Boston University

9:10 AM Keynote
Thermal Implications of Diverging Degradation Modes in Battery Electrodes and Opportunities to Enable Anode-free Systems: Corey Love; Rachel Carter; Robert Atkinson; Todd Kingston; US Naval Research Laboratory; EXCET, Inc.; NRC/NRL Postdoctoral Research Associate

9:50 AM Keynote
Designing Electrode Architectures across Length Scales: Some Lessons Learned from Li-ion and “Beyond Li” Chemistries: Sarbajit Banejee; Texas A&M University

CHARACTERIZATION

Advanced Real Time Imaging — Additive Manufacturing

Sponsored by: TMS Functional Materials Division, TMS Structural Materials Division, TMS: Advanced Characterization, Testing, and Simulation Committee, TMS: Alloy Phases Committee, TMS: Biomaterials Committee

Program Organizers: Jinichiro Nakano, US Department of Energy National Energy Technology Laboratory; David Alman, National Energy Technology Laboratory; Il Sohn, Yonsei University; Hiroyuki Shibata, Imram, Tohoku University; Antoine Allanel, Massachusetts Institute of Technology; Noritaka Saito, Kyushu University; Anna Nakano, US Department of Energy National Energy Technology Laboratory; Zuotai Zhang, Southern University of Science and Technology; Candan Tamerler, University of Kansas; Bryan Webler, Carnegie Mellon University; Wangzhong Mu, KTH Royal Institute of Technology; David Veysset, Stanford University

Monday AM March 15, 2021

Session Chairs: David Veysset, Stanford University; Jinichiro Nakano, USDOE National Energy Technology Laboratory

8:30 AM An In Situ and Operando Additive Manufacturing Process Replicator for High Speed Optical, Infra-red and Synchrotron X-ray Imaging: Sebastian Marussi; Chu Lun Alex Leung; Samuel Clark; Leigh Stranger; Robert Atwood; Veijo Honkimäki; Alexander Rack; Mike Besston; Jon Wilmott; Peter Lee; University College London; The University of Sheffield; Diamond Light Source Ltd; European Synchrotron Radiation Facility; Oxford Lasers Ltd
8:50 AM
In Situ Characterization of the Balling Phenomenon in Additive Manufacturing: Debomita Basu\(^1\); Jack Beuth\(^2\); Bryan Webler\(^3\); \(^1\)Carnegie Mellon University

9:10 AM
In-Situ Machine Learning Enabled Spatter Detection in Laser Powder Bed Fusion Additive Manufacturing: BrandonAbronovic\(^1\); Jack Beuth\(^2\); Rishikesh Magar\(^2\); Lalit Ghule\(^2\); Amir Farimani\(^1\); \(^1\)Carnegie Mellon University

9:30 AM
High-speed Synchrotron X-ray Imaging of Metal Additive Manufacturing Processes: Tao Sun\(^1\); Kamel Fezzaa\(^2\); \(^1\)University of Virginia; \(^2\)Argonne National Laboratory

9:50 AM Invited
Characterizing Laser-Driven Metal Ejecta Interactions: Alison Saunders\(^1\); Camelia Stan\(^2\); Kyle Mackay\(^3\); Suzanne Ali\(^1\); Hans Rinderknecht\(^1\); Hye-Sook Park\(^1\); Jon Eggert\(^1\); Fady Najjar\(^1\); Tomorr Hashimani\(^1\); Brandon Morgan\(^1\); Marcho Echeverria\(^1\); Jeremy Horwitz\(^1\); Yuan Ping\(^1\); Lawrence Livermore National Laboratory; \(^1\)Laboratory for Laser Energetics; \(^2\)University of Connecticut

10:10 AM
Quantifying Spatter in Powder Bed Fusion Processes with High-Speed Video Observations and Machine Learning: Christian Gobert\(^1\); Evan Diewald\(^1\); Jack Beuth\(^2\); \(^1\)Carnegie Mellon University

MATERIALS DESIGN

AI/Data Informatics: Applications and Uncertainty Quantification at Atomistics and Mesoscales — Session I

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Computational Materials Science and Engineering Committee

Program Organizers: Kamal Choudhary, National Institute of Standards and Technology; Garvit Agarwal, Argonne National Laboratory; Wei Chen, Illinois Institute of Technology; Mitchell Wood, Sandia National Laboratories; Vahid Attari, Texas A&M University; Oliver Johnson, Brigham Young University; Richard Hennig, University of Florida

Monday AM March 15, 2021
Session Chairs: Ghanshyam Pilania, LANL; Garvit Agarwal, ANL

8:30 AM
Are We Making Progress on ML Algorithms for Structure-property Relationships? Using MatBench as a Test Bed: Anubhav Jain\(^1\); \(^1\)Lawrence Berkeley National Laboratory

9:00 AM
Model Comparison and Uncertainty Prediction for ML Models of Crystalline Solids Material Properties: Francesca Tavazza\(^1\); Kamal Choudhary\(^2\); Brian De Cost\(^1\); \(^1\)NIST

9:30 AM
Data Science Approaches to Develop Predictive Models for Energy-relevant Materials: Badri Narayanan\(^3\); \(^3\)University of Louisville

10:00 AM
Discovery and Classification of Double Spinel Chemical Space: Ghanshyam Pilania\(^1\); Yancho Koevski\(^1\); Blas Uberuaga\(^1\); \(^1\)Los Alamos National Laboratory

10:30 AM
Inverse Design of Energy Storage Materials via Active Learning: Hieu Doan\(^1\); Garvit Agarwal\(^1\); Rajeev Assary\(^1\); \(^1\)Argonne National Laboratory

All times listed are in EDT time zone (UTC-4:00).

TMS2021 VIRTUAL FINAL TECHNICAL PROGRAM
10:50 AM
Accelerating the Discovery of Self-Reporting Redox-active Materials Using Quantum Chemistry Guided Machine Learning: Garvit Agarwal1; Hieu Doan1; Lily Robertson1; Lu Zhang1; Rajeev Assary2; 1Argonne National Laboratory

MATERIALS DESIGN

Algorithm Development in Materials Science and Engineering — Machine Learning and Atomistic Algorithms to Accelerate Materials Study and Design

Sponsored by: TMS Materials Processing and Manufacturing Division; TMS: Computational Materials Science and Engineering Committee; TMS: Integrated Computational Materials Engineering Committee; TMS: Phase Transformations Committee; TMS: Solidification Committee

Program Organizers: Mohsen Asle Zaeem, Colorado School of Mines; Mikhail Mendeleev, KBR; Bryan Wong, University of California, Riverside; Ebrahim Asadi, University of Memphis; Garritt Tucker, Colorado School of Mines; Charudatta Phatak, Argonne National Laboratory; Bryce Meredig, Citrine Informatics

Monday AM March 15, 2021

Session Chairs: Mohsen Asle Zaeem, Colorado School of Mines; Mikhail Mendeleev, Ames Laboratory

8:30 AM Invited
Theory-infused Machine Learning Algorithms of Chemisorption at Metal Surfaces: Hongliang Xin1; 1Virginia Polytechnic Institute and State University

9:00 AM Invited
Accelerating Atomic Monte Carlo Simulations with Autoregressive Models: Rafael Gomez-Bombarelli1; James Damewood2; 1Massachusetts Institute of Technology

9:30 AM
Application of a Shape Moment Descriptor Set Towards a Robust and Transferable Description of Local Atomic Environments: Jacob Tavenner1; Edward Kober1; Garriott Tucker1; 1Colorado School of Mines; 2Los Alamos National Laboratory

9:50 AM Invited
High Speed Artificial Neural Network Implementation of Interatomic Force Fields in Metals: Doyl Dickel1; Christopher Barrett1; Mashroor Nitol1; 1Mississippi State University

10:20 AM
Machine Learning and Supercomputing to Accelerate the Development of ReaxFF Interatomic Potentials: N. S. Harsha Gunda1; Jian Peng2; Yun Kyung Shin2; Sangkeun Lee2; Adri C. T. Van Duin2; Dongwon Shin2; 1Oak Ridge National Laboratory; 2Pennsylvania State University

10:40 AM
Development of Machine Learned SNAP Potentials for Studying Radiation Damage in Materials: Mary Alice Cusentino1; Mitchell Wood2; Aidan Thompson3; 1Sandia National Laboratories

11:00 AM
Computational Synthesis of Substrates by Crystal Cleavage: Joshua Paul1; Alice Galdi2; Richard Hennig2; 1University of Florida; 2Cornell University

ELECTRONIC MATERIALS

Alloys and Compounds for Thermoelectric and Solar Cell Applications IX — Session I

Sponsored by: TMS Functional Materials Division, TMS Structural Materials Division, TMS: Alloy Phases Committee

Program Organizers: Hsin-Jay Wu, National Chiao Tung University; Sinn-wen Chen, National Tsing Hua University; Franck Gascoin, Cnrs Crismat Unicaen; Philippe Jund, Montpellier University; Yoshisato Kimura, Tokyo Institute of Technology; Lan Li, Boise State University; Takao Mori, National Institute for Materials Science; Tiejun Zhu, Zhejiang University; Alexandra Zevalkink, Michigan State University; Wan-Ting Chiu, Tokyo Institute of Technology

Monday AM March 15, 2021

Session Chairs: Hsin-Jay Wu, National Chiao-Tung University; Albert T. Wu, National Central University

8:30 AM
Introductory Comments: Alloys and Compounds for Thermoelectric and Solar Cell Applications IX: Hsin-Jay Wu1; 1National Chiao Tung University

8:35 AM Invited
n-Bi2-xSbxTe3 as an Alternative to Mainstream n-Bi2Te3-xSex Near Room Temperature: Jian He1; Lipeng Hu2; 1Clemson University; 2Shenzhen University

8:55 AM Invited
Enhanced Thermoelectric Figure-of-Merit in Nanostructured n-type Bi2Te3 via Phase Diagram Engineering: Hsin-Ching Huang1; Wan-Ting Yen2; Hsin-Jay Wu3; 1National Sun Yat-sen University; 2National Chiao Tung University

9:15 AM Invited
Unique Influences of Laser Additive Manufacturing on Multiscale Structuring of Bismuth Telluride Thermoelectric Materials: Saniya Leblanc1; Ryan Welch1; Bengisu Sisik1; 1George Washington University

9:35 AM Invited
Assessment of Electroless Cobalt Diffusion Layer for Bi13Te3-based Thermoelectric Module: Albert T. Wu1; Chun-Hsien Wang2; 1National Central University

9:55 AM
Effect of Interfacial Reaction on Bi2Te3 and Sb2Te3 Thin-film Thermoelectric Module: Kai-Wen Cheng1; Zhen-Wei Sun2; Albert T. Wu1; 1National Central University

10:15 AM
Thermomagnetic Properties of Single-crystal 2H-NbSe2 and Bi13Te3: Md Sabbir Alhanda1; S. Emad Rezaei2; Md Golam Rosul1; Keivan Esfarjani1; Sergiy Krylyuk1; Albert Davydov2; Mona Zebarjadi1; 1University of Virginia; 2National Institute of Standards and Technology
BIOMATERIALS

Bio-Nano Interfaces and Engineering Applications — Bio-Nano I

Sponsored by: TMS Functional Materials Division, TMS Structural Materials Division, TMS: Biomaterials Committee

Program Organizers: Canand Tamerler, University of Kansas; Kalpana Katti, North Dakota State University; Hendrik Heinz, University of Colorado Boulder; Terry Lowe, Colorado School of Mines; Po-Yu Chen, National Tsing Hua University

Monday AM March 15, 2021

Session Chairs: Canand Tamerler, University of Kansas; Kalpana Katti, North Dakota State University

8:30 AM Invited
Bio-imaging with Photoluminescence of Single-layer MoS2: Yuhei Hayamizu; 1Tokyo Institute of Technology

9:00 AM Invited
Stickiness at Bio-nano-interfaces: From Nanoscale Characterization to Macroscale Properties: Hannes Schniepp; 1College of William & Mary

9:30 AM Invited
Insight into the Mechanobiological Progression of Cancer Metastasis to Bone: Dinesh Katti; Sharad Jaswandkar; Kalpana Katti; 1North Dakota State University

10:00 AM
Control of Scaffold Shear Forces Through a Perfusion Bioreactor for Design of Prostate Cancer Bone Metastasis Testbed: Haneesh Jasuja; Akcrkouch Lahcen; Trung Le; Dinesh Katti; Kalpana Katti; 1North Dakota State University

CHARACTERIZATION


Sponsored by: TMS Extraction and Processing Division, TMS: Characterization Committee

Program Organizers: Jian Li, CanmetMATERIALS; Mingming Zhang, ArcelorMittal Global R&D; Bowen Li, Michigan Technological University; Sergio Monteiro, Instituto Militar de Engenharia; Shadia Ikhamayes; Yunus Kalay, Middle East Technical University; Jian-Yang Hwang, Michigan Technological University; Juan Escobedo-Diaz, University of New South Wales; John Carpenter, Los Alamos National Laboratory; Andrew Brown, Army Research Laboratory; Rajiv Soman, Eurofins EAG Materials Science LLC; Alex Moser, US Naval Research Laboratory

Monday AM March 15, 2021

Session Chairs: Alex Moser, U.S. Naval Research Laboratory; Juan Escobedo-Diaz, University of New South Wales

8:30 AM Performance of High Fidelity Inert Thermomechanical Mocks Over a Diverse Range of Strain Rates and Temperatures: Alexandra Burch; Benjamin Morrow; Carl Cady; David Bahr; John Yeager; 1Los Alamos National Laboratory; 2Purdue University

8:50 AM
Microstructure Characterization of Aluminum 1100 Using Ultrasonic Backscatter Measurements and Synthetic Polycrystals: Musa Norouzian; Joseph Turner; 1University of Nebraska-Lincoln

9:10 AM
A Lightweight Mossbauer Spectrometer for Lunar Exploration Using a Piezoelectric Doppler Drive: Pedro Guzman; Stefan Lohau; Valerie Scott; Brent Fultz; 1California Institute of Technology; 2Jet Propulsion Laboratory, California Institute of Technology

9:30 AM
SAXS Tomography of Precipitation Hardened Multilayer Al Alloy Sheets: Shan Lin; Hiroshi Okuda; 1Kyoto University

9:50 AM
APT Composition Profiling for Accurate Evaluation of Diffusion Coefficients in the Zr-Ta Binary System: Yaqiao Wu; Megha Dubey; Shujuan Wang; Chuangye Wang; Ji-Cheng Zhao; 1Boise State University; 2University of Maryland

10:10 AM
Large-scale Crystal Orientation Mapping by Directional Reflectance Microscopy: Matteo Seita; Xiaogang Wang; Mallory Wittwer; 1Nanyang Technological University

10:30 AM
Utilization of Magneto-optical Kerr Effect Microscopy for Microstructural Characterization of Steels: Matic Jovicevic-Klug; Patricia Jovicevic-Klug; Lars Thomählen; Jeffrey McCord; Bojan Podgornik; 1Institute of Metals and Technology; 2Institute for Materials Science, Kiel University

10:50 AM
Characterization of Dealloyed Gradient Nanoporous Foams: Karina Henneminger; Andrea Hodge; 1University of Southern California

NUCLEAR MATERIALS

Characterization of Nuclear Materials and Fuels with Advanced X-ray and Neutron Techniques — X-ray Diffraction/Scattering I

Sponsored by: TMS Structural Materials Division, TMS: Advanced Characterization, Testing, and Simulation Committee, TMS: Nuclear Materials Committee

Program Organizers: Xuan Zhang, Argonne National Laboratory; Jonathan Almer, Argonne National Laboratory; Maria Okuniewski, Purdue University; Joshua Kane, Idaho National Laboratory; Donald Brown, Los Alamos National Laboratory; J. Kennedy, Idaho National Laboratory; Arthur Motta, Pennsylvania State University

Monday AM March 15, 2021

Session Chairs: Jonathan Almer, Argonne National Laboratory; Maria Okuniewski, Purdue University

8:30 AM Invited
Synchrotron High-energy X-ray Studies of Nuclear Reactor Materials: Meimei Li; Xuan Zhang; Jonathan Almer; Jun-Sang Park; Peter Kenesseli; Andrew Chuang; 1Argonne National Laboratory

9:00 AM
Evolution of Stresses in Deformation Twins in the Plastic Zone Using Three-dimensional Synchrotron X-ray Diffraction: Hamidreza Abdolvand; Karim Louca; Charles Mareau; Marta Majkut; Jonathan Wright; 1Western University; 2Arts et Métiers ParisTech; 3European Synchrotron Radiation Facility (ESRF)
9:20 AM  Characterization of Long Range Ordering in Ni-based Alloys with Ex-situ and In-situ Synchrotron X-ray Diffraction: Nicholas Aerne1; David Sprouster2; Fei Teng2; Mehmet Topsakal3; Adrien Couet4; Kumar Sridharan5; Julie Tucker1; 1Oregon State University; 2Stony Brook University; 3Idaho National Lab; 4Brookhaven National Lab; 5University of Wisconsin-Madison

9:40 AM  Irradiation-induced Effects in HT-UPS Steel Using Far-field X-ray Diffraction and Grain Tracking Analysis: Sri Tapaswi Nori1; Alejandro Figueroa1; Jonova Thomas1; Hemant Sharma2; Jun-Sang Park3; Peter Kenesei4; Jonathan Almer5; Maria Okuniewski1; 1Purdue University; 2Argonne National Laboratory

10:00 AM  Invited Multimodal Synchrotron Characterization of Transmutation Products in Structural Materials: David Sprouster1; J Treleiwicz2; DMorrall3; X Hu1; C Parish2; B Wirth3; Y Katoh4; L Snead1; 1Stony Brook University; 2ORNL; 3University of Tennessee, Knoxville

10:30 AM  4D X-ray Diffraction Microscopy Study of Tensile Deformation of Neutron-irradiated Fe-9Cr Alloy: Xuan Zhang1; Dominic Piedmont1; Jun-Sang Park1; Peter Kenesei2; Jonathan Almer2; Meimei Li2; 1Argonne National Laboratory; 2University of Illinois at Urbana-Champaign

10:50 AM  In-Situ XRD Study of Alloy 709’S Mechanical Behavior for Advanced Fast Reactor Applications: Dominic Piedmont1; Donghee Park2; Victoria Riso1; Xiang Liu1; James Stubbins1; 1University of Illinois at Urbana-Champaign

CORROSION

Coatings and Surface Engineering for Environmental Protection III — Protection from Environmental Degradation, Session I

Sponsored by: TMS Structural Materials Division, TMS: Surface Engineering Committee, TMS: Corrosion and Environmental Effects Committee

Program Organizers: Arif Mubarok, PPG; Tushar Borkar, Cleveland State University; Rajeev Gupta, North Carolina State University; Mary Lyn Lim, PPG Industries; Raul Rebak, GE Global Research; Brian Okerberg, PPG Industries

Monday AM  March 15, 2021

8:30 AM  Revealing the Long-term Growth Kinetics and Morphology of Atmospheric Corrosion Pitting in Aluminum via In-operando Microtomography: Philip Noel1; Michael Melia1; Eric Schindelholz2; 1Sandia National Laboratories; 2The Ohio State University

8:50 AM  Pitting Corrosion in Powder-processed Aluminum Alloys Containing Quasycrystalline Dispersoids: Sarshad Rommel1; Hannah Leonard1; Mingxuan Li2; Thomas Watson2; Todd Polciandriotes3; Mark Aindow1; 1University of Connecticut; 2Pratt & Whitney; 3University of California, Berkeley

9:10 AM  The Effect of Surface Treatment on the Formation, Structure, and Chemistry of Protective Oxide Scale on High-temperature Oxidation-resistant Nickel Alloys: Stephen House1; Henry Ayoola1; John Lyons1; Meng Li2; Bingtao Li2; Judith Yang3; Wissam Saidi1; 1University of Pittsburgh; 2University of Detroit Mercy; 3University of the South of France

9:30 AM  Cycling Corrosion Testing of Al-Mg Friction Stir Welding Bi-metallic Joints: Qingli Ding1; Brajendra Mishra2; Adam C Powell1; Kuba Karayagiz1; 1Worcester Polytechnic Institute

9:50 AM  Dealloying and Passivation of Cu-doped Carbide-reinforced Martensitic Steels in a Sulfuric Acid: Kenta Yamana1; Manami Mori1; Kazuo Yoshida1; Kazuyo Omura1; Yusuke Onuki1; Shigeo Sato2; Akihiko Chiba1; 1Tohoku University; 2National Institute of Technology, Sendai College; 3Ibaraki University

NUCLEAR MATERIALS

Composite Materials for Nuclear Applications — TRISO Fuel

Sponsored by: TMS Structural Materials Division, TMS: Composite Materials Committee, TMS: Nuclear Materials Committee

Program Organizers: Anne Campbell, Oak Ridge National Laboratory; Dong Liu, University of Bristol; Rick Ubic, Boise State University; Lauren Garrison, Oak Ridge National Laboratory; Peng Xu, Idaho National Laboratory; Johann (Hans) Riesz, Max Planck Institute for Plasma Physics

Monday AM  March 15, 2021

Session Chair: Dong Liu, University of Bristol

8:30 AM  Invited Tristructural Isotropic (TRISO) Fuel for High-Temperature, Passively-Safe Nuclear Reactors: John Stempfle1; Paul Demkowicz2; John Hunn3; 1Idaho National Laboratory; 2Oak Ridge National Laboratory

9:00 AM  Experimental Characterisation of the Variation of Local Residual Stresses in TRISO Coatings: Alex Leide1; Steven Kno1; Arjan Vreeling2; Dave Goddard3; Dong Liu4; 1University of Bristol; 2NRG; 3National Nuclear Laboratory

9:20 AM  Post-irradiation Examinations of TRISO Particles Corroded in Molten FLiBe Salt under Neutron Irradiation: Guiqiu Zheng1; David Carpenter2; 1Massachusetts Institute of Technology; 2University of California, Berkeley

All times listed are in EDT time zone (UTC-4:00).

www.tms.org/TMS2021
MATERIALS DESIGN

Computational and Modeling Challenges in Metals and Alloys for Extreme Environments — Extreme Environment Simulations from Nano- to Macro-scale

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS Structural Materials Division, TMS: Computational Materials Science and Engineering Committee, TMS: Integrated Computational Materials Engineering Committee

Program Organizers: Jean-Briac le Graverend, Texas A&M University; Jaafar El-Awady, Johns Hopkins University; Giacomo Po, University of Miami; Beñat Gurruntxa-Lerma, University of Birmingham

Monday AM  March 15, 2021

Session Chairs: Jean-Briac le Graverend, Texas A&M University; Avinash Dongare, University of Connecticut

8:30 AM
Molecular Dynamics Modeling of the Influence of Magnesium Dopants on Grain Boundary Stabilization in Nanocrystalline Aluminum: Wénye Ye1; Leslie Mushongera1; 1University of Nevada, Reno

8:50 AM
Understanding Interface Properties Through Dislocation Dynamics Simulations in Metallic Nanolaminates: Aritra Chakraborty1; Miroslav Zecevic1; Abigail Hunter1; Xiang-Yang Liu1; Ricardo Lebensohn1; Laurent Capolungo1; 1Los Alamos National Laboratory

9:10 AM
A Thermo-mechanical Model of the Dynamics of Dislocation Fields in Transient Heterogeneous Temperature Fields: Manas Upadhyay1; 1LMS, CNRS, École Polytechnique, Institut Polytechnique de Paris

9:30 AM
Multi-scale Simulations of Crystallographic Facet-orientation Dependent Corrosion Behavior in Metallic Alloys: Rongpei Shi1; Stephen Wolzien1; Tim Hsu1; Xiao Chen1; Tae Wook Hyeo1; Tuan Pham1; Christine Orme1; Morris Wang1; Brandon Wood1; 1Lawrence Livermore National Laboratory

9:50 AM
The Role of Precipitates on the Microstructure-sensitive Creep Response of 347H Steel via Crystal Plasticity Simulations: Veerappan Prithivirajan1; Nathan Beets1; Aritra Chakraborty1; M Arul Kumar1; Ricardo Lebensohn1; Laurent Capolungo1; 1Los Alamos National Laboratory

10:10 AM
Lattice Orientation Effect on Intragranular Void Growth in Single- and Poly-crystalline Metals: Paul Christodoulou1; Sylvain Dancette1; Ricardo Lebensohn1; Eric Maire1; Irene Beyertlein1; 1University of California, Santa Barbara; 2Institut National des Sciences Appliquées de Lyon; 1Los Alamos National Laboratory

PHYSICAL METALLURGY

Computational Thermodynamics and Kinetics — Grain Boundary Properties and Kinetics

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Chemistry and Physics of Materials Committee, TMS: Computational Materials Science and Engineering Committee

Program Organizers: Nana Ofori-Opoku, Canadian Nuclear Laboratories; Eva Zarkadoula, Oak Ridge National Laboratory; Enrique Martinez Saez, Clemson University; Vahid Attari, Texas A&M University; Jorge Munoz, University of Texas at El Paso

Monday AM  March 15, 2021

Session Chairs: Reza Darvishi Kamachali, Federal Institute for Materials Research and Testing (BAM); Brandon Runnels, University of Colorado; Ian Winter, Lawrence Livermore National Laboratory; Nana Ofori-Opoku, Canadian Nuclear Laboratories

8:30 AM
Introductory Comments: Computational Thermodynamics and Kinetics: Nana Ofori-Opoku1; 1Canadian Nuclear Laboratories

8:35 AM
Extracting and Examining the Grain Boundary Diffusivity Tensor of Hydrogen in Nickel Using Atomistic Simulations: David Page1; Hadley Peay1; Katie Varela1; Olivier Johnson1; David Fullwood1; Eric Homer1; 1Brigham Young University

8:55 AM Invited
Elastic Interactions in Grain Boundary Phase Transformations: Ian Winter1; Robert Rudd1; Tomas Oppelstrup1; Timofey Frolov1; 1Lawrence Livermore National Laboratory

9:25 AM
Atomistic Modeling of Carbon Atom Redistribution in the Fe-C Martensite: Helena Zapolsky1; Felix Schwab1; Gilles Demange1; Frederic Danoix1; Renaud Patte1; Armen Khachatryan1; 1Cnrs, Gpm, Umr 6634; 2Cnrs-University of Rouen Normandy; 3Rutgers University

9:45 AM Invited
Density-based Thermodynamics of Microstructure Defects: Lei Wang1; Reza Darvishi Kamachali1; 1Federal Institute for Materials Research and Testing (BAM)

PHYSICAL METALLURGY

Continuous Phase Transformations — Session I

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Chemistry and Physics of Materials Committee, TMS: Phase Transformations Committee

Program Organizers: Jessica Krogstad, University of Illinois at Urbana-Champaign; Gregory Thompson, University of Alabama; Matthew Steiner, University of Cincinnati; Janelle Wharry, Purdue University

Monday AM  March 15, 2021

Session Chairs: Jessica Krogstad, University of Illinois at Urbana-Champaign; Gregory Thompson, University of Alabama

8:30 AM Invited
Cluster Variation Model of Phase Behavior in Heusler-forming Alloy Systems: Michael Widom1; 1Carnegie Mellon University
9:00 AM Invited
Interfacial Spinodals: Reza Davishi Kamachali; 1Federal Institute for Materials Research and Testing (BAM)

9:30 AM
Competitive Partitioning and Decomposition Evolution in Nanocrystalline Alloys: Gregory Thompson; Xuyang Zhou; Reza Kamachali; Jabir Mianood; Alisson Kwiatkowski da Silva; Pratheek Shanthraj; Dirk Ponge; Baptiste Gault; Bob Svendsen; Dierk Raabe; Brad Boyce; Blythe Clark; Blythe Clark; Blythe Clark; 1University of Alabama; 2Max-Planck-Institut für Eisenforschung; 3Federal Institute for Materials Research and Testing (BAM); 4Max-Planck-Institut für Eisenforschung; 5The University of Manchester; 6Aachen University; 7Sandia National Laboratories

9:50 AM
Study of Precipitation Behavior of High-Cr Ni-based Filler Metals Using In-situ S/TEM: Cheng-Han Li; Siram Vijayan; Carolin Fink; Joerg Jinschek; 1The Ohio State University

10:10 AM Invited
Microstructural Engineering of Ni-based Superalloys Processed by Conventional and Additive Manufacturing: Felix Theeska; Nima Haghdadi; Sophie Primig; 1University of New South Wales

10:40 AM
Phase Competition in the Two Steps Continuous Phase Transformation during Solidification of Terbium: Huajing (Wilson) Song; M.I. Mendeleev; 1Physics and Chemistry of Materials, Los Alamos National Lab; 2Ames Laboratory, US Department of Energy

CORROSION

Corrosion in Heavy Liquid Metals for Energy Systems — Materials Compatibility with Liquid Metal Coolants I

Sponsored by: TMS Structural Materials Division, TMS: Corrosion and Environmental Effects Committee, TMS: Nuclear Materials Committee

Program Organizers: Osman Anderoglu, University of New Mexico; Alessandro Marino, SCK-CEN; Michael Short, Massachusetts Institute of Technology; Peter Hosemann, University of California; Mike Ickes, Westinghouse Electric Company

Monday AM  March 15, 2021

Session Chairs: Alessandro Marino, SCK-CEN; Michael Short, MIT

8:30 AM
Material Needs and Developments for the Westinghouse Lead Fast Reactor: Mike Ickes; 1Arash Parsi; 1Luke Czerniak; Paolo Ferroni; 1Westinghouse Electric Company

8:50 AM Invited
Compatibility of Alumina-forming Austenitic Steels in Static and Flowing Pb: Bruce Pint; Jiheon Jun; Michael Brady; Yuki Yamamoto; Michael Ickes; 1Oak Ridge National Laboratory; 2Westinghouse Electric Company

9:15 AM
Fundamental Interactions of Steels and Nickel-based Alloys with Lead-based Liquid Alloys or Liquid Tin: Carsten Schroër; 1Karlsruhe Institute of Technology (KIT)

9:35 AM Invited
Exposure Tests of Different Materials in Liquid Lead for LFRs: Effect of the Dissolved Oxygen on Corrosion: Serena Bassini; Camillo Sartorio; Andrea Antonelli; Sebastiano Cataldo; Angelo Fiore; Massimo Angioli; Daniele Martelli; Micheal Ickes; Paolo Ferroni; Ivan Di Piazza; Mariano Tarantino; 1Enea; 2Westinghouse Electric Company

10:00 AM Invited
Corrosion of Refractory Metals and Advanced Steels in Lead-bismuth Eutectic: Stuart Malay; Keith Woloshun; Eric Olivas; Robert Wahren; Terry Grimm; 1Los Alamos National Laboratory; 2Niowave Inc.

10:25 AM
Corrosion Investigations of Materials in Antimony-tin and Antimony-bismuth Alloys For Liquid Metal Batteries: Tianru Zhang; Annette Heinzel; Adrian Jianu; Alfons Weisenburger; Georg Müller; 1Karlsruhe Institute of Technology

10:45 AM
Lead Bismuth Eutectic Corrosion on Austenitic Stainless Steel: Peter Hosemann; Konstanza Lambrinou; David Frazer; Erich Stergar; 1University of California Berkeley

11:05 AM
Corrosion Behaviour and Microstructural Stability of Alumina-forming Austenitic Steels Exposed to Oxygen-containing Molten Lead: Annette Heinzel; Adrian Jianu; Alfons Weisenburger; Hao Shi; Renate Fetzer; Georg Müller; 1Karlsruher Institut für Technologie

11:25 AM
Liquid Metal Embrittlement of Al-containing High-entropy Alloys Exposed to Lead-bismuth Eutectic: Xing Gong; 1Shenzhen University

CHARACTERIZATION

Data Science and Analytics for Materials Imaging and Quantification — Session I: Data-led Approaches for 2D Characterization & EBSD


Program Organizers: Emine Gulsoy, Northwestern University; Charudatta Phatak, Argonne National Laboratory; Stephan Wagner-Conrad, Carl Zeiss Microscopy; Marcus Hanwell, Brookhaven National Laboratory; David Rowenhorst, Naval Research Laboratory; Tiberiu Stan, Northwestern University

Monday AM  March 15, 2021

Session Chair: Emine Gulsoy, Northwestern University

8:30 AM
Introductory Comments: Data Science and Analytics for Materials Imaging and Quantification: Emine Gulsoy; 1Northwestern University

8:35 AM
Computer Vision and Machine Learning for Microstructural Characterization and Analysis: Elizabeth Holm; Ryan Cohn; Nan Gao; Katelyn Jones; Bo Lei; Srujana Yarasi; 1Carnegie Mellon University

9:00 AM
Microstructure Image Segmentation with Deep Learning: from Supervised to Unsupervised Methods: Bo Lei; Elizabeth Holm; 1Carnegie Mellon University
9:20 AM
Improved EBSD Indexing through Non-Local Pattern Averaging: David Rowenhorst1; Patrick Brewick1; 1Naval Research Laboratory

9:45 AM
Resolving Pseudosymmetry in Tetragonal ZrO2, Using EBSD with a Modified Dictionary Indexing Approach: Edward Pong1; Peter Larsen1; Christopher Schuh2; 2Massachusetts Institute of Technology

10:05 AM
Dictionary Indexing of EBSD Patterns Assisted by Convolutional Neural Network: Zhihao Ding1; Marc Graef1; 1Carnegie Mellon University

10:25 AM
Advancements in EBSD Using Machine Learning: Kevin Kaufmann1; Chaoyi Zhu2; Alexander Rosengarten2; Daniel Maryanovsky2; Tyler Harrington2; Hobson Lane2; 2University of California, San Diego; 3Tangible AI LLC

MATERIALS PROCESSING

Deformation Induced Microstructural Modification — Session I: Deformation of Pure Metals and Model Alloys

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Shaping and Forming Committee

Program Organizers: Arun Devaraj, Pacific Northwest National Laboratory; Suveen Mathaudhu, University of California-Riverside; Kester Clarke, Colorado School of Mines; Bharat Gwalani, Pacific Northwest National Laboratory; Daniel Coughlin, Los Alamos National Laboratory

Monday AM  March 15, 2021

Session Chair: Arun Devaraj, Pacific Northwest National Laboratory

8:30 AM
Introductory Comments: Deformation Induced Microstructural Modification: Arun Devaraj1; 1Pacific Northwest National Laboratory

8:35 AM Invited
Phase Evolution in Two-phase Alloys during Severe Plastic Deformation: Nirab Pant1; Nisha Verma1; Yinson Askhenazy1; Pascal Bellon2; Robert Averback2; 2University of Illinois at Urbana-Champaign

9:05 AM
Extreme Shear-deformation-induced Modification of Defect Structures and Hierarchical Microstructure in Immiscible Alloy: Bharat Gwalani1; Matthew Olszta1; Ançi Yu2; Krassimir Bozhilov2; Soumya Varma3; Siddhartha Pathak4; Aashish Rohatgi5; Suveen Mathaudhu3; Peter Sushko4; Cynthia Powell4; Arun Devaraj3; 3Pacific Northwest National Laboratory; 3University of California, Riverside; 1Iowa State University

9:25 AM Invited
Microstructural Changes in Nanotwinned Metals under Various Deformation Modes: Andrea Hodge1; 1University of Southern California

9:55 AM
Effect of Cryogenic Equal Channel Angular Pressing on Mechanical Behavior and Microstructure of Pure Copper: Pedro Henrique Oliveira1; Danièle Magalhães1; Andrea Klauuga1; Vitor Sordi1; 1Federal University of São Carlos

10:15 AM
Influence of Deformation on Microstructure of Al4Si and Cu4Nb Alloys during Friction Stir Processing: A Multi-modal Microstructural Characterization Study: Julian D. Escobar1; Bharat Gwalani1; Matthew Olszta1; Joshua Silverstein1; Luciano Bergmann1; Jorge dos Santos2; Peter Staron2; Emad Maawad2; Benjamin Klausermann2; Suveen Mathaudhu3; Arun Devaraj3; 3Pacific Northwest National Laboratory; 4Helmholtz-Zentrum Geesthacht

10:30 AM Invited
Hierarchical Microstructure in Shear Bands of Pure Titanium: Xiaolong Ma1; Dexin Zhao2; Dinakar Sagapuram2; Kelvin Xie2; 2Pacific Northwest National Lab; 2Texas A&M University

SPECIAL TOPICS


Sponsored by: TMS Extraction and Processing Division, TMS Light Metals Division, TMS: Recycling and Environmental Technologies Committee

Program Organizers: Mary Dougherty, Colorado School of Mines; Christopher Finfrock, Colorado School of Mines; Brady McBride, Colorado School of Mines; Jaden Zymbaluk, Colorado School of Mines; Desmond Mills, Colorado School of Mines; Casey Gilliams, Colorado School Of Mines

Monday AM  March 15, 2021

Session Chairs: Mary Dougherty, Colorado School of Mines; Christopher Finfrock, Colorado School of Mines; Casey Gilliams, Colorado School of Mines; Desmond Mills, Colorado School of Mines; Jaden Zymbaluk, Colorado School of Mines

8:30 AM
Introductory Comments: Design and Manufacturing Approaches for the Next Generation of Sustainable Materials: The 2021 Student-led Symposium: Christopher Finfrock1; 1Colorado School of Mines

8:35 AM Invited
Research with a Sustainable Materials Science and Engineering Approach: Bryan Boudouris1; Lynnette Madsen2; 2National Science Foundation

8:55 AM Invited
Research Requirements for Sustainable Materials: Daniel Cooper1; 1University of Michigan

9:15 AM Invited
Creating New Green Jobs Starts at the Product Design Stage: Justine Burt1; 1Appraccel

9:35 AM Invited
Materials Innovations Towards Decarbonization of Industrial Processes: Elsa Olivetti1; 1Massachusetts Institute of Technology

9:55 AM Invited
Genomic Computational Design: Materials for Sustainability: Gregory Olson1; 1Massachusetts Institute of Technology

10:15 AM Invited
Additive Manufacturing of High Temperature Materials: New Alloys and Sustainability Considerations: Tresa Polioch1; 1University of California, Santa Barbara
10:35 AM Invited
Challenges in Optimizing Structural Metamaterials: Brad Boyce1; Anthony Garland1; Benjamin White2; Ryan Alberdi2; 1Sandia National Laboratories

10:55 AM Invited
Microstructural Development and Powder Feedstock Recyclability in Additive Manufacturing by Laser Powder Bed Fusion: Yangho Sohn3; Sharon Park4; Holden Hyer5; Nathalia Diaz Vallecito6; Thin Huynh7; Asif Mahmud7; Kevin Graydon7; Cameron Lucas7; Nicolas Ayers8; Abhishek Mehta8; Le Zhou9; 1University of Central Florida

11:15 AM Invited
Shaping a Sustainable World Together – Delivering Novellis’ Commitment to Sustainability: James Felkete1; 1Novelis Global Research and Technology Center

11:35 AM Invited
Using Rapid Alloy Prototyping to Investigate the Effects of Increased Levels of Residual Elements from Recycled Scrap on DP800 Steel: Caroline Norrish1; Carlos Llovo-Vidal2; Richard Underhill2; Cameron Pleydell-Pearce3; Nicholas Lavery3; 1Swansea University, Bay Campus; 2Tata Steel Europe

ENERGY & ENVIRONMENT

Energy Technologies and CO2 Management — Session I

8:30 AM
CO2 Emission Calculation Model of Integrated Steel Works Based on Process Analysis: Xinhuang Li1; Hui Li2; Weijian Tian3; Zhe Chen4; Hao Bai5; 1China Metallurgical Industry Planning and Research Institute; 2University of Science and Technology Beijing

8:50 AM
In-situ Electrode Temperature Monitoring and Thermal Runaway Detection of Li-ion Pouch Cell: Bing Li1; Mihit Parekh1; Vilas Pol1; Thomas Adams2; James Fleetwood3; Casey Jones4; Vikas Tomar1; 1Purdue University

9:10 AM
Experimental Study on Dust Removal Performance of Dynamic Wave Scrubber for Smelting Flue Gas: Fang Dong1; Yan Liu1; Xiaolong Li1; Guili Liu1; Tingan Zhang1; 1Northeastern University

9:30 AM
Homogenization of the Dense Composite Membranes for Carbon-dioxide Removal: Dragutin Nedeljkovic1; 1American University of the Middle East

9:50 AM
Hydrodynamics of Gas-liquid Two-phase Flow in Reverse Spray Washing Process: Xiaolong Li1; Tingan Zhang1; Yan Liu1; Guili Liu1; Fang Dong1; 1Northeastern University

10:10 AM
Reliability Evaluation of Ag Sinter-joining Die Attach under a Harsh Thermal Cycling Test: Zheng Zhang1; Chuantong Chen2; Suetake Aiji3; Ming-Chun HSieh4; Iwai Aya5; Katsuaki Sugarunuma6; 1Osaka University/ISIR

10:30 AM
Modeling Effect of Copper Solute on Electromigration Induced Stress Generation in Al-based Interconnects: Kieran Cavanagh1; Ping-Chuan Wang1; 1SUNY New Paltz

ELECTRONIC MATERIALS

Electronic Packaging and Interconnections 2021 — Pb-free Solder Alloys I

8:30 AM Invited
Nucleation and Growth Kinetics of Sn Whiskers Under Applied Pressure: Eric Chason1; Piyush Jagtap1; Nupur Jain1; Allan Bower1; 1Brown University

8:50 AM
Development of Near Room Temperature Solder Alloys and Soldering Processes in Microelectronics: Shiqian Liu1; Stuart McDonald2; Tetsuro Nishimura2; Kazuhiro Nogita2; 1University of Queensland; 2University of Science and Technology Beijing

9:10 AM Invited
Comparison of Corrosion for Ni- and Co-based Surface Finishes: Albert T. Wu1; Si-Wei Lin1; Shu-Chi Ku1; Nico Li2; 1National Central University; 2Taiwan Uyemura Co., Ltd

9:30 AM Invited
Microstructural Evolution in Low-temperature Pb-free SOLDERS: Nihithilesh Chawla1; 1Purdue University

9:50 AM
Tailoring βSn Grain Orientations in Electronic Interconnections via Manipulating Textures of Interfacial Intermetallics: Zhaolong Ma1; Ce Li2; Xingwang Cheng1; Suyuan Yang1; 1Beijing Institute of Technology

Monday AM
March 15, 2021

Session Chairs: Mehran Maalekian, Mat-Tech; Amir Hossein Nobari, SNPlus

MONDAY AM
MATERIALS PROCESSING

Friction Stir Welding and Processing XI — Lightweight Materials & High Entropy Alloys

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Shaping and Forming Committee

Program Organizers: Yuri Hovanski, Brigham Young University; Piyush Upadhyay, Pacific Northwest National Laboratory; Yutaka Sato, Tohoku University; Nilesh Kumar, University of Alabama; Tuscaloosa; Anton Naumov, Peter the Great St. Petersburg Polytechnic University

Monday AM  March 15, 2021

Session Chair: Nilesh Kumar, University of Alabama

8:30 AM
Case Study: Implementation of FSW in the Colombian Rail Transport Sector: Elizabeth Hoyos1; Jeroen De Backer2; Santiago Escobar3; Jonathan Martin4; Mauricio Palacio5; 1Universidad EIA; 2TWI; 3Metro de Medellín

8:50 AM
Three Sheet Al Alloy Assembly for Automotive Application: Piyush Upadhyay1; Hirshikesh Das1; Daniel Graff1; 1Pacific Northwest National Laboratory

9:10 AM
Bobbin Friction Stir Processing of AZ31B Mg Alloy Plates: Eisha Khald1; Vasanth Shunmugasamy1; Bilal Mansoor1; 1Texas A&M University at Qatar

9:30 AM
Characterization and Analysis of the Effective Wear Mechanisms on FSW Tools: Michael Hasieber1; Michael Grätz1; Jean Pierre Bergmann1; 1Technische Universität Ilmenau

9:50 AM
Friction Stir Lap Welding between Al and FeCoCrNiMn High Entropy Alloy: Haining Yao1; Ke Chen1; Muyang Jiang1; Min Wang1; Xueming Hua1; Lanting Zhang1; Aidang Shan1; 1Shanghai Jiao Tong University

10:10 AM
Modified Friction Stir Welding of Al-Mg-Cu-Zn Aluminum Alloy: Ahmad Alati Alathalah1; Anna Tesleva1; Pavel Polyakov1; Matthias Moschinger1; Sebastian Frische1; Iuliia Morozova1; Anton Naumov1; Fedor Ispou1; Gonçalo Pina Cipriano1; Sergio T. Amancio-Filho1; 1Peter the Great St.Petersburg Polytechnic University (SPbPU); 2Graz University of Technology; 3Brandenburg University of Technology Cottbus-Senftenberg

10:30 AM
Heterogeneous Structure-induced Strength-ductility Synergy by Partial Recrystallization during Friction Stir Welding of a High-entropy Alloy: Po-Ting Lin1; Hung-Chi Liu1; Po-Ying Hsieh1; Cheng-Yu Wei1; Che-Wei Tsai1; Yutaka Sato1; Shih-Che Chen1; Hung-Wei Yen1; Nian-Hu Lu1; Chih-Hsuan Chen1; 1National Tsing Hua University; 2Tohoku University; 3National Taiwan University

PHYSICAL METALLURGY

Frontiers in Solidification Science VIII — Dendritic Growth

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Chemistry and Physics of Materials Committee, TMS: Phase Transformations Committee, TMS: Solidification Committee, TMS: Computational Materials Science and Engineering Committee

Program Organizers: Damien Tourret, IMDEA Materials; Amy Clarke, Colorado School of Mines; Ulrike Hecht, Access e.V.; Nana Ofori-Opoku, Canadian Nuclear Laboratories; Melis Serefgolu, Koc University; Tiberiu Stan, Northwestern University

Monday AM  March 15, 2021

Session Chairs: Charles-Andre Gardin, MINES ParisTech CEMEF UMR CNRS 7635; Damien Tourret, IMDEA Materials; Tomohiro Takaki, Kyoto Institute of Technology; Amy Clarke, Colorado School of Mines

8:30 AM
Introductory Comments: Frontiers in Solidification Science VIII: Damien Tourret1; 1IMDEA Materials

8:35 AM
Invited
In-situ Measurement of Dendrite Tip Shape in a Metallic Alloy: Christoph Beckermann1; H. Neumann-Heyme2; N. Shevchenko3; J. Grenzer4; S. Eckert5; 1University of Iowa; 2Helmholtz-Zentrum Dresden-Rossendorf (HZDR)

9:05 AM
Microstructural Evolution in Metallic Alloys during Solidification: Tiberiu Stan1; Peter Voorhees1; 1Northwestern University

9:25 AM
Shapes of Dendritic Tips at Small and Large Undercoolings: Andrew Kao1; Liubov Toropova1; Dmitri Alexandrov1; Peter Galenko1; 1University of Greenwich; 2Ural Federation University; 3Friedrich Schiller University Jena

9:45 AM
A Model for Dendrite Fragmentation in Alloy Solidification: Hieram Neumann-Heyme1; Kerstin Eckert1; Christoph Beckermann1; 1Helmholtz-Zentrum Dresden-Rossendorf (HZDR); 2University of Iowa

10:05 AM
Dendritic Spacing Selection during Al-Cu Casting: Experiments and Multiscale Simulations: Barbara Bellon1; Ahmed Boukellali1; Thomas Isensee2; John Coleman2; Matthew Krane2; Michael Titus2; Damien Tourret3; Javier Llorca4; 1Texas A&M University; 2Aix-Marseille Université; 3Iowa State University; 4IMDEA Materials Institute & Technical University of Madrid

10:25 AM
Characterization of Dendritic Spatially Extended 3D Patterns in Directional Solidification: Microgravity Experiments in DECLIC-DSI Onboard ISS and 3D Phase-field Simulations: Kathua J.P. Fatima Mota1; Louise Strutzemberg2; Rohit Trivedi3; Nathalie Bergeon3; Alain Karma1; 1Northeastern University; 2Aix-Marseille Université; 3NASA Marshall Space Flight Center; 4Iowa State University

10:45 AM
Comparison of Solidification Characteristics of In-situ X-radiography Experiments and DNN Simulations: Maike Becker1; Laszlo Sturz2; Dirk Bräuer3; Florian Kargl4; 1German Aerospace Center (DLR); 2Access e.V.
11:05 AM
Grain Competition in Polycrystalline Columnar Dendritic Solidification: Scale Bridging between Phase Field and Cellular Automaton Methods: **Elaheh Dorari**; **Kaihua Ji**; **Gildas Guillemot**; **Charles-André Gandin**; **Alain Karma**. 1Northeastern University; 2MINES ParisTech

11:25 AM
Interaction of Hydrogen-bubbles with the Approaching Solidification Front in Al-Cu Melt - An In-situ Study: **Thomas Werner**; **Juliane Baumann**; **Maike Becker**; **Christoph Pickmann**; **Laszlo Sturz**; **Florian Kargl**. 1German Aerospace Center (DLR) - Institute of Materials Physics in Space; 2ACCESS e.V.

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**SPECIAL TOPICS**

Frontiers of Materials Award Symposium: 2021 Functional Nanomaterials: Translating Innovation into Pioneering Technologies — Session I

**Program Organizer:** Huanyu Cheng, Pennsylvania State University

**Monday AM**

8:30 AM

8:35 AM
**Invited**
Bio-inspired Artificial Vision and Wirelessly-integrated Wearable/Implantable Device: **Dae-Hyeong Kim**. 1Seoul National University

9:15 AM
**Invited**
Graphene and 2D Materials for Wearable Electronic Devices and Biosensors: **Jong-Hyun Ahn**. 1Yonsei University

9:55 AM
**Invited**
The Science of Contact-electrification and the Technology of Triboelectric Nanogenerators: **Zhong Wang**. 1Beijing Institute of Nanoenergy and Nanosystems; Georgia Institute of Technology

10:35 AM
**Invited**
Conformal Bioelectronic Interfaces: **Xiaodong Chen**. 1Nanyang Technological University

11:15 AM
**Invited**
Flash Joule Heating as a Rapid Solvent-free Scalable Route to New Materials: **James Tour**. 1Rice University

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**NANOSTRUCTURED MATERIALS**


**Sponsored by:** TMS Structural Materials Division, TMS: Mechanical Behavior of Materials Committee

**Program Organizers:** Yuntian Zhu, City University of Hong Kong; Kei Ameyama, Ritsumeikan University; Irene Beyerlein, University of California-Santa Barbara; Yves Brechet, Grenoble Institute of Technology; Huajian Gao. Nanyang Technological University; Hyoung Seop Kim. Pohang University of Science and Technology; Ke Lu. Institute of Metal Research; Xiaolei Wu. Chinese Academy of Sciences

**Monday AM**

8:30 AM
**Invited**
Gradients, Singularities and Interatomic Potentials: **K. Parisis**. 1Aristotle University of Thessaloniki

8:55 AM
**Invited**
Microstructure Dependence of Strain Partitioning and Localization in Heterostructured Metals: **C. Tasan**. 1Massachusetts Institute of Technology

9:20 AM
**Invited**
Nanoscale Heterogeneity and Gradients Engineered by Compositional Defect Decoration and Manipulation: The Atomic Scale Basis of Segregation Engineering: **Dierk Raabe**. 1Max-Planck Institute

9:45 AM
**Invited**
Cu-Fe Based Immiscible Medium-entropy Alloys with Excellent Tensile Properties: **Jongun Moon**; **Jeong Min Park**; **Jae Wung Bae**; **Peter Liaw**; **Hyoung Seop Kim**. 1POSTECH; 2The University of Tennessee

10:10 AM
**Invited**
Thickness-dependent Shear Localization in Cu/Nb Metallic Nanolayered Composites: **Caizhi Zhou**; **Shujing Dong**. 1University of South Carolina

10:30 AM
**Invited**
Heterostructured Materials: An Emerging Materials Field with Great Potential: **Yuntian Zhu**; **Xiaolei Wu**; **Chongxiang Huang**; **North Carolina State University; 2Institute of Mechanics, CAS; 3Sichuan University

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All times listed are in EDT time zone (UTC-4:00).

www.tms.org/TMS2021
Monday AM March 15, 2021

**ADVANCED MATERIALS**

**High Entropy Alloys IX: Alloy Development and Properties — Alloy Development and Application I**

**Sponsored by:** TMS Functional Materials Division, TMS Structural Materials Division, TMS: Alloy Phases Committee, TMS: Mechanical Behavior of Materials Committee

**Program Organizers:** Peter Liaw, University of Tennessee; Michael Gao, National Energy Technology Laboratory; E.-Wen Huang, National Chiao Tung University; Srivatsan Tirumalai, The University of Akron; Xie Xie, FCA US LLC; Gongyao Wang, Alcoa Technical Center

**Session Chairs:** Peter Liaw, The University of Tennessee; Carl Koch, North Carolina State Univ

8:30 AM Keynote
Nanostuctured High Entropy Alloys: A Review: Carl Koch1; 2North Carolina State University

9:00 AM Invited
Exploring Benefits of Metastability in High Entropy Alloys: C. Tasan1; Shaolou Wei1; Massachusetts Institute of Technology

9:25 AM Invited
Opportunities and Trends in High Entropy Alloys: A Materials Science Perspective from the National Science Foundation: Judith Yang1; 2National Science Foundation

9:50 AM Invited
Linking the Metallurgy of Multiple Principal Element Alloys to Properties: David Shifler1; 3Office of Naval Research

10:15 AM Invited
Order and Disorder in Amorphous and High-entropy Alloys: Yong Zhang1; Xuehui Yan1; University of Science and Technology Beijing; 2University of Science and Technology Beijing

10:40 AM Invited
Revisit the VEC Rule in High Entropy Alloys (HEAs) with High-throughput CALPHAD Approach and Its Applications for Material Design: A Case Study with Al-Co-Cr-Fe-Ni System: Songge Yang1; Jun Lu1; Fangzhou Xing1; Lijun Zhang2; Yu Zhong2; 3Worcester Polytechnic Institute; 4Central South University

11:10 AM Invited
Efficient First-principles Methods of Calculating Stacking Fault Energies in High Entropy Alloys: Comparison of FCC and BCC Lattices: Joshua strother1; Alexandra Scheer1; Chelsey Hargather1; 2New Mexico Institute of Mining and Technology

11:40 AM Invited
Screening of Generalized Stacking Fault Energies, Surface Energies and Intrinsic Ductile Potency of Refractory Multicomponent Alloys: Yong-Jie Hu1; Liang Qi1; Aditya Sundar1; 2University of Michigan

12:10 PM Invited
Efficient First-principles Methods of Calculating Stacking Fault Energies in High Entropy Alloys: Comparison of FCC and BCC Lattices: Joshua strother1; Alexandra Scheer1; Chelsey Hargather1; 2New Mexico Institute of Mining and Technology

12:40 PM Invited
Screening of Generalized Stacking Fault Energies, Surface Energies and Intrinsic Ductile Potency of Refractory Multicomponent Alloys: Yong-Jie Hu1; Liang Qi1; Aditya Sundar1; 2University of Michigan

**MATERIALS DESIGN**

**Hume-Rothery Symposium: Accelerated Measurements and Predictions of Thermodynamics and Kinetics for Materials Design and Discovery — Session I**

**Sponsored by:** TMS Structural Materials Division, TMS: Alloy Phases Committee

**Program Organizers:** Wei Xiong, University of Pittsburgh; Shuanglin Chen, CompuTherm LLC; Wei Chen, Illinois Institute of Technology; James Saal, Citrine Informatics; Greta Lindwall, KTH Royal Institute of Technology

**Session Chairs:** Wei Xiong, University of Pittsburgh

8:30 AM Introductory Comments: Hume-Rothery Symposium: Accelerated Measurements and Predictions of Thermodynamics and Kinetics for Materials Design and Discovery: Wei Xiong1; 2University of Pittsburgh

8:35 AM Keynote
William Hume-Rothery Award Lecture: High-throughput Measurements of Composition-dependent Properties of Alloy Phases for Accelerated Alloy Design: Ji-Cheng Zhao1; 2University of Maryland

9:00 AM Invited
Combination Design of High-entropy Alloys: Dierk Raabe1; Zhiming Li2; 3Max-Planck Institute; 4Central South University

10:00 AM Invited
Emerging Capabilities for the High-throughput Characterization of Structural Materials: Daniel Miracle1; 2Air Force Research Laboratory

10:40 AM Invited
Genomic Materials Design: From CALPHAD Data to Flight: Gregory Olson1; 3MIT
11:20 AM Invited
Design of Cobalt Base Superalloys for 3D Printing: Sean Murray1; Kira Pusch2; Michael Kirk2; Ning Zhou1; Stephane Forsik3; Tresa Pollock4; 1University of California, Santa Barbara; 2Oak Ridge National Laboratory; 3Carpenter Technology Corp

LIGHT METALS

Magnesium Technology 2021 — Keynote Session

Sponsored by: TMS Light Metals Division, TMS: Magnesium Committee

Program Organizers: Victoria Miller, University of Florida; Petra Maier, University of Applied Sciences Stralsund; J. Brian Jordon, University of Alabama; Neale Neelameggham, IND LLC

Monday AM March 15, 2021

Session Chairs: Victoria Miller, University of Florida; Petra Maier, Stralsund University of Applied Sciences

8:30 AM Keynote
Measurement of the Critical Resolved Shear Stress for Slip in Mg Alloys Using Instrumented Indentation: Warren Poole1; Shuheng Li1; Ghazal Nayeri2; 1University of British Columbia

9:15 AM Invited
Development of a Low-cost and Room-temperature Formable Mg Alloy Sheet with In-plane Isotropic Tensile Properties: Taihi Nakata1; Chao Xu1; Hideaki Ohashi2; Yu Yoshida3; Katsuhiro Yoshida1; Shigeharu Kamado1; 1Nagaoka University of Technology; 2Harbin Institute of Technology; 3Sumitomo Electric Industries, Ltd.

9:45 AM Invited
Microstructure and Fracture Toughness of an Extruded Mg-Dy-Nd-Zn-Zr Alloy Influenced by Heat Treatment: Petra Maier1; Benjamin Clausius1; Charis Joy1; Roman Menze2; Benjamin Bittinger2; Norbert Hort3; 1University of Applied Sciences Stralsund; 2Meko Laser Material Processing; 3Helmholtz-Zentrum Geesthacht

10:15 AM Invited
The High-solution Design of Magnesium Alloys: Yuan Yuan1; Jun Wang2; Xiongying Cheng1; Tao Chen1; Bin Jiang1; Torben Bol1; Fushen Pan2; 1Chongqing University; 2Karlsruhe Institute of Technology

10:45 AM Invited
Assessment and Qualification of Austenitic Stainless Steel for Use in Molten Salts: George Young1; Micah Hackett1; 1Kairos Power

9:05 AM
Corrosion Behavior of SS316, Hastelloy X, and Hastelloy N in FLIHaK: Amanda Leong1; Huai Li1; Jinsuo Zhang3; 1Virginia Tech

9:25 AM
Corrosion of 316 Stainless Steel in Molten Chloride Salt Micro Convection Loop: Yafei Wang1; 1University of Wisconsin Madison

10:05 AM
Development of an In-situ Mechanical Test System for Molten Salts: Jake Quincey1; Peter Beck1; Josef Parrington1; Lars Parrington1; Christopher Lamb2; George Young1; Julie Tucker1; Samuel Briggs1; 1Oregon State University; 2Parrington Instruments

10:25 AM
Role of Alloy Chemistry in Governing Corrosion Rates of Candidate Materials for Molten Salt Reactors: Rishi Pillai1; Cory Parker1; Stephen Raiman1; Bruce Pitt1; 1Oak Ridge National Laboratory

10:45 AM
Influence of Corrosion Product Solubility and Dissimilar Materials on Corrosion of Alloys in Molten Salt Environment: Cody Falconer1; William Doniger1; Matthew Weinstein1; Mohamed Elbakhshwan1; Kumar Sridharan1; Adrien Couet1; 1University Of Wisconsin Madison

ADVANCED MATERIALS

Materials for High Temperature Applications: Next Generation Superalloys and Beyond — Superalloys: Alloy Development

Sponsored by: TMS Structural Materials Division, TMS: Refractory Metals Committee

Program Organizers: Govindarajan Muralidharan, Oak Ridge National Laboratory; Martin Heilmaier, KIT Karlsruhe; Ben Adam, Portland State University; Mario Bochiochio, Pratt & Whitney; Katerina Christofidou, University of Sheffield; Eric Lass, University of Tennessee-Knoxville; Jeremy Rame, Safran Aircraft Engines; Pierre Salott, Safran; Akane Suzuki, GE Research; Michael Titus, Purdue University

Monday AM March 15, 2021

8:30 AM
Introductory Comments: Materials for High Temperature Applications-Next Generation Superalloys and Beyond: Govindarajan Muralidharan1; 1Oak Ridge National Laboratory

8:35 AM
Assessment and Qualification of Austenitic Stainless Steel for Use in Molten Salts: George Young1; Micah Hackett1; 1Kairos Power

9:05 AM
Corrosion Behavior of SS316, Hastelloy X, and Hastelloy N in FLINaK: Amanda Leong1; Huai Li1; Jinsuo Zhang3; 1Virginia Tech

9:25 AM
Corrosion of 316 Stainless Steel in Molten Chloride Salt Micro Convection Loop: Yafei Wang1; 1University of Wisconsin Madison
9:35 AM  
TROPEA: A Platinum Containing New Generation Nickel-based Superalloy for Single Crystalline Applications: Jeremy Rome; Satoshi Utada; Luciana Maria Bortoluci Ormastroni; Lorena Mataveli Suave; Edern Menou; Lucille Després; Paraskevas Kontis; Jonathan Cormier; 1Safran Aircraft Engines; 1Institut Pprime - ISAE-ENSMA / Safran Aircraft Engines; 2Safran Tech; 1Institut Pprime - ISAE-ENSMA / Safran Tech; 1Max Planck Institut für Eisenforschung; 1Institut Pprime - ISAE-ENSMA

9:55 AM  
Enhancing the Creep Performance of a Corrosion Resistant Ni-based Superalloy through Grain Boundary Design: Martin Detroit; Paul Jablonski; Jeffrey Hawk; 1National Energy Technology Laboratory

10:15 AM  
Segregation-assisted Climb of Frank Partial Dislocations: A Novel Planar Fault Formation Mechanism in L12-hardened Superalloys: Malte Lenz; Erdmann Spiecker; Mingjian Wu; 1Institute of Micro- and Nanostructure Research

10:35 AM  
Microstructural Evolution under Complex Stress States during Creep of Single Crystal Ni-base Superalloy CMSX-4: Nicolas Karpstein; Malte Lenz; Jonathan Cormier; Erdmann Spiecker; 1Institute of Micro- and Nanostructure Research; 1Institut Pprime, CNRS-Université de Poitiers-ISAE ENSMA

10:50 AM  
On the Crack Growth Retardation under Dwell-fatigue in Nickel Disc Alloys: Hangyue Li; 2University of Birmingham

11:25 AM  
Crack Initiation Anisotropy of Ni-based Single-crystal Superalloys in the VHCF Regime: Alice Cervellon; Chris Torbet; Tresa Pollock; 1University Of California Santa Barbara

NUCLEAR MATERIALS

Mechanical Behavior of Nuclear Reactor Components — Processing Effects

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS Structural Materials Division, TMS: Nanomechanical Materials Behavior Committee, TMS: Nuclear Materials Committee

Program Organizers: Clarissa Yablinsky, Los Alamos National Laboratory; Assel Atkaliyeva, University of Florida; Eda Aydogan, Middle East Technical University; Laurent Capolungo. Los Alamos National Laboratory; Khalid Hattar, Sandia National Laboratories; Kayla Yano, Pacific Northwest National Laboratory; Caleb Massey, Oak Ridge National Laboratory

Monday AM  March 15, 2021

8:30 AM  Invited  
Development of Modified 3Cr-3WVTa Base Bainitic Steels for Fusion Structural Applications: YuhinorI Yamamoto; Roger Miller; Arthur Rowcliffe; 1Oak Ridge National Laboratory

9:00 AM  
Low Temperature Neutron Irradiation and Mechanical Properties of Welded AISI 347: Lauren Garrison; Nathan Reid; John Echols; Kaustubh Bawane; 1Oak Ridge National Laboratory

9:20 AM  
Neutron Irradiation Response of SA508 Pressure Vessel Steel Prepared by Powder Metallurgy and Hot Isostatic Pressing: Yangyang Zhao; Caleb Clement; Shujuan Wang; Yaqiao Wu; Katelyn Wheeler; Donna Guillen; David Gandy; Janelle Wharry; 1Purdue University; 2Boise State University, Center for Advanced Energy Studies; 3Idaho National Laboratory; 4Electric Power Research Institute

9:40 AM  
Dose and Temperature Dependence of Microstructure and Mechanical Properties in Ion-Irradiated PM-HIP Inconel 625: Caleb Clement; Janelle Wharry; Yangyang Zhao; David Gandy; Shujuan Wang; Yaqiao Wu; 1Purdue University; 2Electric Power Research Institute; 3Boise State University, Center for Advanced Energy Studies

10:00 AM  Invited  
Mechanical Behavior and Radiation Effect in Additively Manufactured 316L Stainless Steel: Meimei Li; Xuan Zhang; Wei-Ying Chen; 1Argonne National Laboratory

10:30 AM  
Mechanical Properties of Additively Manufactured 316L Stainless Steel before and after Neutron Irradiation: Thak Sang Byun; Timothy Lach; Maxim Gussev; Kurt Terrani; 1Oak Ridge National Laboratory

10:50 AM  
Effects of Low-temperature Neutron Irradiation and Post-weld Heat Treatment on Tensile Properties of Welded Zircaloy-4: John Echols; Nate Reid; Sara Wonner; Lauren Garrison; 1Oak Ridge National Laboratory

CHARACTERIZATION

Mechanical Response of Materials Investigated through Novel In-situ Experiments and Modeling — Session I

Sponsored by: TMS Structural Materials Division, TMS: Thin Films and Interfaces Committee, TMS: Advanced Characterization, Testing, and Simulation Committee

Program Organizers: Saurabh Puri, Microstructure Engineering; Amit Pandey, Lockheed Martin Space; Dhruti Bhattacharyya, Australian Nuclear Science and Technology Organization; Dongchan Jang, KAIST; Jagannathan Rajagopalan, Arizona State University; Josh Kacher, Georgia Institute of Technology; Minh-Son Pham, Imperial College London; Robert Wheeler, Microtesting Solutions LLC; Shailendra Joshi, University of Houston

Monday AM  March 15, 2021  
Session Chair: Minh-Son Pham, Imperial College

8:30 AM  
In-situ X-Ray Diffraction Investigation of High-strain Rate, High-temperature Deformation in Microalloyed Steel: Tim Wigger; Rosa Pineda; Simon Hunt; Danielle Fench; Ben Thomas; Thomas Kwok; David Dye; Gorka Plata; Jokin Lozares; Inaki Hurtado; Stefan Michalik; Michael Preuss; Mohammed Azem; Peter Lee; 1University College London; 2University of Leicester; 3Diamond Light Source; 4University of Manchester; 5University of Sheffield; 6Imperial College London; 7Mondragon Unibertsitatea; 8Heinrich Hertz Institute for Applied Energy Studies
8:50 AM
In-situ Characterization of Material under Extreme Thermal Cycling Using High-speed Synchrotron X-ray Diffraction: Andrew Chuang; Peter Kenesei; Yan Gao; Jonathon Almer; Jun-Sang Park; 1Argonne National Laboratory; 2GE Global Research

9:10 AM
Mechanical Behavior and Microstructural Evolution of a Cu-0.7Cr-0.1Zr Alloy at Cryogenic Temperature: An in-situ Synchrotron X-ray Evaluation: Pedro Henrique Oliveira; Daniille Magalhães; Marcel Izumi; Osvaldo Cintho; Andrea Klauga; Vitor Sordi; 1Federal University Of São Carlos; 2State University Of Ponta Grossa

9:30 AM
A Quantitative Assessment of Stress/Strain Partitioning in a Dual-phase Titanium Alloy: Gaoming Zhu; Shaolou Wei; Cemal Tasan; 1Massachusetts Institute of Technology

9:50 AM
Dislocation Density Inference from XRD Simulations of In-situ Microstructure Evolution Using Discrete Dislocation Dynamics: Dylan Madisetti; Jaafar El Awady; 1Johns Hopkins University

10:10 AM Keynote
Microstructural Anisotropy and Its Influence on the Internal Stress Field within Grains: Experimental Confrontation with Full Field Crystal Plasticity Models: Kaustubh Venkatraman; Mereim Ben Haj Slama; Vincent Taupin; Nabila Maloufi; Stephane Berbenni; Anthony Rollett; Martin Diehl; Antoine Guitton; 1Università de Lorraine – CNRS; 2Carnegie Mellon University; 3Max-Planck-Institut für Eisenforschung GmbH

10:50 AM
Impact of Precipitate Size, Orientation, and Temperature on Strain Hardening Behavior in Al-Cu Alloys: Brian Milligan; Dong Ma; Lawrence Allard; Amit Shyam; Amy Clarke; 1Colorado School of Mines; 2Oak Ridge National Laboratory

MATERIALS DESIGN

Metal-Matrix Composites: Advances in Analysis, Measurement and Observations — Metal Matrix Composites

Sponsored by: TMS Structural Materials Division, TMS: Composite Materials Committee

Program Organizers: Srivatsan Tirumalai, The University of Akron; William Harrigan, Gamma Alloys; Simona Hunyadi Murph, Savannah River National Laboratory

Monday AM March 15, 2021

Session Chair: Goswami Ramasai, Naval Research Laboratory

8:30 AM Invited
The Mechanical Performance of an In Situ Processed Nickel-Titanium-Graphite Metal Matrix Composites: Influence of Processing: Amit Patil; Tushar Borkar; 1Cleveland State University

9:00 AM Development of Ultra-high Conductivity Metal Composites: Keerti Kappagantula; Xiao Li; Woongjo Choi; Glenn Grant; 1Pacific Northwest National Laboratory

9:20 AM Invited
Role of Microstructure on the Potential of MAX and MAB Phases and Their Derivative-based Composites – A Review: Surojit Gupta; 1University of North Dakota

9:50 AM Microstructure Evolution of Al/Ca Metal-Matrix Composite Conductor Wires by Thermal Aging: Dustin Hickman; Trevor Riedemann; Iver Anderson; 1Iowa State University; 2Ames Laboratory

10:10 AM Understanding the Mechanical Response of Friction Stir Welded In-situ Processed Aluminum Alloy Metal Matrix Composite: Experimental and Statistical Modelling Approaches: Jimmy Karloopia; Shaik Mozammil; Pradeep Jha; Srivatsan Tirumalai; 1Indian Institute of Technology; 2University of Akron

10:40 AM The Effect of Titanium Carbide and Spark Plasma Sintering Processing on Nickel-titanium Carbide Composites: Ganesh Walunj; Tushar Borkar; 1Cleveland State University

11:00 AM The Tribological Behavior of an In-situ Processed Magnesium Alloy Based Metal Matrix Composite: Ararinda Meher; Manas Mohan Mahapatra; 1Indian Institute of Technology Bhubaneswar

MATERIALS PROCESSING

Ni-Co 2021: The 5th International Symposium on Nickel and Cobalt — Plenary

Sponsored by: The Metallurgy & Materials Society of the Canadian Institute of Mining, Metallurgy and Petroleum, TMS Extraction and Processing Division, TMS: Hydrometallurgy and Electrometallurgy Committee, TMS: Pyrometallurgy Committee

Program Organizers: Corby Anderson, Colorado School of Mines; Dean Gregurek, RHI Magnesita; Mari Lundström, Aalto University; Christina Meskers; Prabhat Tripathy, Batelle Energy Alliance (Idaho National Laboratory); Fiseha Tesfaye, Abo Akademi University; Yuanbo Zhang, Central South University; Sari Muinonen, Glencore; Corby Anderson, Colorado School of Mines; 1; 1Argonne National Laboratory; 2; 2University of Akron: Special Reference to the Former INCO Ltd and Falconbridge Ltd.

Monday AM March 15, 2021

8:30 AM Introductory Comments: Ni-Co 2021: The 5th International Symposium on Nickel and Cobalt: Corby Anderson; 1Colorado School of Mines

8:35 AM Introductory Comments: EPD Distinguished Lecture: Christina Meskers

8:40 AM Invited
EPD Distinguished Lecture: Ferronickel - Thermodynamics, Chemistry, and Economics: Rodney Jones; 1Mintek; University of the Witwatersrand; Pyro Consulting

9:10 AM Invited
“Around the Nickel World in Eighty Days” A Virtual Tour of World Nickel Sulphide and Laterite Operations and Technologies: Phillip Mackey; Ahmed Vahed; Tony Warner; 1Worley

9:40 AM Invited
A Review of Nickel Pyrometallurgy over the Past 50 Years with Special Reference to the Former INCO Ltd and Falconbridge Ltd.: A Vahed; Phillip Mackey; 1Anthony Warner; 1Worley

10:10 AM Invited
Establishing a Domestic Cobalt Supply Chain: Unlocking Challenging Feedstocks: Frank Santaguida; 1First Cobalt Corporation
10:30 AM Invited
Sustainable Developments in Nickel Recovery Process: John Quinn; Dennis Berger; Shijie Wang; Freeport McMoRan Mining; Rio Tinto Kennecott Utah Copper Corp

PHYSICAL METALLURGY

Phase Transformations and Microstructural Evolution — Modeling and Simulations

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Phase Transformations Committee

Program Organizers: Rongpei Shi, Lawrence Livermore National Laboratory; Yipeng Gao, Idaho National Laboratory; Fadi Abdeljawad, Clemson University; Bharat Gwalani, Pacific Northwest National Laboratory; Qian An, University of Nevada-Reno; Eric Lass, University of Tennessee-Knoxville; Huajing (Wilson) Song, Los Alamos National Laboratory

Monday AM March 15, 2021

Session Chair: Fadi Abdeljawad, Clemson University

8:30 AM
Burgers Circuit Analysis of Grain Boundary Junctions: Ian Winter; Robert Rudd; Tomas Oppelstrup; Timofey Frolov; Lawrence Livermore National Laboratory

8:50 AM
Electron-hole Carriers Induced Microstructure Evolution in Inorganic Semiconductors: Yidi Shen; Qi An; University of Nevada, Reno

9:10 AM
Image-driven Discriminative and Generative Machine Learning Algorithms for Establishing Microstructure-processing Relationships: Wufei Ma; Elizabeth Kautz; Arun Baskaran; Aritra Chowdhuri; Vineet Joshi; Bulent Yener; Daniel Lewis; Purdue University; Pacific Northwest National Laboratory; Rensselaer Polytechnic Institute; GE Research Center

9:30 AM
Structure and Local Environment of Intermetallic Precipitate Phase Nucleus: Deep Choudhuri; New Mexico Institute of Mining and Technology

9:50 AM
The Origin and Stability of Nanostructural Hierarchy in Nickel-base Superalloys: Subhastish Meher; Larry Aagesen; Tresa Pollock; Idaho National Laboratory; University of California Santa Barbara

10:10 AM
The Role of Grain Boundaries in Nanoscale Sintering: An Atomistic Simulation Study: Omar Hussein; Maher Alghalayini; Fadi Abdeljawad; Clemson University

10:30 AM
A Phase Field Modeling Study on Coupling of Compositional Patterning with Evolution of Grain Boundaries in Irradiated Binary Immiscible Alloys: Qun Li; Pascal Bellon; Robert Averback; University Of Illinois Urbana-Champaign

10:50 AM
Characterizing Evolution of Grain Boundary Network Structure during Anisotropic Grain Growth: Jose Nino; Oliver Johnson; Brigham Young University

11:10 AM
Investigating the Microstructural Evolution of Cylindrical Interfaces: Anqi Qiu; Ian Chesser; Elizabeth Holm; Carnegie Mellon University

MATERIALS PROCESSING

Phonons, Electrons and Dislons: Exploring the Relationships Between Plastic Deformation and Heat — Session I

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Shaping and Forming Committee

Program Organizers: Aashish Rohatgi, Pacific Northwest National Laboratory; Sean Agnew, University of Virginia; Thomas Bieler, Michigan State University

Monday AM March 15, 2021

Session Chairs: Aashish Rohatgi, Pacific Northwest National Lab; Sean Agnew, University of Virginia; Thomas Bieler, Michigan State University

8:30 AM

8:35 AM Invited
Introduction to Dislons: A Quantized Description of Dislocations with Implications for Thermal and Electrical Transport: Mingda Li; Massachusetts Institute of Technology

8:55 AM
Inelastic Neutron Scattering Investigation of the Phonon Spectra of Dislocated Nb Crystals: Sean Agnew; Thomas Bieler; Matthew Stone; University of Virginia; Michigan State University; Oak Ridge National Laboratory

9:15 AM Invited
Dislocation-limited Thermal Transport in III-Nitride Materials: Lucas Lindsay; Hongkun Li; Wiley Hands; Carlos Polanco; Andreas Zeidler; Gregor Koblmuller; Yee Kan Koh; Oak Ridge National Laboratory; National University of Singapore; Technical University of Munich

9:35 AM
Role of Tantalum Concentration and Processing Temperature on High Strain Rate Phonon Behavior in Copper-tantalum Alloys: Sounarya Srinivasan; Scott Turnage; Billy Hornbuckle; Chaltanya Kale; Kris Darling; Kiran Solanki; Arizona State University; Army Research Laboratory

9:55 AM Invited
Dislocation Drag in Metals: Dependence on Velocity, Temperature, Density, and Crystal Geometry, and Its Effect on Material Response: Daniel Blaschke; Leonid Burakovskiy; Abigail Hunter; Darby J. Luscher; Dean L. Preston; Los Alamos National Laboratory

10:15 AM
The Effects of Heating Rate on Defect Reduction by Recrystallization in Deformed Polycrystal Niobium: E. Nicometo; Z. Thune; C. Edge; T. Bieler; Michigan State University
NANOSTRUCTURED MATERIALS

Plasmonics in Nanocomposite Materials — From Theory to Application Session I

Sponsored by: TMS Structural Materials Division, TMS: Composite Materials Committee

Program Organizers: Nasrin Hooshmand, Georgia Institute of Technology; Simona Hunyadi Murph, Savannah River National Laboratory; Mahmoud Abdelwahed, The University of Texas at San Antonio

Monday AM  March 15, 2021

Session Chair: Nasrin Hooshmand, Georgia Institute of Technology

8:30 AM Keynote
Gold and Au/Ni and Other Plasmonic Nanoparticles: Using Theory to Understand Metal Recovery and Optical Properties: George Schatz1; 1Northwestern University

9:15 AM Invited
Anisotropic and Shape-selective Plasmonic Nanomaterials: Structure-property Relationships: Simona Hunyadi Murph1; 1Savannah River National Laboratory

9:45 AM Invited
Nanophotonics for Neural Engineering: David Garfield1; Emory Chan1; Peter Schuck1; Michel Maharbiz2; Maysam Chamanzar2; 1The Molecular Foundry, Lawrence Berkeley National Laboratory; 2Carnegie Mellon University

10:05 AM Invited
Understanding Photocarrier and Gas Dynamics to Rationally Design Nano-heterostructured Photocatalysts for CO2 Conversion: Anthony Thompson1; 1Savannah River National Laboratory

ENERGY & ENVIRONMENT

Powder Materials for Energy Applications — Metal Powder Materials

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Powder Materials Committee

Program Organizers: Kathy Lu, Virginia Polytechnic Institute and State University; Eugene Olevsky, San Diego State University; Hang Yu, Virginia Polytechnic Institute and State University; Ruigang Wang, The University of Alabama; Isabella Van Rooyen, Idaho National Laboratory

Monday AM  March 15, 2021

Session Chair: Hang Yu, Virginia Polytechnic Institute and State University; Ruigang Wang, The University of Alabama

8:30 AM Introductory Comments: Powder Materials for Energy Applications: Kathy Lu1; 1Virginia Polytechnic Institute and State University

8:35 AM Development of Gas Atomization Processes for Production of Passivated Calcium Powders: Jordan Tiarks1; Dustin Hickman1; Trevor Riedemann1; Iver Anderson1; 1Ames Laboratory; 2Iowa State University

8:55 AM Utilizing Solid-state Grain Alignment to Bias Abnormal Grain Growth in Strategically Designed Alnico Alloys: Emily Rinko1; Timothy Prost1; Emma White3; Iver Anderson3; 1Iowa State University; 2Ames Laboratory; 3Iowa State University

9:15 AM Invited
Wear Resistant Powder Materials for Energy Applications: Paul Prichard1; Matthew Yao2; 1Kennametal Inc.

9:45 AM Conformal Coating of Powders by Physical Vapor Deposition: Jonathan Priedeman1; Gregory Thompson1; 1University of Alabama

MATERIALS DESIGN

Practical Tools for Integration and Analysis in Materials Engineering — Session I

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS Structural Materials Division, TMS: Titanium Committee, TMS: Computational Materials Science and Engineering Committee, TMS: Integrated Computational Materials Engineering Committee

Program Organizers: Adam Pilchak, US Air Force Research Laboratory; Michael Gram, Titanium Metals Corporation; William Joost; Raymundo Arroyave, Texas A&M University; Charles Ward, AFRL/RXM

Monday AM  March 15, 2021

8:30 AM Introductory Comments: Practical Tools for Integration and Analysis in Materials Engineering: Adam Pilchak1; 1US Air Force Research Laboratory

8:35 AM Invited
Accelerated Tools for Disordered-materials Discovery: Stefano Curtarolo1; 1Duke University

9:05 AM Calculation of First Principles Based Thermodynamic and Kinetic Materials Properties Using CASM: Brian Puchala1; John Thomas2; John Goiri3; Anton Van der Ven3; 1University of Michigan; 2University of California, Santa Barbara

9:25 AM A Framework for Closed-loop Materials Design Using Density Functional Theory: Vinay Hegde1; Kevin Williams1; Travis Ludlum2; Maxwell Hutchinson2; Eric Lundberg2; Bryce Meredith1; 1Citrine Informatics

9:45 AM Batch Reification Fusion Optimization (BAREFOOT) Framework: Richard Couperthwaite1; Danial Khatamsaz1; Abhilash Mokkeri2; Douglas Allaire1; Ankit Srivastava1; Raymundo Arroyave1; 1Texas A&M University

10:05 AM Invited
Microstructural Modeling with FiPy: Jonathan Guyer1; Daniel Wheeler1; James Warren1; 1National Institute of Standards & Technology; 2National Institute of Standards and Technology

10:35 AM A Private Ledger Architecture Tailored for Secure Workflow Management in Additive Manufacturing Facilities: Evan Diewald1; Jack Beuth1; 1Carnegie Mellon University

10:55 AM Invited
LAMMPS as a Tool in Materials Modeling Workflows: Steve Plimpton1; Aidan Thompson1; Mitch Wood2; 1Sandia National Laboratories; 2Sandia National Labs
The Materials Commons 2.0: A Collaboration Platform and Information Repository for the Global Materials Community: Brian Puchala; Glenn Tarcea; Tracy Berman; John Allison; University of Michigan

MATERIALS PROCESSING

Rare Metal Extraction & Processing — Li, Co, Ni

Sponsored by: TMS Extraction and Processing Division, TMS: Hydrometallurgy and Electrometallurgy Committee

Program Organizers: Gisele Azimi, University of Toronto; Takanari Ouchi, The University of Tokyo; Kerstin Forsberg, KTH Royal Institute of Technology; Hojong Kim, Pennsylvania State University; Shafiq Alam, University of Saskatchewan; Alafara Baba, University of Ilorin; Neale Neelameggham, IND LLC

Monday AM March 15, 2021

8:30 AM Introductory Comments: Rare Metal Extraction & Processing: Gisele Azimi; University of Toronto

8:35 AM Keynote Scenarios of Future Lithium Use, 2021-2040: Roderick Eggert; Colorado School of Mines

8:55 AM Invited The Importance of Spodumene Decrepitation on the Lithium Sulfate Extraction: Colin Dessemond; Gervais Soucy; Université de Sherbrooke

9:15 AM Application of Eutectic Freeze Crystallization in Recycling of Li-ion Batteries: Yiqian Ma; Michael Svärd; James Gardner; Richard Olsson; Kerstin Forsberg; KTH - Royal Institute of Technology

9:35 AM Invited Selective Separation of Co and Ni from REE in Recycling: Gulaim Seisenbaeva; Ani Vardanyan; Swedish University of Agricultural Sciences; Swedish University of Agricultural Sciences

9:55 AM Recovery of Valuable Metals from End-of-life Lithium-ion Battery Using Electro dialysis: Ka Ho Chan; Monu Malik; Gisele Azimi; University of Toronto

10:15 AM Lithium Adsorption Mechanism for Li2TiO3: Raja Shekhar Marthi; York Smith; University of Utah

10:35 AM Study on the Production of Lithium by Aluminothermic Reduction Method: Huimin Lu; Neale Neelameggham; Beihang University; IND LLC

10:55 AM Invited Effect of Synthesis Method on the Electrochemical Performance of LiNi0.5Mn1.5O4 (NMC) Cathode for Li-ion Batteries: A Review: Monu Malik; Ka Ho Chan; Gisele Azimi; University of Toronto

LIGHT METALS

Sustainability in the Aluminum Supply Chain: Joint Session — Keynote Session

Sponsored by: TMS Light Metals Division, TMS: Aluminum Committee

Program Organizer: Les Edwards, Rain Carbon Inc.

Monday AM March 15, 2021

8:30 AM Introductory Comments: Sustainability in the Aluminum Supply Chain: Linus Perander; Rain Carbon Inc.

8:35 AM Introductory Comments: Sustainability in the Aluminum Supply Chain: Les Edwards; Rain Carbon Inc.

8:40 AM Invited Long Term Sustainability of the Aluminium Sector: Pernelle Nunez; International Aluminium Institute

9:05 AM Invited Near Zero-waste and Near Break-even: A Path towards Sustainable Bauxite Processing: Efthymios Balomenos; Mytilineos SA

9:30 AM Invited Alumina in a More Sustainable World: Andrew Furlong; Worley


10:20 AM Invited Hydro’s Approach to Sustainability: Hans Erik Vatne; Hydro

10:45 AM Invited Aluminium Production: A Pathway to Zero Carbon by 2050: Mark Dorreen; EnPot Limited

11:10 AM Invited The Aluminium Stewardship Initiative (ASI): Implementation and Impact: Fiona Solomon; Marieke van der Mijn; Aluminium Stewardship Initiative

11:35 AM Question and Answer Period
NANOSTRUCTURED MATERIALS

100 Years and Still Cracking: A Griffith Fracture Symposium — Fracture and Dislocations

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Nanomechanical Materials Behavior Committee

**Program Organizers:** Megan Cordill, Erich Schmid Institute of Materials Science; William Gerberich, University of Minnesota; David Bahr, Purdue University; Christopher Schuh, Massachusetts Institute of Technology; Daniel Kiener, Montanuniversität Leoben; Neville Moody; Nathan Mara, University of Minnesota; Erica Lichteodden, Helmholtz-Zentrum Geesthacht

Monday PM March 15, 2021

**Session Chair:** Daniel Kiener, Montanuniversität Leoben

12:00 PM Invited
The Role of Fracture in the Reduction of Iron Ore with Hydrogen: Dierk Raabe1; 1Max-Planck Institute

2:00 PM Invited
Dislocation Pathways in Refractory Multi-principal Element Alloys: Fulin Wang1; Glenn Balbus2; Shouzhi Xu1; Yanqing Su1; Jungho Shin1; Paul Rottmann3; Keith Knipling4; Jean-Charles Stinville1; Leah Mills1; Oleg Senkov5; Irene Beyerlein1; Tresa Pollock1; Daniel Gianola1; 1University of California, Santa Barbara; 2Utah State University; 3University of Kentucky; 4U. S. Naval Research Laboratory

2:40 PM Invited
Dislocation Processes in Fracture and Toughening Mechanisms of UFG bcc Metals at Room Temperature: Inas Issa1; Anton Hohenwarter2; Jakub Zálešák1; Daniel Kiener1; 1Montanuniversität Leoben, Austria; 2Montanuniversität Leoben, Austria

3:00 PM Invited
In Situ Observations and Measurements of Local Plastic Deformation and Fracture with 4D-STEM: Yang Yang1; Tom Pekin1; Ruopeng Zhang1; Shihteng Zhao2; Qin Yu2; Sheng Yin2; Colin Ophus2; Mark Asta2; Robert Ritchie2; Andrew Minor2; 1Lawrence Berkeley National Laboratory; 2Humboldt University, Berlin; 3University of California, Berkeley and Lawrence Berkeley National Laboratory

4:00 PM Invited
Imaging the Chemo-mechanical Coupled Fracture in Metal Passivation Layer by In-situ TEM: Yang Yang1; Akihiro Kushima1; Huolin Xin1; Peter Hosemann1; Ji Li1; Lawrence Berkeley National Laboratory; 1University of California, Irvine; 2University of California, Berkeley; 3Massachusetts Institute of Technology

ADDITIVE TECHNOLOGIES

Additive Manufacturing Fatigue and Fracture V: Processing-Structure-Property Investigations and Application to Qualification — Titanium and Steel

Sponsored by: TMS Structural Materials Division, TMS: Additive Manufacturing Committee, TMS: Mechanical Behavior of Materials Committee

**Program Organizers:** Nik Hrabe, National Institute of Standards and Technology; John Lewandowski, Case Western Reserve University; Nima Shamsaei, Auburn University; Mohsen Seifi, ASTM International/Case Western Reserve University; Steve Daniewicz, University of Alabama

Monday PM March 15, 2021

**Session Chair:** John Lewandowski, Case Western Reserve University

12:00 PM Invited
Strain Accumulation during Fatigue and Fracture of Additively Manufactured Ti6Al4V: Experiments and Simulations: Raymundo Muro-Barrios1; Raeann VanSickle1; Huck Beng Chew1; John Lambros1; 1University of Illinois

2:00 PM Invited
Effect of Defects on Stress State Dependent Fracture of Additively Manufactured Metals: Allison Beese1; 1Pennsylvania State University

2:30 PM Invited
Structure-property Relationships to Explain the Elasto-plastic Anisotropy of Additively Manufactured Metal Alloys: Hunter Macdonald1; Jishnu Battacharyya2; Md Shamsujjoha1; Sean Agnew1; 1University of Virginia

3:10 PM Invited
Design of Fatigue Resistant Additive Manufactured Austenitic Stainless Steels: Jonathan Pegues1; Seunjongj Lee1; Theron Rodgers1; David Siaz1; Shaun Whetten1; Andrew Kustas1; Michael Roach1; Nima Shamsaei1; 2Sandia National Laboratories; 3Auburn University; 4University of Mississippi Medical Center

3:40 PM Invited
Progressive Amplitude Fatigue Performance of Additively Manufactured Stainless Steel Superalloy: Sanna Siddiqui1; Krystal Rivera1; Isha Ruiz-Candelario1; Ali Gordon1; 1Florida Polytechnic University; 2University of Central Florida

SPECIAL TOPICS

2021 TMS Special Sessions — SMD/FMD Awards Ceremony & Special Lecture

Monday PM March 15, 2021

12:00 PM
FMD Awards Ceremony: Paul Ohodnicki1; 1University of Pittsburgh

12:15 PM
SMD Awards Ceremony & Introduction of Special Lecturer: Daniel Miracle1; 1Air Force Research Laboratory
ADDITIVE TECHNOLOGIES

Additive Manufacturing for Energy Applications III — Additive Manufacturing Processing

**Sponsored by:** TMS Structural Materials Division, TMS: Additive Manufacturing Committee, TMS: Nuclear Materials Committee

**Program Organizers:** Isabella Van Rooyen, Idaho National Laboratory; Indrajit Charit, University of Idaho; Subhashish Meher, Idaho National Laboratory; Michael Kirk, Oak Ridge National Laboratory; Kumar Sridharan, University of Wisconsin-Madison; Xiaoyuan Lou, Auburn University

**Session Chair:** Indrajit Charit, University of Idaho

**Monday PM** | **March 15, 2021**

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Authors</th>
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<tbody>
<tr>
<td>2:00 PM</td>
<td>Invited</td>
<td><strong>Metal Additive Manufacturing for Energy Industries:</strong> Edward Herderich1; Ohio State University</td>
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<tr>
<td>2:20 PM</td>
<td>Invited</td>
<td><strong>Laser Powder Bed Fusion of Grade 300 Maraging Steel for Tooling Applications:</strong> Peeush Mandavale1; Rangasayee Kannan1; Donovan Leonard2; Derek Siddel1; Chase Joslin1; Ryan Dehoff1; Oak Ridge National Laboratory</td>
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<tr>
<td>2:40 PM</td>
<td><strong>Additive Manufacturing of Zr-modified Aluminum Alloy 6061 by Laser-powder Bed Fusion:</strong> Abhishek Mehta1; Le Zhou1; Holden Hyer1; Thinh Huynh1; Sharon Park1; Devin Imholte2; Nicolas Woolstenhulme3; Daniel Wachs1; Yongho Sohn1; University of Central Florida; Idaho National Laboratory</td>
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<tr>
<td>3:00 PM</td>
<td><strong>Harnessing a High Energy, Superconducting Electron Beam for Additive and Far-from-Equilibrium Manufacturing</strong></td>
<td>Adam Duzike1; Justin Hill1; Mainstream Engineering Corporation</td>
</tr>
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<td>3:20 PM</td>
<td>Invited</td>
<td><strong>Novel Aspects of multi-Wire Arc Additive Manufacturing for Large Component Fabrication for Extreme Environments and New Alloy Discovery:</strong> Thomas Lillo1; Nathan Huft1; Denis Clark2; Michael Glazoff3; Joel Simpson1; Idaho National Lab; DEClark Welding Engineering, PLLC</td>
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<td>3:40 PM</td>
<td><strong>Efficient Production of a High-performance Dispersion Strengthened, Multi-principal Element Alloy</strong></td>
<td>Timothy Smith1; Aaron Thompson1; Timothy Gabb1; Christopher Kantzos1; NASA Glenn Research Center</td>
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<td>4:00 PM</td>
<td><strong>Investigation of the Effect of Laser Energy Density on Properties of Additively Manufactured Tungsten Lattices</strong></td>
<td>Carly Rombes1; Omar Mireles2; James Stubbs1; University of Illinois at Urbana-Champaign; NASA Marshall Space Flight Center</td>
</tr>
<tr>
<td>4:20 PM</td>
<td><strong>Toward Part Qualification: Thermal Signature Analysis Using Wavelet Transform in Metal Additive Manufacturing</strong></td>
<td>Sujana Chandrasekhar1; Jamie Coble1; Amy Godfrey1; Serena Beauchamp1; Fred List2; Vincent Paquit2; Sudarsanam Babu1; University of Tennessee; Oak Ridge National Laboratory</td>
</tr>
<tr>
<td>4:40 PM</td>
<td><strong>Effective Thermal Conductivity of Additively Manufactured Metal Matrix Composite</strong></td>
<td>Soehre Mzebbobe1; Venkata Vinay Krishna Doddapangan1; Kijoon Lee1; Sriram Manoharan1; Chih-hung Chang2; Brian K. Paul1; Somayeh Paseban1; Oregon State University</td>
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ADDITIVE TECHNOLOGIES

Additive Manufacturing of Metals: Applications of Solidification Fundamentals — Micro-scale Modeling

**Sponsored by:** TMS Materials Processing and Manufacturing Division, TMS: Additive Manufacturing Committee, TMS: Solidification Committee

**Program Organizers:** Alex Plotkowski, Oak Ridge National Laboratory; Lang Yuan, University of South Carolina; Kevin Chaput, Northrop Grumman; Mohsen Asle Zaeem, Colorado School of Mines; Wenda Tan, University of Utah; Lianyi Chen, University of Wisconsin-Madison

**Session Chairs:** Lianyi Chen, University of Wisconsin; Wenda Tan, University of Utah

**Monday PM** | **March 15, 2021**

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<tr>
<th>Time</th>
<th>Title</th>
<th>Authors</th>
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<tbody>
<tr>
<td>2:00 PM</td>
<td><strong>3D Analysis of Grain Morphologies and Solidification Texture in AM 316L</strong></td>
<td>David Rowenhorst1; Naval Research Laboratory</td>
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<tr>
<td>2:20 PM</td>
<td><strong>A Multi-scale Modeling Approach to Microstructure Prediction for Powder Bed Fusion Additive Manufacturing Processes Through Phase Field and Cellular Automata Methods:</strong> Daniel Dreljan1; Abdur Rahman Al Azad1; Alojz Ivankovic1; Philip Cardiff2; David Browne3; University College Dublin</td>
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<tr>
<td>2:40 PM</td>
<td><strong>CA Model Sensitivity to Material Parameters, Nucleation, and Thermal Conditions Across AM Process Space</strong></td>
<td>Matthew Rolchigo1; Alex Plotkowski1; John Coleman1; Jim Belak1; Lawrence Livermore National Laboratory; Oak Ridge National Laboratory</td>
</tr>
<tr>
<td>3:00 PM</td>
<td><strong>Controlling Additive Manufacturing Processes with Magnetic Fields</strong></td>
<td>Andrew Koo1; Teddy Gan1; Xianqiang Fan2; Catherine Tonry3; Ivars Krastins3; Peter Lee4; Kouls Pericles1; University of Greenwich; UCL; University of Latvia</td>
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<td>3:20 PM</td>
<td><strong>Optimizing and Validating the Cellular Automata Finite Element Model for Additive Manufacturing</strong></td>
<td>Kirubel Tefera1; David Rowenhorst1; United States Naval Research Laboratory</td>
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<td>3:40 PM</td>
<td><strong>Prediction of Columnar-to-equiaxed Transition in Single Tracks during Laser Powder Bed Fusion Additive Manufacturing</strong></td>
<td>Lang Yuan1; Adrian Sabau2; David StJohn3; Arvind Prasad2; Peter Lee4; University of South Carolina; Oak Ridge National Laboratory; The University of Queensland; University College London</td>
</tr>
<tr>
<td>4:00 PM</td>
<td><strong>Effect of Kinetic Anisotropy on Microstructure Development during Simulated Powder Bed Fusion of 316L Stainless Steel</strong></td>
<td>Alexander Chadwick1; Peter Voorhees1; Northwestern University</td>
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<td>4:20 PM</td>
<td><strong>Microstructure Prediction Framework for Additively Manufactured Metals</strong></td>
<td>Andrew Polonsky1; Narendran Raghavan2; McLean Echlin3; Michael Kirkga; Ryan Dehoff1; Jonathan Madison1; Tresa Pollock3; Sandia National Laboratories; Oak Ridge National Laboratory; University of California, Santa Barbara</td>
</tr>
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ADDITIVE TECHNOLOGIES

Additive Manufacturing: Materials Design and Alloy Development III -- Super Materials and Extreme Environments — Light Weight Materials

**Sponsored by:** TMS Materials Processing and Manufacturing Division, TMS: Additive Manufacturing Committee

**Program Organizers:** Behrang Poororganji, University of Waterloo; Hunter Martin, HRL Laboratories LLC; James Saal, Citrine Informatics; Orlando Rios, Oak Ridge National Laboratory; Atieh Moridi, Cornell University; Jiadong Gong, Questek Innovations LLC

**Monday PM**

**Session Chair:** Hunter Martin, HRL

**March 15, 2021**

2:00 PM  Invited Presentation

Architected Interpenetrating Structures with Tailorable Energy Absorption in Tension: Zachary Cordero1; 1Massachusetts Institute of Technology

2:30 PM

Al-Cu-Zn-Mg Alloy for Additive Manufacturing by Electron Beam Deposition: Marcia Domack1; Cecilia Mulvaney2; Christopher Domack3; Brandon Bodily4; Karen Taminger5; 1NASA Langley Research Center; 2University of Virginia; 3Analytical Mechanical Associates; 4Arcconic Technology Center

2:50 PM

Development of High Strength and/or Corrosion-resistant Alloys with High Printability: Le Zhou1; Holden Hyer2; Abhishek Mehta3; Sharon Park4; Thinh Huynh5; Brandon McWilliams6; Kyu Cho7; Yongho Sohn2; 1Marquette University; 2University of Central Florida; 3CCDC Army Research Laboratory

3:10 PM

Ability of Creation of Aluminium Alloys with High Heat Conductivity Suitable for 3D Printing: Mann Viktor1; Krokhin leksandr1; Vakhromov Roman2; Ryabov Dmitriy3; Mikhailov Ivan4; Kirill Nyaza5; Grol Mariya6; 1RUSSIAN Aluminum Management; 2Light Materials and Technologies Institute RUSAL Management

3:30 PM

High Strength WE43 Microlattices Manufactured by Laser Powder Bed Fusion: Holden Hyer1; Qingyang Liu1; Le Zhou1; Dazhong Wu1; Shutao Song2; Yuanli Bai3; Brandon McWilliams4; Kyu Cho5; Yongho Sohn6; 1University of Central Florida; 2CCDC Army Research Laboratory

CHARACTERIZATION

Advanced Characterization Techniques for Quantifying and Modeling Deformation — Session II

**Sponsored by:** TMS Extraction and Processing Division, TMS Materials Processing and Manufacturing Division, TMS Structural Materials Division, TMS: Advanced Characterization, Testing, and Simulation Committee, TMS: Materials Characterization Committee

**Program Organizers:** Rodney McCabe, Los Alamos National Laboratory; Marko Knezevic, University of New Hampshire; Irene Beyerlein, University of California-Santa Barbara; Wolfgang Pantleon, Technical University of Denmark; C. Tasan, Massachusetts Institute of Technology; Arul Kumar Mariyappan, Los Alamos National Laboratory; Olivia Underwood, Sandia National Laboratories

**Monday PM**

**March 15, 2021**

2:00 PM

3D Maps of Geometrically Necessary Dislocations in Shock-loaded Polycrystalline Tantalum: Wyatt Witten1; Toby Francis2; Tresa Pollock3; Irene Beyerlein1; 1University of California Santa Barbara

2:20 PM

Dislocation Imaging by Precession Electron Diffraction: Dexin Zhao1; Kelvin Xie2; 1Texas A&M University

2:40 PM

On the Mechanistic Origins of Maximum Strength in Nanocrystalline Materials: Ankit Gupta1; Gregory Thompson2; Garritt Tucker3; 1Colorado School of Mines; 2University of Alabama

3:00 PM

Grain Boundary Slip Transfer Classification and Metric Selection with Artificial Neural Networks: Zhaowen Zhao1; Thomas Bieler1; Javier LLorca2; Philip Eisenlohr3; 1Michigan State University; 2IMDEA Materials Institute

3:20 PM

High Resolution Characterization of Dislocations Using Weak Beam Dark Field Scanning Transmission Electron Microscopy: Jiaish Miao1; 1Ohio State University

3:40 PM

Revisiting the Origin of Indentation Size Effect at Sub-micrometer Scales: Xiaolong Ma1; Wesley Higgins2; Zhiyuan Liang3; Dexin Zhao4; George Pharr5; Kelvin Xie6; 1Pacific Northwest National Laboratory; 2Texas A&M University

4:00 PM

Critical Resolved Shear Stresses (CRSS) of Hexagonal Titanium from Nanoindentation Optimization: Zhaowen Zhao1; Mario Ruiz2; Jiawei Lu1; Miguel Monclus3; Jon Molina-Aldareguia4; Thomas Bieler1; Philip Eisenlohr3; 1Michigan State University; 2IMDEA Materials Institute

4:20 PM

Spatial Localization of Dislocation Avalanches in Microplasticity of a High-entropy Alloy: Quentin Rizzardi1; Robert Maass2;

1University of Illinois at Urbana-Champaign
ADVANCED MATERIALS

Advanced High Strength Steels V — Session II

Sponsored by: TMS Structural Materials Division, TMS: Steels Committee

Program Organizers: Ana Luisa Araujo, CBMM North America Inc.; Louis Hector, General Motors Global Technical Center; Igor Vieira, Nucor Steel; Lijia Zhao, ArcelorMittal USA; Krista Limmer, CCDC Army Research Laboratory; Jonah Klemm-Toole, Colorado School of Mines; Sebastien Allain, Institut Jean Lamour; MingXin Huang, University of Hong Kong

Monday PM March 15, 2021

2:00 PM
Cryogenic Tensile and Microstructural Behaviors of High Manganese Steel Welds: Myeonghwan Choi1; Junghoon Lee1; Hyunbin Nam1; Namhyun Kang1; Myunghyun Kim1; Daewon Cho2; 1Pusan National University; 2Korea Institute of Machinery and Materials

2:20 PM
Effects of V and Mo Additions on the Suppression of HAZ Softening of Friction Stir Welded Si-Mn Martensitic Steel: Zexi Wu1; Kohsaku Ushioda1; Hidetoshi Fujii1; 1Joining and Welding Research Institute, Osaka University

2:40 PM
Microstructural Characterization of Fracture in Fe-10 pct Ni Gas Metal Arc Welds: Richard Baumer2; Daniel Bechetti2; Matthew Sinfield2; 1LeTourneau University; 2Naval Surface Warfare Center, Carderock Division

3:00 PM
Use of Physical Simulations for Accelerated Welding Procedure Development in Supermartensitic Stainless Steels: Reed Phillips3; Ezequiel Pessoa4; Richard Baumer2; 3LeTourneau University

3:20 PM
Use of Thermo-mechanical Simulation to Assess Liquid Metal Embrittlement (LME) in Zinc Coated Advanced High Strength Steels: Kaleb Ponder1; Dean Sage2; Carolin Fink3; Hassan Ghassemi-Armaki4; Michael Karagoulis5; Antonio Ramirez6; 1Ohio State University; 2ArcelorMittal Global R&D - East Chicago, East Chicago, IN, USA; 3Retired - General Motors; 4Purdue University; 5University of North Dakota; 6Purdue University

3:40 PM
Revisit the Slow Strain Rate Test for Hydrogen Embrittlement of Press-hardened Steel: Zuoheng Cao1; MingXin Huang1; 1University of Hong Kong

4:00 PM
Methods for Improving the Hydrogen Embrittlement Resistance in Press-hardened Steel: Zuoheng Cao1; Xiaochuan Xiong2; MingXin Huang1; 1University of Hong Kong; 2Ironovation (Suzhou) Materials Technology

ENERGY & ENVIRONMENT

Advanced Materials for Energy Conversion and Storage VII — Sustainability Materials

Sponsored by: TMS Functional Materials Division, TMS: Energy Conversion and Storage Committee

Program Organizers: Jung Pyung Choi, Pacific Northwest National Laboratory; Soumendra Basu, Boston University; Amit Pandey, Lockheed Martin Space; Paul Ohodnicki, University of Pittsburgh; Kyle Brinkman, Clemson University; Partha Mukherjee, Purdue University; Surojit Gupta, University of North Dakota

Monday PM March 15, 2021

Session Chairs: Surojit Gupta, University of North Dakota; Monu Malik, University of Toronto

2:00 PM
Design of Novel Agriculture-based Materials by Using Principles of Circular Economy: Surojit Gupta1; 1University of North Dakota

2:30 PM
Aluminum-ion Battery Made of AlCl3-Trimethylamine Hydrochloride Ionic Liquid with Superior Performance: Kok Long Ng1; Tony Dong1; John Anawati2; Gisele Azimi1; 1University of Toronto

2:50 PM
High Performing Vertically Aligned Graphene/Metal Oxide on Carbon Fiber Composite Electrodes for Wearable Supercapacitors and Strength Applications: Deepak Pandey1; Kowsik Sambath Kumar1; Jayan Thomas5; 1University of Central Florida

3:10 PM
Investigation of Cost-effective AlCl3-urea Ionic Liquid Analog for Al-ion Batteries: Monu Malik1; Kok Long Ng1; Gisele Azimi1; 1University of Toronto

3:30 PM
Morphology Evolution and Interface Instability of Sodium Metal Electrodes: Susmita Sarkar1; Partha Mukherjee2; 1Purdue University; 2Purdue University
CHARACTERIZATION

Advanced Real Time Imaging — Iron & Steelmaking

**Sponsored by:** TMS Functional Materials Division, TMS Structural Materials Division, TMS: Advanced Characterization, Testing, and Simulation Committee, TMS: Alloy Phases Committee, TMS: Biomaterials Committee

**Program Organizers:** Jinchiro Nakano, US Department of Energy National Energy Technology Laboratory; David Alman, National Energy Technology Laboratory; Il Sohn, Yonsei University; Hiroyuki Shibata, Imram, Tohoku University; Antoine Allanore, Massachusetts Institute of Technology; Noritaka Salto, Kyushu University; Anna Nakano, US Department of Energy National Energy Technology Laboratory; Zuotai Zhang, Southern University of Science and Technology; Candan Tamerler, University of Kansas; Bryan Webler, Carnegie Mellon University; Wangzhong Mu, KTH Royal Institute of Technology; David Veysset, Stanford University

**Monday PM**

**Session Chairs:** Il Sohn, Yonsei University; Jinchiro Nakano, USDOE National Energy Technology Laboratory

**Monday PM March 15, 2021**

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<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Presenters</th>
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<tr>
<td>2:00 PM</td>
<td>In-situ Real Time Observation of Austenite Formation in Duplex Stainless Steels during Different Cooling Conditions: Wangzhong Mu1; Oscar Rova1; Sohei Sukenaga2; Hiroyuki Shibata2; Kth Royal Institute of Technology; IMRAM, Tohoku University</td>
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<td>2:20 PM</td>
<td>Dissolution Mechanism of Oxide Particles in Silicate Melt: A Theoretical Study Supported by In-situ Observation Experiment: Changji Xuan1; Wangzhong Mu2; Sandvik Machining Solutions AB; Kth Royal Institute of Technology</td>
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<td>2:40 PM</td>
<td>Direct Observation of Boron Nitride Dissolution in a Heat Resistant Martensitic Steel Using Confocal Scanning Laser Microscopy: Andrew (Drew) Huch1; Bryan Webler1; Carnegie Mellon University</td>
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<td>3:00 PM</td>
<td>Observation of Surface and Interfacial Phenomena at High Temperature: Masashi Nakamoto1; Osaka University</td>
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<td>3:20 PM</td>
<td>Wetting and Spreading Kinetics between Liquid CaO-SiO2 Slags and a Solid SiO2: Chaeyeon Yoo1; Jaewoo Myung2; Yongsug Chung3; Korea Polytechnic University</td>
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<td>3:40 PM</td>
<td>In-situ Quantitative Study of Heat Transfer Performance of Mold Flux by Using Double Hot Thermocouple Technology: Zhe Wang1; Guanghua Wen1; Wenbo Jiang1; Ping Tang1; Shuheng Huang1; Chongqing University</td>
<td></td>
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<tr>
<td>4:00 PM</td>
<td>In-situ Observation of Interfacial Phenomena between Magnetite and Matte at High Temperature by a Novel Optical Microscopic Technique: Seung-Hwan Shin1; Sakiko Kawanishi1; Sohei Sukenaga2; Junichi Takahashi1; Hiroyuki Shibata2; Tohoku University; Sumitomo Metal Mining</td>
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BIOMATERIALS

Advances in Biomaterials for 3D Printing of Scaffolds and Tissues — Advances in Biomaterials for 3D Printing of Scaffolds and Tissues I

**Sponsored by:**

**Program Organizers:** Changxue Xu, Texas Tech University; Yifei Jin, University of Nevada, Reno; Zhengyi Zhang, Huazhong University of Science and Engineering; Jun Yin, Zhejiang University

**Monday PM March 15, 2021**

**Session Chairs:** Changxue Xu, Texas Tech University; Jun Yin, Zhejiang University

**Monday PM**

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<tr>
<th>Time</th>
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<tbody>
<tr>
<td>2:00 PM</td>
<td>A Bilayered GelMA/PEGDA-based Nerve Conduit with Supportive Cells for Peripheral Nerve Regeneration: Jingyi Liu1; Yun Yin2; Zhejiang University</td>
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<td>2:20 PM</td>
<td>A Novel Dual-layer Hydrogel/Cell Conduit Fabrication Method for Tissue Engineering: Xiaoxia Liu1; Jun Yin1; Zhejiang University</td>
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<td>2:40 PM</td>
<td>Design and Evaluations System for 3D-printed Dental Implants Based on Deep Neural Networks: Pei-Ching Kung1; Chai-Wei Hsu1; An-Cheng Yang1; Nan-Yow Chen1; National Chiao Tung University; National Center for High-performance Computing</td>
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<tr>
<td>3:00 PM</td>
<td>Mechanical Properties and Biodegradability of Porous Mg and Zn Scaffolds Fabricated by Power Bed Laser Fusion for Biomedical Applications: Muzi Li1; Felix Benn1; Thomas Derra2; Alexander Kopp2; Jon Molina-Aldareguia1; Javier Llorca2; IMDEA Materials Institute; Meotec; IMDEA Materials Institute &amp; Technical University of Madrid</td>
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<td>3:20 PM</td>
<td>Mechanical Properties and Biodegradability of Porous PLA/Mg and PLA/Zn Scaffolds Fabricated by Fused Filament Deposition for Biomedical Applications: Cristina Pascual1; Cillian Thompson1; Jimena de la Vega1; De-Yi Wang1; Carlos González2; Javier Llorca2; IMDEA Materials Institute; IMDEA Materials Institute &amp; Technical University of Madrid</td>
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<td>3:40 PM</td>
<td>Laser-based Powder-bed Fusion Strategies for the Fabrication of Cellular Scaffolds with a Fine Resolution: Ebrahim Asadi1; Fatemeh Hejripour1; Md Abdus Salam1; Faridreza Attarzadeh1; Lauren Priddy2; Gary Bowlin1; University of Memphis; Mississippi State University</td>
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MATERIALS PROCESSING

Advances in Powder and Ceramic Materials Science — Advanced Ceramics and Processes

Sponsored by: TMS Extraction and Processing Division, TMS Materials Processing and Manufacturing Division, TMS: Materials Characterization Committee, TMS: Powder Materials Committee

Program Organizers: Bowen Li, Michigan Technological University; Shefford Baker, Cornell University; Huazhang Zhai, Beijing Institute of Technology; Kathy Lu, Virginia Polytechnic Institute and State University; Rajiv Soman, Eurofins EAG Materials Science LLC; Faqin Dong, Southwest University of Science and Technology; Jinhong Li, China University of Geosciences (Beijing); Ruigang Wang, The University of Alabama; Eugene Olevsky, San Diego State University

Monday PM March 15, 2021

Session Chairs: Shefford Baker, Cornell University; Huazhang Zhai, Beijing Institute of Technology

2:00 PM Invited
Effect of Diamond Content and Modality on the Densification of Diamond Particulate Ceramic Composites by Hot-pressing: Jerry LaSalvia1; Anthony DiGiovanni2; Kristopher Behler3; CCDC Army Research Laboratory

2:25 PM
An Analysis on the Factors Affecting Oxidation Resistance of Silicon Containing Ultra High Temperature Borides Ceramics: Giuseppe Blanco Atrid4; Arvind Agarwal5; Cheng Zhang5; Ambreen Nisar6; 6Florida International University

2:50 PM
A Bayesian Optimization Framework for Exploring the Grain Boundary Manifold: Leila Khailil7; Owen Rettenmaier8; Srikanth Patala9; 9North Carolina State University

3:10 PM
Machine Learning for Predicting Grain Boundary Properties: Lingxiao Mu10; Elizabeth Holm11; 11Carnegie Mellon University

3:30 PM
Machine Learning Prediction of Defect Formation Energies: Vinut Sharma12; Pankaj Kumar13; Pratibha Dev14; Ghanshyam Pilania15; 15University of Tennessee Knoxville; 15Howard University; 15Los Alamos National Laboratory

3:50 PM
Accuracy, Uncertainty, Inspectability: The Benefits of Compositionally-restricted Attention-based Networks: Taylor Sparri5; Steven Kauwe16; Ryan Murdock17; Anthony Wang18; 18University of Utah; 18Technische Universitat Berlin

4:10 PM
A Probabilistic Approach with Built-in Uncertainty Quantification for the Calibration of a Superelastic Constitutive Model from Full-field Strain Data: Harshad Paranjape19; Kenneth Aycock20; Craig Bonsignore1; Jason Weaver1; Brent Craven2; Thomas Duerig2; 2Confluent Medical; 2U.S. Food and Drug Administration

4:30 PM
Uncertainty Quantification of Microstructures with a New Technique: Shape Moment Invariants: Arulmurugan Senthinathan21; Pinar Acar22; 22Virginia Tech

4:50 PM
Predicting Adsorption Energies and Surface Pourbaix Diagram of Metal NPs by GCNN Method: Kihoon Bang1; Younetae Park1; Donghun Kim1; Sang Soo Han2; Hyuck Mo Lee2; 2KAIST; 2KIST

MATERIALS DESIGN

AI/Data Informatics: Applications and Uncertainty Quantification at Atomistics and Mesoscales — Session II

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Computational Materials Science and Engineering Committee

Program Organizers: Kamal Choudhary, National Institute of Standards and Technology; Garvit Agarwal, Argonne National Laboratory; Wei Chen, Illinois Institute of Technology; Mitchell Wood, Sandia National Laboratories; Vahid Attari, Texas A&M University; Oliver Johnson, Brigham Young University; Richard Hennig, University of Florida

Monday PM March 15, 2021

Session Chairs: Vahid Attari, Texas A&M University; Wei Chen, Illinois Institute of Technology

2:00 PM
Uncertainty Quantification in Computational Thermodynamics - From the Atomistic to the Continuum Scale: Noah Paulson1; Joshua Gabriel1; Thien Duong1; Marius Stan1; 1Argonne National Laboratory

2:30 PM
Bayesian Inference and Uncertainty Quantification of Grain Boundary Properties: Sterling Baird2; Brandon Snow2; Alexia Bigelow2; David Fullwood3; Eric Homer3; Oliver Johnson; 3Brigham Young University

2:50 PM
An Analysis on the Turbulent Boundary Layer Forced by a Periodic Array of Axisymmetric Coanda Vortex Generators: H. M. Nisar4; J. M. Serafin4; 4Brown University

3:10 PM
A Bayesian Optimization Framework for Exploring the Grain Boundary Manifold: Leila Khailil7; Owen Rettenmaier8; Srikanth Patala9; 9North Carolina State University

3:30 PM
Machine Learning for Predicting Grain Boundary Properties: Lingxiao Mu10; Elizabeth Holm11; 11Carnegie Mellon University

3:50 PM
Accuracy, Uncertainty, Inspectability: The Benefits of Compositionally-restricted Attention-based Networks: Taylor Sparri5; Steven Kauwe16; Ryan Murdock17; Anthony Wang18; 18University of Utah; 18Technische Universitat Berlin

4:10 PM
A Probabilistic Approach with Built-in Uncertainty Quantification for the Calibration of a Superelastic Constitutive Model from Full-field Strain Data: Harshad Paranjape19; Kenneth Aycock20; Craig Bonsignore1; Jason Weaver1; Brent Craven2; Thomas Duerig2; 2Confluent Medical; 2U.S. Food and Drug Administration

4:30 PM
Uncertainty Quantification of Microstructures with a New Technique: Shape Moment Invariants: Arulmurugan Senthinathan21; Pinar Acar22; 22Virginia Tech

4:50 PM
Predicting Adsorption Energies and Surface Pourbaix Diagram of Metal NPs by GCNN Method: Kihoon Bang1; Younetae Park1; Donghun Kim1; Sang Soo Han2; Hyuck Mo Lee2; 2KAIST; 2KIST

MATERIALS DESIGN

Algorithm Development in Materials Science and Engineering — Machine Learning Algorithms and Computational Modeling for Study and Design Materials


Program Organizers: Mohsen Asle Zaeem, Colorado School of Mines; Mikhail Mendelev, KBR; Bryan Wong, University of California, Riverside; Ebrahim Asadi, University of Memphis; Garritt Tucker, Colorado School of Mines; Charudatta Phatak, Argonne National Laboratory; Bryce Meredig, Citrine Informatics

Monday PM March 15, 2021

Session Chairs: Bryan Wong, University of California, Riverside; Bryce Meredig, Citrine Informatics

2:00 PM Invited
Multi-Information Source Bayesian Optimization Applied to Materials Design: Raymundo Arroyave1; Danial Khatamsaz1; Richard Cooperthwaite2; Abhilash Mokeri1; Douglass Allaire2; Ankit Srivastava2; 2Texas A&M University

2:30 PM
Understanding Grain Boundary Metastability Using the SOAP Descriptor and Unsupervised Machine Learning Techniques: Lydia Serafin1; Derek Hensley2; Jay Spendlove3; Gus Hart4; Eric Homer1; 1Brigham Young University
2:50 PM
Grain Boundary Network Optimization through Human Computation and Machine Learning: Christopher Adair1; Oliver Johnson1; 1Brigham Young University

3:10 PM Invited
Deep Learning for Characterization of Deformation Induced Damage: Ulrich Kerzel1; Setareh Medghalchi1; Carl Kuschel2; Talal Al-Samman2; Sandra Korte-Kerzel1; 1iUBH; 2RWTH Aachen University

3:40 PM
Automatic Segmentation of Microstructures in Steel Using Machine Learning Methods. Hoheolt Kim1; Junya Ioue1; Tadashi Kasuya1; 1The University of Tokyo

4:00 PM
2D Microstructure Reconstruction for SEM via Non-local Patch-based Image Inpainting: Anh Tran1; Hoang Tran2; 1Sandia National Laboratories; 2Oak Ridge National Laboratory

4:20 PM Invited
AI-assisted Analysis of Flame Stability: Marius Stan1; Jessica Pani2; Noah Paulson1; Joseph Libera3; 1Argonne National Laboratory; 3Princeton University

4:50 PM
Neural Network Model of He Diffusion in W-based High Entropy Alloys: Gustavo Esteban-Manzanares1; Enrique Martínez1; Duc Nguyen1; Javier Llorca1; 1IMDEA Materials Institute; 2Los Alamos National Laboratory; 3IMDEA Materials Institute & Technical University of Madrid

5:10 PM
Comparison of Correction Schemes for Charged Point Defects in 2D Materials: Preston Vargas1; Anne Marie Tan1; Biswas Rijal1; Richard Hennig1; 1University of Florida

**ELECTRONIC MATERIALS**

**Alloys and Compounds for Thermoelectric and Solar Cell Applications IX — Session II**

**Sponsored by:** TMS Functional Materials Division, TMS Structural Materials Division, TMS: Alloy Phases Committee

**Program Organizers:** Hsin-Jay Wu, National Chiao Tung University; Sinn-wen Chen, National Tsing Hua University; Franck Gascoin, CNRS Crismat Unicaen; Philippe Jund, Montpellier University; Yoshisato Kimura, Tokyo Institute of Technology; Lan Li, Boise State University; Takao Mori, National Institute for Materials Science; Tiejun Zhu, Zhejiang University; Alexandra Zevalkink, Michigan State University; Wan-Ting Chiu, Tokyo Institute of Technology

**Monday PM** March 15, 2021

**Session Chairs:** Yi-Fen Tsai, National Chiao Tung University; Wan-Ting Yen, National Chiao Tung University

2:00 PM Invited
Challenges and Opportunities of Flexible Thermoelectric Devices Based on Printing Technology: Chien-Neng Liao1; 1National Tsing Hua University

2:20 PM Invited
Comparing Thermoelectricity of Bulk and Thin Film Heusler Alloys: Ernst Bauer1; 2B. Hinterleitner1; A. Riss1; M. Parzer1; F. Garrmoudi1; T. Mori1; X. Chen1; 1Technische Universität Wien; 2NIMS; 3Shenyang National Laboratory for Materials Science

2:40 PM
Optimizing Thermoelectric Properties of Few-layer Transition Metal Dichalcogenides: Tianhui Zhu1; Mona Zebarjadi1; 1University of Virginia

3:00 PM
Solid-state thermionic Devices: Effect of Asymmetry on the Device Performance. Md Golam Rosul1; Mona Zebarjadi1; 1University of Virginia

3:20 PM
Interfacial Reaction in Ag/Se, Ag/Te, Ag2Te/Se and Ag2Te/Se-30at.%Te Couples and Their Related Phase Diagram: Yohanes Hutaialian1; Sinn-wen Chen1; 1National Tsing Hua University

3:40 PM
Thermoelectric Cell Setup for Heat Recovery in Industrial Chimneys: Manuela Castañeda Montoya1; Andrés Amell Arrieta1; Henry Colorado1; 1Universidad de Antioquia

4:00 PM Invited
Impact of Surface Engineering in Silicon Film Thermoelectrics: Masahiro Nomura1; 1The University of Tokyo

4:20 PM Invited
Developing Thermoelectric Thin Films and Modules for IoT Energy Harvesting: Takao Mori1; 1National Institute for Materials Science

4:40 PM Invited
Thermomagnetic Transport in 2D Layered Topological Materials: Mona Zebarjadi1; Md. Sabbir Akhanda1; Emad Rezaei1; Md. Golam Rosul1; Keivan Esfarjani1; Albert Davydov1; Sergiy Krylyuk1; 1University of Virginia; 2NIST

5:00 PM Invited
Cu-Sn Based Thiospinel Compounds: Insight of Alternative Route for Developing Thermoelectrics Thiospinel Compounds?: Cédric Bourgès1; 1Nims

5:20 PM
First-principles Calculation of Nernst Coefficient and Magneto-Seebeck: Emad Rezaei1; Md. Sabbir Akhanda1; Keivan Esfarjani1; Mona Zebarjadi1; 1University of Virginia

**LIGHT METALS**

**Alumina and Bauxite — Process Optimization and Bauxite Enrichment**

**Sponsored by:** TMS Light Metals Division, TMS: Aluminum Committee

**Program Organizer:** Anne Duncan, Hatch

**Monday PM** March 15, 2021

2:00 PM
Introductory Comments: Alumina and Bauxite: Anne Duncan1; 1Hatch

2:05 PM Invited
Implementation of Digital Technologies in Alumina Refining: A Producer Experience: Vladimir Golubev1; Dmitry Mayorov1; Dmitry Chistyakov1; Evgeniy Fomichev1; Ilya Blednykh1; Andrey Panov1; 1RUSAL Engineering and Technological Center

2:40 PM
The Application of Intelligent Control to Red Mud Settling and Washing in Alumina Refinery: Yuehua Jiang1; Jinlong Tian1; Zhengyong Zhang1; 1Shenyang Aluminium and Magnesium Engineering and Research Institute Co., Ltd
3:00 PM
Alumina Refinery Volume Control: Thiago Franco; 1CBA

LIGHT METALS

Aluminum Alloys, Processing and Characterization — Alloy and MMC Development

Sponsored by: TMS Light Metals Division, TMS: Aluminum Committee

Program Organizer: Dimitry Sediako, University of British Columbia

Monday PM March 15, 2021

Session Chair: Dimitry Sediako, University of British Columbia

2:00 PM
Introductory Comments: Aluminum Alloys, Processing and Characterization: Dimitry Sediako; 1University of British Columbia

2:05 PM Invited
Anodization Compatibility of Eutectic Aluminum-Cerium Alloys: Zachary Sims; 1David Weiss; 1Hunter Henderson; 1Orlando Rios; 1Jiheon Jun; 1Sur Debashish; 1Max Wiener; 1Ryan Ott; 1Fangqiang Meng; 1University of Tennessee; 2Eck Industries; 1Lawrence Livermore National Laboratory; 1University of Tennessee Knoxville; 1Oak Ridge National Laboratory; 1University of Virginia; 1Auto Anodics; 1University of Tennessee

2:35 PM
Al-Sm Alloys Under Far-from-Equilibrium Conditions: Can Ohyucu; 1Burçin Kaygusu; 1Cemil Isıkasça; 1Onur Meydanoglu; 1Amir Motallebzadeh; 1Sezer Özer; 1Yunus Kalay; 1Middle East Technical University; 1Assan; 1Koç University

2:55 PM
Effect of Minor Additives to Al-Zn-Mg Alloys on Welding and Corrosion Performance for Building Constructions: Zachary Sims; 1David Weiss; 1Hunter Henderson; 1Orlando Rios; 1Jiheon Jun; 1Sur Debashish; 1Max Wiener; 1Ryan Ott; 1Fangqiang Meng; 1University of Tennessee; 2Eck Industries; 1Lawrence Livermore National Laboratory; 1University of Tennessee Knoxville; 1Oak Ridge National Laboratory; 1University of Virginia; 1Auto Anodics; 1University of Tennessee

3:15 PM
Mechanism Behind Al/Cu Interface Reaction: The Kinetics and Diffusion of Cu in Forming Different Intermetallic Compounds: Yongqiong Ren; 1Jie Chen; 1Jingge Zhao; 1Yonggu Group Corporation Co., Ltd.; 1Shanghai University

3:35 PM
Phase Formation of Mo- and Cr-rich Compounds in an Al-Si Cast Alloy: Peer Decher; 1Jan Stegili; 1Anna-Lena Kauws; 1Andreas Kiefert; 1Luisa Marzoli; 1Marcel Rosefort; 1Trimet Aluminium SE

3:55 PM
Understanding the Effect of Quench Delay and Alloy Chemistry on Various 6000 Series Alloys Systems: David Shoemaker; 1Robert Matuska; 1Kaiser Aluminum

4:15 PM
Effect of Heat Treatment on the Microstructure and Mechanical Properties of LB-PBF A1Si10Mg and Scalmalloy: Shaharyar Baig; 1Seyed Ghiaasiaan; 1Nima Shamsaei; 1Auburn University

4:35 PM
Thermal Properties of Hybrid Al-Cu-Components Produced by Combining Powder Pressing and Semi-solid Forming Strategies: Marco Speth; 1Mathias Liewald; 1Kim Rouven Riedmueller; 1University of Stuttgart; Institute for Metal Forming Technology

4:55 PM Question and Answer Period Dr. Dimitry Sediako

LIGHT METALS

Aluminum Reduction Technology — Cell Modernization (Modelling and Energy Optimization)

Sponsored by: TMS Light Metals Division, TMS: Aluminum Committee

Program Organizers: Nadia Ahli, Emirates Global Aluminium; Nancy Hoff, Hydro Aluminium AS

Monday PM March 15, 2021

Session Chairs: Jayson Tessier, ALCOA; Andre Schneider, HATCH

2:00 PM
Introductory Comments: Aluminum Reduction Technology: Nadia Ahli; 1Emirates Global Aluminium

2:05 PM
Mass Transport by Waves: Bath-metal Interface Deformation, Rafts Collision and Physical Model: Lovatiana Rakotondrannanan; 1Laszlo Kiss; 1Sandor Poncsak; 1Renaud Santerre; 1Sebastian Guerard; 1Jean-Francois Bilodeau; 1Simon Richer; 1Grips Universite Du Quebec A Chicoutimi; 1Rio Tinto

2:25 PM
Modeling Anode Current Pickup After Setting: Choon-Jie Wong; 1Yuchen Yao; 1Jie Bao; 1Maria Skyllas-Kazacos; 1Barry J. Welch; 1Ali Jassim; 1University of New South Wales; 1Emirates Global Aluminium

2:45 PM
Superconductor Busbars – High Benefits for Aluminium Plants: Wolfgang Reiser; 1Till Reek; 1Carsten Räch; 1Daniel Kreutzer; 1Vision Electric Super Conductors GmbH; 1Martin Iffert Consulting; 1University of Applied Sciences Kaiserslautern

3:05 PM
Coupled SPH-DEM to Simulate the Injection of a Powder into a Liquid with Heat Transfer and Phase Change: Thomas Roger; 1Laszlo Kiss; 1Kirk Fraser; 1Sándor Poncsák; 1Sebastien Guerard; 1Jean Francois Bilodeau; 1Gualiaume Bonneau; 1Universite Du Quebec A Chicoutimi; 1National Research Council Canada; 1Rio Tinto Aluminium

3:25 PM
Individual Anode Current Monitoring during Aluminum Reduction Cell Power Reduction: Yuchen Yao; 1Jie Bao; 1Maria Skyllas-Kazacos; 1Barry Welch; 1Ali Jassim; 1University of New South Wales; 1Emirates Global Aluminium

3:45 PM Question and Answer Period
BIOMATERIALS

Bio-Nano Interfaces and Engineering Applications — Bio-Nano II

Sponsored by: TMS Functional Materials Division, TMS Structural Materials Division, TMS: Biomaterials Committee

Program Organizers: Candan Tamerler, University of Kansas; Kalpana Katti, North Dakota State University; Hendrik Heinz, University of Colorado Boulder; Terry Lowe, Colorado School of Mines; Po-Yu Chen, National Tsing Hua University

Monday PM  March 15, 2021

Session Chairs: Candan Tamerler, University of Kansas; Feride Sermin Utku, Yeditepe University

2:00 PM  Invited
Flexible-glass Like Coating onto PTFE Vascular Graft Material via Nonthermal Plasma Process: Vineeth Vijayan1; Bernabe Tucker1; Yogesh Vohra1; Vinoy Thomas1; 1University of Alabama at Birmingham

2:30 PM
Detection of Limonene Using Graphene Field Effect Transistor Modified by Self-assembling Peptide: Honma Chishu1; Yoshiaki Sugizaki2; Atsunobu Isobayashi2; Yuhei Hayamizu1; 1Tokyo Tech; 2Toshiba Corporation

2:50 PM
Enhancing Electrochemical Detection of Choline Using Molecularly Imprinted Polymer Electrode: Sermin Utku1; Sevgul Bakay2; Adil Denizli3; Inci Cilesiz4; 1Yeditepe University Biomedical Engineering; 2Duzce University; 3Hacettepe University; 4Istanbul Technical University

3:20 PM
Developing Nanostructured Metals for Innovative Medical Implants with Improved Design and Biofunctionality: Ruslan Valiev1; Evgeny Parfenov1; Olga Kulyasova1; 1UFA State Aviation Technical University

3:40 PM  Invited
The Mechanical Significance of Sublamellar Organization of Mineralized Collagen Fibrils: Sermin Utku1; 1Yeditepe University Biomedical Engineering
Characterization of Minerals, Metals and Materials 2021 — Advanced Microstructure Characterization

**Sponsored by:** TMS Extraction and Processing Division, TMS: Materials Characterization Committee

**Program Organizers:** Jian Li, CanmetMATERIALS; Mingming Zhang, ArcelorMittal Global R&D; Bowen Li, Michigan Technological University; Sergio Monteiro, Instituto Militar de Engenharia; Shadla Ikthmayies; Yunus Kalay, Middle East Technical University; Jiann-Yang Hwang, Michigan Technological University; Juan Escobedo-Díaz, University of New South Wales; John Carpenter, Los Alamos National Laboratory; Andrew Brown, Army Research Laboratory; Rajiv Soman, Eurofins EAG Materials Science LLC; Alex Moser, US Naval Research Laboratory

**Monday PM**

**Session Chairs:** John Carpenter, Los Alamos National Laboratory; Mingming Zhang, ArcelorMittal Global R&D

2:00 PM

**A Comparison between ZnO Cauliflowers on Glass and Aluminum Substrates:** Shadla Ikthmayies

2:20 PM

**Plastic Behavior and Texture Anisotropy in Dynamically Loaded Substrates:** Shadla Ikthmayies

2:40 PM

**Effect of Misorientation Development Near Grain and Twin Boundaries in Pure Copper and Copper-aluminium Alloy:** Sandhya Verma; Prita Pant; M P Gururajan

3:00 PM

**Rapid Irradiation and Characterization of HT9:** Gabriella Bruno; Kevin Field; Li He; T.M. Kelsy Green; Todd Allen

3:20 PM

**The Influence of Alloying in Stabilizing a Faceted Grain Boundary Structure:** Jonathan Priedeman; Gregory Thompson; University of Alabama

3:40 PM

**Crystal Mosaicity and Local Alloy Chemistry of Low Angle Grain Boundaries in Ni-based Superalloys:** Felicitas Scholz; Junyang He; Oliver Horst; Pascal Thome; Gunther Eggleiter; Baptiste Gault; Jan Frenzel

4:00 PM

**Characterization of Nuclear Materials and Fuels with Advanced X-ray and Neutron Techniques — X-ray Diffraction/Scattering II**

**Sponsored by:** TMS Structural Materials Division, TMS: Advanced Characterization, Testing, and Simulation Committee, TMS: Nuclear Materials Committee

**Program Organizers:** Xuan Zhang, Argonne National Laboratory; Jonathan Almer, Argonne National Laboratory; Maria Okuniewski, Purdue University; Joshua Kane, Idaho National Laboratory; Donald Brown, Los Alamos National Laboratory; J. Kennedy, Idaho National Laboratory; Arthur Motta, Pennsylvania State University

**Monday PM**

**Session Chairs:** Arthur Motta, The Pennsylvania State University; Xuan Zhang, Argonne National Laboratory

2:00 PM Invited

**In-situ Investigation into The Stability of Hydride Phases in Zirconium:** Fei Long; Nima Badr; Matthew Topping; Igor Cherubin; Jun-Sang Park; Mark Daymond

2:30 PM

**In-situ Synchrotron X-ray Diffraction Study on Tensile Deformation of Neutron Irradiated Fe-Cr-C Alloys:** Hoon Lee; Xiang Liu; Mark Warren; Dominic Piedmont; Xuan Zhang; Meimei Li; Jeff Terry; Jonathan Almer; JamesStubbins; University of Illinois at Urbana-Champaign; Idaho National Laboratory; Illinois Institute of Technology; Argonne National Laboratory

2:50 PM

**Microstructural Characterization of the Stress and Strain Deformation Partitioning Evolution in Tungsten Heavy Alloys:** David Sprouster; M. E. Alam; G. R. Odette; L Sneed; Stony Brook University; UCSB

3:10 PM

**Creep Behavior of Advanced Austenitic (Fe-25Ni-20Cr) Alloy 709 through In-situ Neutron Diffraction Characterization and Transmission Electron Microscopy Characterization:** Yuchen Zhao; Ryan Schoell; Matthew Frost; Djamel Kaoumi; North Carolina State University; Oak Ridge National Laboratory

3:30 PM

**Using In-situ Synchrotron X-ray Scattering to Determine the TTT Diagram of U-6Nb:** Nathan Peterson; Jianzhong Zhang; Don Brown; Bjorn Clausen; Eloisa Zepeda-Alarcon; Erik Watkins; Elea Garlea; Sean Agnew; University of Virginia; Los Alamos National Laboratory; Y-12 National Security Complex
2:00 PM Designing Lubricant-impregnated Coatings to Reduce Corrosion and Hydrogen Embrittlement: Sami Khan\textsuperscript{1}; Kripa Varanasi\textsuperscript{1}; \textsuperscript{1}Massachusetts Institute of Technology

2:20 PM Effects of Heat Treatments, Current Density, and Electroless Ni Layer Thickness on Corrosion Performance of Trivalent Chromium Passivations on ZnNi Coatings: Kevin Foster\textsuperscript{1}; William Fahrenholtz\textsuperscript{2}; Matthew O’Keefe\textsuperscript{2}; James Claypool\textsuperscript{3}; \textsuperscript{3}Missouri University of Science & Technology; \textsuperscript{3}Missouri University of Science & Technology

2:40 PM Electronic Structure Mechanisms to Explain the Onset of Cl-induced Localised Corrosion in Al\textsubscript{2}O\textsubscript{3}: Aditya Sundar\textsuperscript{1}; Ganlin Chen\textsuperscript{1}; Liang Qi\textsuperscript{1}; \textsuperscript{1}University of Michigan

3:00 PM Galvanic Corrosion Mitigation by Material and Coating Selection for AZ31B bolt-joined with CFRP: Yong Chae Lim\textsuperscript{1}; Jiheon Jun\textsuperscript{2}; Charles Warren\textsuperscript{3}; Zhili Feng\textsuperscript{4}; \textsuperscript{4}Oak Ridge National Laboratory

3:20 PM Using Mechanical and Ion Polishing to Identify Structural and Chemical Defects for the Pitting Corrosion of a Compositionally Complex Steel: Mark Wischhusen\textsuperscript{1}; Carol Glover\textsuperscript{1}; John Scully\textsuperscript{1}; Sean Agnew\textsuperscript{1}; \textsuperscript{1}University of Virginia

3:40 PM Irradiation Induced Forced Chemical Mixing and Local Hardening in Mechanically-processed Immiscible Zr/Nb Multilayers: Madhavan Radhakrishnan\textsuperscript{1}; Thomas Nizolek\textsuperscript{2}; Mukes B. Bachhav\textsuperscript{3}; Yongjiang Wang\textsuperscript{3}; Nathan Mara\textsuperscript{4}; Osman Anderoglu\textsuperscript{1}; \textsuperscript{1}University of New Mexico; \textsuperscript{2}Los Alamos National Laboratory; \textsuperscript{3}Idaho National Laboratory; \textsuperscript{4}University of Minnesota

4:00 PM Radiation Tolerance and Microstructural Changes of Nanocrystalline Cu-Ta Alloy to High Dose Self-ion Irradiation: Soudarya Srivivason\textsuperscript{1}; Chaitanya Kale\textsuperscript{2}; Billy Hornbuckle\textsuperscript{3}; Kris Darling\textsuperscript{3}; Matthew Chancey\textsuperscript{3}; Efrain Hernandez-Rivera\textsuperscript{3}; Yimeng Chen\textsuperscript{3}; Thomas Koenig\textsuperscript{3}; Yongjiang Wang\textsuperscript{3}; Gregory Thompson\textsuperscript{3}; Kiran Solanki\textsuperscript{3}; \textsuperscript{3}Arizona State University; \textsuperscript{3}Army Research Laboratory; \textsuperscript{3}Los Alamos National Laboratory; \textsuperscript{3}CAMECA Instruments Inc; \textsuperscript{3}The University of Alabama

4:20 PM Synthesis and Irradiation Response of Hetero FeCr - Fe\textsubscript{3}O\textsubscript{4} Interfaces: Benjamin Derby\textsuperscript{1}; Jon Kevin Baldwin\textsuperscript{2}; Djamel Kacoumi\textsuperscript{2}; Danny Edwards\textsuperscript{2}; Daniel Schreiber\textsuperscript{3}; Timothy Lach\textsuperscript{4}; Blas Uberuaga\textsuperscript{1}; Nan Li\textsuperscript{1}; \textsuperscript{1}Los Alamos National Laboratory; \textsuperscript{2}North Carolina State University; \textsuperscript{3}Pacific Northwest National Laboratory; \textsuperscript{4}Oak Ridge National Laboratory

4:40 PM Understanding Defect Recovery and Accommodation and Their Implications on Mechanical Performance in Irradiated Nanocomposite Materials: Michael Wurmshuber\textsuperscript{1}; David Frazer\textsuperscript{2}; Mehdi Balooch\textsuperscript{4}; Inas Issa\textsuperscript{4}; Andrea Bachmaier\textsuperscript{4}; Peter Hosemann\textsuperscript{4}; Daniel Kiener\textsuperscript{1}; \textsuperscript{1}Montanuniversitaet Leoben; \textsuperscript{2}Los Alamos National Laboratory; \textsuperscript{4}University of California, Berkeley; \textsuperscript{5}Erich Schmid Institute of Materials Science
MATERIALS DESIGN

Computational and Modeling Challenges in Metals and Alloys for Extreme Environments — High Strain Rates and Irradiation Effects

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS Structural Materials Division, TMS: Computational Materials Science and Engineering Committee, TMS: Integrated Computational Materials Engineering Committee

Program Organizers: Jean-Briac le Graverend, Texas A&M University; Jaafar El-Awady, Johns Hopkins University; Giacomo Po, University of Miami; Beñat Gurrutxaga-Lerma, University of Birmingham

Monday PM March 15, 2021

Session Chairs: Giacomo Po, University of Miami; Laurent Capolungo, Los Alamos National Lab

2:00 PM Investigation of Role of Interface Microstructure on the Shock Compression and Spall Failure Behavior of Nanoscale Cu/ Ta Multiphase Metallic Materials: Marco Echeverria1; Avinash Dongare1; University of Connecticut

2:20 PM Modeling of Laser Interactions with BCC Metals Using a Hybrid Atomistic-continuum Approach: Ching Chen1; Avanish Mishra2; Sergey Gallistlki3; Avinash Dongare1; University of Connecticut

2:40 PM Mesoscale Modeling of Deformation Behavior of Fe-based Microstructures at High Strain Rates and under Shock Loading Conditions: Ke Ma1; Avinash Dongare1; University of Connecticut

3:00 PM The Microscopic Structure of a Heavily Irradiated Metal: Peter Derlet1; Sergei Dudarev1; Paul Scherrer Institure; UKAEA CGFE

PHYSICAL METALLURGY

Computational Thermodynamics and Kinetics — Diffusion, Kinetics and Non-equilibrium Events

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Chemistry and Physics of Materials Committee, TMS: Computational Materials Science and Engineering Committee

Program Organizers: Nana Ofori-Opoku, Canadian Nuclear Laboratories; Eva Zarkadoula, Oak Ridge National Laboratory; Enrique Martinez Saez, Clemson University; Vahid Attari, Texas A&M University; Jorge Munoz, University of Texas at El Paso

Monday PM March 15, 2021

Session Chairs: Pascal Bellon, University of Illinois at Urbana-Champaign; Enrique Martinez Saez, Clemson University; Nana Ofori-Opoku, Canadian Nuclear Laboratories; Maylise Nastar, C.E.A

2:00 PM Hydrogen Diffusion and Trapping in Multiphase Materials: A Multiscale Model for Non-point Trapping: Fernando León-Cázares1; Dominic Dziedzic2; Enrique Galindo-Nava1; University of Cambridge

2:20 PM Kinetic Assessment of HCP Mg-Li-Al Alloys: David Christianson1; Lilong Zhu2; Michele Manuel1; University of Florida; Yantai University

2:40 PM Quantitative Inference of the Mobility Coefficient in the Cahn-Hilliard Equation from a Model Experiment: Zirui Mao1; Michael Demkowicz2; Texas A&M University

3:00 PM Invited Defect Kinetics in Multi-component Oxides via Accelerated Molecular Dynamics: Blas Uberuaga1; Ghanshyam Piania2; Los Alamos National Laboratory

3:30 PM Invited Predicting Non-equilibrium Patterns Beyond Thermodynamic Concepts: Application to Radiation Induced Microstructures: David Simeone1; Philippe Garcia1; Laurence Luneville1; CEA

4:00 PM Quantitative Phase-field Modeling for Corrosion of Engine Materials at High Temperature: Xueyang Wu1; Michael Tonks2; University of Florida

4:20 PM Invited Molecular Dynamics Modeling of Embrittlement in Irradiated Nickel-base Alloys: Michael Demkowicz1; Texas A&M University

4:50 PM Invited Modeling Delayed-onset Kinetics of Materials Used in Nuclear Power Applications Using Atomistic Simulations: Laurent Béland1; Cong Dai2; Peyman Saidi3; Eric Nicholson4; Yu Luo5; Chandra Singh6; Mark Daymond7; Zhongwen Yao8; Queen’s University; 2Canadian Nuclear Laboratories; 3University of Toronto

PHYSICAL METALLURGY

Continuous Phase Transformations — Session II

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Chemistry and Physics of Materials Committee, TMS: Phase Transformations Committee

Program Organizers: Jessica Krogstad, University of Illinois at Urbana-Champaign; Gregory Thompson, University of Alabama; Matthew Steiner, University of Cincinnati; Janelle Wharry, Purdue University

Monday PM March 15, 2021

Session Chairs: Janelle Wharry, Purdue University; Matthew Steiner, University of Cincinnati

2:00 PM Invited Effect of Bulk and Local Phase Transformation on Deformation Mechanisms: Maryam Ghazisaeidi1; Mubarak Shih1; Edwin Antillon2; Ohio State University; Naval Research Lab

2:30 PM Cross-Slip and Work-Hardening in Short-Range Ordered FCC Alloys: Anas Abu-Odeh1; Mark Asta1; University of California, Berkeley

2:50 PM Invited Structural Transformations Driven by Irradiation in the High Defect Density Limit: Sergei Dudarev1; Daniel Mason2; Peter Derlet3; UK Atomic Energy Authority; Paul Scherrer Institut

3:20 PM Magnetically Driven Short-range Order in the CrCoNi System: Flynn Walsh1; Robert Ritchie2; Mark Asta1; Lawrence Berkeley National Laboratory
3:40 PM
Short-range Clustering and Ordering Evolution of Ni-22Cr-13Mo Alloy: Po-Cheng Kung1; Jessica Krogstad2; 1University of Illinois at Urbana-Champaign

4:00 PM
Thermodynamics of the Invar Transition: Phonons vs. Magnetism: Stefan Lohaus1; Pedro Guzman2; Brent Fultz3; 1California Institute of Technology

4:20 PM Invited
Intrinsic Phase Stability and Continuous Phase Transformations in TiAlZrN: Alexander Aerts1; Borja Gonzalez Prieto1; Jun Lim1; Kris Rosseel1; Alexander Aerts1; 1SCK CEN

2:00 PM
Numerical Modelling of Coolant Chemistry in Lead Bismuth Eutectic Cooled Reactor: Alessandro Marino1; Kristof Gladinez2; Borja Gonzalez Prieto2; Jun Lim2; Kris Rosseel2; Alexander Aerts2; 1SCK-CEN

2:20 PM Invited
Behaviour of Spallation, Activation and Fission Products in LBE: Alexander Aerts1; Borja Gonzalez Prieto1; Jörg Neuhausen2; 1SCK CEN; 2Paul Scherrer Institut

2:45 PM
Engineering Model of the Kinetics of the Steel Oxide Layer in a Flow of a Heavy Liquid Metal Coolant Under Various Oxygen Conditions: Alexander Avdeenkov1; Alexander Orlov2; Nofees Kobar3; 1All-Russian Research Institute for Nuclear Power Plants Operation» JSC; 2Proryv JSC; 3MEPhI

3:05 PM Invited
Progress in LBE Chemistry Control and Measurement Techniques for MYRRHA: Jun Lim2; Kristof Gladinez2; Borja Gonzalez-Prieto2; Alessandro Marino2; Kris Rosseel2; Alexander Aerts2; 1SCK CEN

3:30 PM
PILLAR: Pool-type Integral Leading Facility for Lead-alloy Cooled Advanced Small Modular Reactor, and Its Use for Natural Convection Study and Corrosion: Jaewon Choi1; SangBum KIM1; KyungHwan Keum1; Youho Lee1; Il Soon Hwang2; Han-Chil Lee2; 1Seoul National University; 2Ulsan National Institute of Science and Engineering (UNIST); 3Moojin

3:50 PM
Materials Compatibility Testing with Molten Lead up to 700°C: Osman Anderoglu1; Cemal Cakez1; Shuprio Ghosh2; Khaled Talaat3; Madhavan Radhakrishnan1; Keith Woloshun4; Cetin Unal2; Stuart Maloy2; Michael Ickes3; Paolo Ferroni4; 1University of New Mexico; 2Los Alamos National Laboratory; 3Westinghouse Electric Company

4:10 PM
Anubis Multiphysics: A Neutronics-Thermal Hydraulics Coupling Platform for Flow Accelerated Corrosion Modeling in Reactor Conditions: Khaled Talaat2; Osman Anderoglu1; 1The University of New Mexico

4:30 PM
Performance of Candidate Alloys at 500°C in Flowing Lead: Cemal Cakez1; Shuprio Ghosh2; Khaled Talaat2; Keith Woloshun3; Stuart Maloy2; Cetin Unal2; Michael Ickes3; Paolo Ferroni4; Osman Anderoglu1; 1University of New Mexico; 2Los Alamos National Lab; 3Westinghouse Electric Corporation; 4Westinghouse Electric Corporation

CORROSION

Corrosion in Heavy Liquid Metals for Energy Systems — Materials Compatibility with Liquid Metal Coolants II

Sponsored by: TMS Structural Materials Division, TMS: Corrosion and Environmental Effects Committee, TMS: Nuclear Materials Committee

Program Organizers: Osman Anderoglu, University of New Mexico; Alessandro Marino, SCK-CEN; Michael Short, Massachusetts Institute of Technology; Peter Hosemann, University of California; Mike Ickes, Westinghouse Electric Company

Monday PM March 15, 2021
Session Chairs: Peter Hosemann, UC Berkeley; Michael Ickes, Westinghouse Electric Co.

2:00 PM
Data Science and Analytics for Materials Imaging and Quantification — Session II: Data-led Approaches for 3D Characterization & X-Ray Imaging


Program Organizers: Emine Gulsoy, Northwestern University; Charudatta Phatak, Argonne National Laboratory; Stephan Wagner-Conrad, Carl Zeiss Microscopy; Marcus Hanwell, Brookhaven National Laboratory; David Rowenhorst, Naval Research Laboratory; Tiberiu Stan, Northwestern University

Monday PM March 15, 2021
Session Chair: Charudatta Phatak, Argonne National Laboratory

2:00 PM
Convolutional neural network-assisted recognition of nanoscale L12 ordered structures in face-centred cubic alloys: Yue Li1; Leigh Stephenson1; Raabe Dierk1; Baptiste Gault1; 1Max-Planck-Institut für Eisenforschung GmbH

2:20 PM
Deep Neural Network Facilitated Complex Imaging of Phase Domains: Longlong Wu1; Pavol Juhás2; Shinjae Yoo1; Ian Robinson3; 1Brookhaven National Laboratory; 2University of Connecticut; 3Clemson University

2:40 PM
Quantitative X-ray Fluorescence Nanotomography: Mingyuan Ge1; Xiaojing Huang1; Hanfei Yan1; Wilson Chiu2; Kyle Brinkman3; Yong Chu4; 1Brookhaven National Laboratory; 2University of Connecticut; 3Brookhaven National Laboratory; 4Los Alamos National Laboratory

3:00 PM
Materials Characterization in 3D Using High Energy X-ray Diffraction Microscopy: Irradiated and Deformed Materials: Hemant Sharma1; Peter Kenesei2; Jun-Sang Park2; Zhengchun Liu1; Jon Almer3; 1Argonne National Laboratory
3:20 PM  Invited
Understanding the Keyhole Dynamics in Laser Processing Using Time-resolved X-ray Imaging Coupled With Computer Vision and Data Analytics: Jongchan Pyeon1; Joseph Arsh1; Runbo Jiang1; Andy Ramlatchan1; Benjamin Gould1; Anthony Rollett1; Lara Draelos1; Zachary Levin1; Ankit Srivastava1; Tingkun Liu1; Bharat Gwalani1; Matthew Olsztyn1; changyong Park2; Stanislav Sinogeikin1; Cynthia Powell1; Suveen Mathaudhu1; Wendy Gu1; Jongchan Pyeon1; 1Laser Processing Laboratory, Colorado School of Mines; 2Argonne National Laboratory; 3University of California Riverside; 4Vanderbilt University; 5Georgia Tech

3:40 PM  Question and Answer Period

MONDAY PM

MATERIALS PROCESSING

Deformation Induced Microstructural Modification — Session II: In Situ Interrogation of Microstructural Evolution During Deformation

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Shaping and Forming Committee

Program Organizers: Arun Devaraj, Pacific Northwest National Laboratory; Suveen Mathaudhu, University of California-Riverside; Kester Clarke, Colorado School of Mines; Bharat Gwalani, Pacific Northwest National Laboratory; Daniel Coughlin, Los Alamos National Laboratory

Monday PM  March 15, 2021

Session Chair: Bharat Gwalani, Pacific Northwest National Laboratory

2:00 PM  Invited
Probing Microstructural Evolution in Deformation with Electrons and X-rays: Anthony Rollett1; Robert Suter1; Rachel Lim1; Matthew Wilkin1; Yueheng Zhang1; Patcharapit Promoppatum1; Carter Cocke1; Ashley Spear1; Ricardo Lebensohn1; Jerard Gordon1; Anthony Rollett1; 1Carnegie Mellon University; 2KMUTT; 3University of Utah; 4Los Alamos National Laboratory

2:30 PM  Invited
In Situ Analysis of Microstructural Evolution of Metallic Alloys under High Speed Rotational Shear Deformation: Arun Devaraj1; Tingkun Liu1; Bharat Gwalani1; Matthew Olsztyn1; changyong Park2; Stanislav Sinogeikin1; Cynthia Powell1; Suveen Mathaudhu1; 1Pacific Northwest National Laboratory; 2High pressure collaborative access team; 3DAC tools; 4University of California Riverside

2:50 PM  Invited
Deformation at a Single Precipitate Using a Nanocube Model System: Wendy Gu1; Mehrdad Kiani1; Mitsu Murayama2; 1Stanford University; 2Virginia Tech

3:20 PM  Invited
In-situ Analysis of Microscale Deformation and Fracture in Severely Deformed Polycrystalline Tungsten: Lara Draelos1; Zachary Levin1; Ankit Srivastava1; 1Texas A&M University

SPECIAL TOPICS

Design and Manufacturing Approaches for the Next Generation of Sustainable Materials: The 2021 Student-led Symposium — Materials for Energy Production and Storage

Sponsored by: TMS Extraction and Processing Division, TMS Light Metals Division, TMS: Recycling and Environmental Technologies Committee

Program Organizers: Mary Dougherty, Colorado School of Mines; Christopher Finfrock, Colorado School of Mines; Brady McBride, Colorado School of Mines; Jaden Zymbaluk, Colorado School of Mines; Desmond Mills, Colorado School of Mines; Casey Williams, Colorado School of Mines

Monday PM  March 15, 2021

Session Chairs: Christopher Finfrock, Colorado School of Mines; Casey Williams, Colorado School of Mines; Brady McBride, Colorado School of Mines; Jaden Zymbaluk, Colorado School of Mines; Desmond Mills, Colorado School of Mines; Jaden Zymbaluk, Colorado School of Mines

2:00 PM  Invited
III-V Photovoltaic Substrate Reuse and Recycle Strategies for Reduced Cost and Improved Materials Utilization: Corinne Packard1; 1Colorado School of Mines

2:20 PM  Invited
Reducing CO2 Emissions Through Improvements in the Materials Science of Fossil Fuels: Jonah Erlebacher1; Shashank Lakshman1; Gina Greenidge1; 1Johns Hopkins University

2:40 PM  Invited
Lithium-ion Battery Recycling Research at the ReCell Center: Linda Gaines1; Bryant Polzin1; Jeffrey Spangenberger1; 1Argonne National Laboratory

3:00 PM  Invited
Stepwise Approach to Improving Lead Furnace Operation Through Pilot Scale Studies and Computational Modeling: Alexandra Anderson1; Joseph Grogan1; John Wagner2; Sandeep Alavandi2; David Cygan2; 1Gopher Resource; 2Gas Technology Institute; 3Gas Technology Institute

LIGHT METALS

Electrode Technology for Aluminum Production — Carbon Anode Production – Where is the Cutting Edge? – A Focus on 4.0 and the Future

Sponsored by: TMS Light Metals Division, TMS: Aluminum Committee

Program Organizer: Derek Santangelo, Hatch

Monday PM  March 15, 2021

Session Chair: Antti Koulumies, Outotec

2:00 PM  Invited
Introductory Comments: Electrode Technology for Aluminum Production: Derek Santangelo1; 1Hatch

2:05 PM  Invited
Digitalization in the Carbon Area as a Means to Improve Productivity: Antti Koulumies1; Paul Merlin1; Ana Maria Becerra1; 1Metso Outotec
2:25 PM Invited
AMELIOS Suite or the Fives Digital Package for Carbon 4.0: Christophe Bouchez; Xavier Genin; Sylvain Georgel; Pierre Mahieu; 1Fives

2:45 PM
Development and Applications of the Four Points Probe (4PP) Electrical Resistivity Measurements for Anode Process Optimization: Julien Laouzon-Gauthier; John Secasan; 1Alcoa Corporation

3:05 PM Invited
The Readiness and Compatibility of a Modern Anode Handling and Cleaning System for Industry 4.0 Technologies: Kevin Williams; 1Advanced Dynamics Corporation Ltd.

3:25 PM Break

3:40 PM Panel Discussion

ELECTRONIC MATERIALS

Electronic Packaging and Interconnections 2021 — 3D Microelectronic Packaging and Emerging Interconnects

Sponsored by: TMS Functional Materials Division, TMS: Electronic Packaging and Interconnection Materials Committee

Program Organizers: Mehran Maalekian, Mat-Tech; Christopher Gourlay, Imperial College London; Babak Arfai, Ford Motor Company; Praveen Kumar, Indian Institute of Science; Sai Vadlamani, Intel Corporation; Kazuhiro Nogita, University of Queensland; David Yan, San Jose State University

Monday PM March 15, 2021

Session Chairs: Praveen Kumar, Indian Institute of Science; Nilesh Badwe, Intel Corp.

2:00 PM
Electromigration of Cu-Cu Bonds Fabricated by Instant Bonding Using <111>-oriented Nanotwinned Cu Microbumps: Kai-Cheng Shieh; Po-Ning Hsu; Yu-Jin Li; King-Ning Tu; Chih Chen; 1National Chiao Tung University

2:20 PM
Enhancement on the Bonding Strength of Instantly-bonded Cu-Cu Joints by Post Annealing: Jia Juin Ong; Chih Chen; King-Ning Tu; 1National Chiao Tung University

2:40 PM
High Electromigration Resistance of Nanotwinned Cu Redistribution Lines for Fan-out Packaging: I-Hsin Tseng; Chih Chen; Benson Lin; Chia-Cheng Chang; 1National Chiao Tung University; 3MediaTek Inc

3:00 PM
Investigation of Interdiffusion In Micro Solder Joint with a Fine Pitch Copper Pillar Subjected to Electromigration Stressing: Hossein Madanipour; Yi Ram Kim; Allison Osmanson; Mohsen Tajedin; Choong-Un Kim; 1University of Texas at Arlington

3:20 PM
On the 3D Evolution of the Nanoporous Structure of Sintered Ag on a Cu Substrate During Isothermal Aging Observed by In-situ X-ray Nanotomography: Kokouvi N'Tsouagia; Azdine Nait-Ali; Mikael Gueguen; Pascal Gadaud; Loic Signor; Juan Creus; Marc Legros; Yjian Liu; Xavier Milhet; 1Prime Institute CNRS ENSMA; 2LASIE Université La Rochelle; 3CEMES CNRS; 4SLAC-SSRL

3:40 PM
Low Temperature Cu Direct Bonding with (111)-oriented Nanotwinned Copper Films on Metal Substrates: Hung-Che Liu; Chih Chen; 1National Chiao Tung Universality

4:00 PM
Effect of Annealing on Mechanical Properties of nt-Cu Lines in Fan-out Wafer Level Packaging: Wei-You Hsu; Yu-Jin Li; I-Hsin Tseng; Benson Tzu-Hung Lin; Chia-Cheng Chang; Chih Chen; 1National Chiao Tung University; 3MediaTek Inc.

4:20 PM
Direct Bonding Process of (111) Nanotwinned Copper Thin Films: Jing-Yi Zhong; Yung-Ting Tai; Fan-Yi Ouyang; 1National Tsing Hua University

ENERGY & ENVIRONMENT

Energy Technologies and CO2 Management — Session II

Sponsored by: TMS Extraction and Processing Division, TMS Light Metals Division, TMS: Energy Committee

Program Organizers: Alafara Baba, University of Ilorin; Lei Zhang, University of Alaska Fairbanks; Donna Guilen, Idaho National Laboratory; Xiaobo Chen, RMIT University; John Howarter, Purdue University; Neale Neelameggham, IND LLC; Cong Wang, Northeastern University; Qiqi Sun, Queensland University of Technology; Hong Peng, University of Queensland; Yu Lin Zhong, Griffith University

Monday PM March 15, 2021

Session Chairs: Donna Guilen, Idaho National Laboratory; Neale Neelameggham, IND LLC

2:00 PM
Low Energy Mesoporous Silica Recovery from a Nigerian Kaolinite Ore for Industrial Value Additions: Alafara Baba; Abdullah Ibrahim; Dele Fapojuwo; Kuranga Ayinta; Daud Ololowa; Sadisu Girigisu; Mustapha Raji; Fasat Akanji; Abdul Alabi; 1University of Ilorin; 2University of Johannesburg; 3University of Ilorin; Federal Polytechnic Offa; 4SHEDA, Abuja; 5Kwara State University

2:20 PM
Prediction Model of Converter Oxygen Consumption Based on Recursive Classification and Feature Selection: Liu Zhang; Zhong Zheng; Kaitian Zhang; Xinyue Shen; Yongzhou Wang; 1Chongqing University

2:40 PM
Reduction Behaviors of Hematite to Metallic Iron by Hydrogen at Low Temperatures: Kun He; Zhong Zheng; Hongsheng Chen; Weiping Hao; 1Chongqing University

3:00 PM
Simulation and Optimization of Deflourinazion and Desulfurization Processes of Aluminum Electrolysis Flue Gas: Xuehe Li; Yan Liu; Xiaolong Li; Tingan Zhang; 1Northeastern University

3:20 PM
The Influence of Hydrogen Injection on the Reduction Process in the Lower Part of Blast Furnace: A Thermodynamic Study: Zaiyi Tang; Zhong Zheng; Hongsheng Chen; Kun He; 1Chongqing University

3:40 PM
A Study of Numerical Modeling of Jet Heating Phenomenon in a Porous Media: Qingxuan Luo; Yuchao Chen; Armin Silaen; Chenn Zhou; 1Purdue University Northwest
MATERIALS PROCESSING

Friction Stir Welding and Processing XI — High Melting Temperature Materials

*Sponsored by:* TMS Materials Processing and Manufacturing Division, TMS: Shaping and Forming Committee

*Program Organizers:* Yuri Hovanski, Brigham Young University; Piyush Upadhyay, Pacific Northwest National Laboratory; Yutaka Sato, Tohoku University; Nilesh Kumar, University of Alabama; Tuscaloosa; Anton Naumov, Peter the Great St. Petersburg Polytechnic University

**Monday PM**

2:00 PM
Study of Residual Stress and Microstructure Changes in Friction Stir Processed Dual Phase 980 Grade Steel: Koichi Taniguchi1; Yong Chae Lim1; Jeffery Bunn1; Zhili Feng1; 1JFE Steel Corporation; 2Oak Ridge National Laboratory

2:20 PM
Advances in High Temperature FSW: Single Use Tools: Jonathan Martin1; 1TWI Ltd.

2:40 PM
Phosphorus Segregation and its Effect on Properties in Friction Stir Welded High Phosphorus Weathering Steel: Tatsumi Kawakubo1; Kohsaku Ushioda1; Hidetoshi Fuji1; 1Joining and Welding Research Institute Osaka University

3:00 PM
Friction Stir Welding of Armor Grade Steels: Stan Hawkes1; Rafael Giorjao1; Martin McDonnell2; Antonio Ramirez1; Alex Thiel1; Michael Eff1; 1Ohio State University; 2US Army; 3Oshkosh Corp.; 4EWI

3:20 PM
Friction Stir Welding of NiTi Shape Memory Alloy: Parker West1; Vasanth Shunmugasamy1; Bilal Mansoor1; Ibrahim Karaman1; 1Texas A&M University; 2Texas A&M University at Qatar

3:40 PM
On the development of Friction Stir Welding to Repair or Mitigate Chloride-induced Corrosion in 304L Austenitic Stainless Steel: Ben Sutton1; Gabriella Marino1; Rafael Giorjao1; Jayendra Srinivasan1; Antonio Ramirez1; Jenifer Locke1; 1Ohio State University

4:00 PM
Low-force Friction Surfacing for Crack Repair in 304L Stainless Steel: Hemant Agival1; Hwasung Yeom1; Kumar Sriharan1; Kenneth Ross2; Frank Pfefferkorn1; 1University of Wisconsin-Madison; 2Pacific Northwest National Laboratory

4:20 PM
Evaluation of Residual Stresses in Isothermal Friction Stir Welded 304L Stainless Steel Plates: Madhumanti Bhattacharyya1; Thomas-Gnaupel Herold2; Krishnan Raja1; Jens Darsell1; Saumyadeep Jana1; Indrajit Charit1; 1University of Idaho; 2National Institute of Standards and Technology; 3Pacific Northwest National Laboratory

PHYSICAL METALLURGY

Frontiers in Solidification Science VIII — Convection & Gravity

*Sponsored by:* TMS Materials Processing and Manufacturing Division, TMS: Chemistry and Physics of Materials Committee, TMS: Phase Transformations Committee, TMS: Solidification Committee, TMS: Computational Materials Science and Engineering Committee

*Program Organizers:* Damien Tourret, IMDEA Materials; Amy Clarke, Colorado School of Mines; Ulrike Hecht, Access e.V.; Nana Ofori-Opoku, Canadian Nuclear Laboratories; Melis Serefoglu, Koc University; Tiberiu Stan, Northwestern University

**Monday PM**

2:00 PM Invited
Permeability Prediction of Dendritic Mushy Zone by Phase-field and Lattice Boltzmann Simulations: Tomohiro Takakih; 1Kyoto Institute of Technology

2:30 PM
Multiscale Modeling of Alloy Dendritic Growth with Liquid Convection: Thomas Isensee1; Damien Tourret2; 1IMDEA Materials Institute & Polytechnic University of Madrid; 2IMDEA Materials Institute

2:50 PM Invited
Coupling of Solidification Grain Structures with Heat and Mass Transfers: Charles-Andre Gandin1; Vincent Maguin1; Gildas Guillomet1; Chengdan Xue1; Michel Bellet1; Romain Fleurisson1; Yijian Wu1; Orianne Senninger1; 1MINES ParisTech CEMEF UMR CNRS 7635

3:20 PM
Understanding the Role of Magnetic Fields on Freckle Formation during Solidification through In Situ Imaging: Xianqiang Fan1; Natalia Shevchenko2; Samuel Clark1; Sebastian Marussi1; Saurabh Shah1; Robert Atwood1; Sven Eckert1; Andrew Kao2; Peter Lee3; 1University College London; 2Helmholtz-Zentrum Dresden-Rossendorf; 3Diamond Light Source; 4University of Greenwich

3:40 PM Invited
Solidification and Fluid Convection - The Story of an Inseparable Couple: Sten Anders1; Natalia Shevchenko2; Andrew Kao2; Sven Eckert1; 1Helmholtz-Zentrum Dresden-Rossendorf; 2University of Greenwich

4:10 PM
Directional Solidification of Al-10wt.%Cu Alloy in Hypergravity: Ali Jafarizadeh Koohbanani1; Sonja Steinbach1; Florian Kargl1; 1German Aerospace Center, Institute of Materials Physics in Space

4:30 PM
A Comparison of Terrestrial and Microgravity Isothermal Equiaxed Alloy Solidification through Machine Learning, Multistage Thresholding and Sub-dendrite-based In Situ X-ray Video Processing: Jonathan Muller1; Mert Celikin1; Pádraig Cunningham1; David Browne1; 1University College Dublin
SPECIAL TOPICS

Frontiers of Materials Award Symposium: 2021 Functional Nanomaterials: Translating Innovation into Pioneering Technologies — Session II

Program Organizer: Huanyu Cheng, Pennsylvania State University

Monday PM  March 15, 2021

2:00 PM Invited
Becoming Sustainable, The New Frontier in Soft Electronics and Robotics: Martin Kaltenbrunner1; 1Johannes Kepler University Linz

2:40 PM Invited
Organic Bioelectronics for the Precise Sensing, Delivery and Processing of Bio-signals: Magnus Berggren1; 1Linköping University

3:20 PM Invited
Stamping Applications: A Microstructural Perspective
Enabling High Strength AA7xxx Sheet for Automotive Hot
and Commercial Perspective: Martin Kaltenbrunner1; 1Johannes Kepler University Linz; Eric Nyberg, Tungsten Heavy Powder & Parts; J. Brian Jordon, Northwest National Laboratory

3:40 PM Invited
Developing Biomaterials at nanoMAG from a Historical and Commercial Perspective: Victoria Miller1; 1University of Florida; Stephen LeBeau2; 2University of Arizona; Retired; Stephen LeBeau3; 3University of Maryland; Sezer Ozerinc1; 1Middle East Technical University; Özgür Duygulu3; 3Middle East Technical University; Sezer Ozerinc4; 4Middle East Technical University; Sezer Ozerinc5; 5Middle East Technical University; Sezer Ozerinc6; 6Middle East Technical University

4:00 PM Invited
Electronics on the Brain: George Malliaras1; 1University of Cambridge

4:40 PM Invited
3D Printing Functional Materials & Devices: Michael McAlpine1; 1University of Minnesota

LIGHT METALS

Greater Than the Sum of Its Parts — Concurrent Alloy Design and Processing Science: An LMD Symposium Honoring Raymond Decker — Session I

Program Organizers: Victoria Miller, University of Florida; Eric Nyberg, Tungsten Heavy Powder & Parts; J. Brian Jordon, University of Alabama; Wilhelmus Sillekens, European Space Agency; Neale Neelameggham, IND LLC; Vineet Joshi, Pacific Northwest National Laboratory

Monday PM  March 15, 2021

Session Chair: Victoria Miller, University of Florida

2:00 PM Invited
Nickel-base Alloys Development:Then and Now: Victoria Miller1; 1University of Florida; Aziz Asphahani1; 1University of Florida; QuesTek

2:30 PM Invited
New Under the Sun: Robert Carnahan1; 1University of Florida; Victoria Miller2; 2Retired; Stephen LeBeau3; 3University of Arizona; Retired; Stephen LeBeau4; 4University of Arizona; Retired; Stephen LeBeau5; 5University of Arizona; Retired; Stephen LeBeau6; 6University of Arizona; Retired

3:00 PM Invited
Development of Biomaterials at nanoMAG from a Historical and Commercial Perspective: Victoria Miller1; 1University of Florida; Stephen LeBeau2; 2University of Arizona; Retired; Stephen LeBeau3; 3University of Maryland; Sezer Ozerinc1; 1Middle East Technical University; Özgür Duygulu3; 3Middle East Technical University; Sezer Ozerinc4; 4Middle East Technical University; Sezer Ozerinc5; 5Middle East Technical University; Sezer Ozerinc6; 6Middle East Technical University

3:30 PM Invited
Enabling High Strength AA7xxx Sheet for Automotive Hot Stamping Applications: A Microstructural Perspective: Atish Ray1; 1Tudor Piroteala; Rashmi Ranjan Mohanty1; 1University of Florida; John Carsley2; 2Novelis Inc.

NANOSTRUCTURED MATERIALS

Heterostructured and Gradient Materials (HGM IV): Tailoring Heterogeneity for Superior Properties — Heterostructured Materials II: Mechanical Properties

Sponsored by: TMS Structural Materials Division, TMS: Mechanical Behavior of Materials Committee

Program Organizers: Yuntian Zhu, City University of Hong Kong; Kei Ameyama, Ritsumeikan University; Irene Beyerlein, University of California-Santa Barbara; Yves Brechet, Grenoble Institute of Technology; Hualian Gao, Nanyang Technological University; Hyoong Seop Kim, Pohang University of Science and Technology; Ke Lu, Institute of Metal Research; Xiaolei Wu, Chinese Academy of Sciences

Monday PM  March 15, 2021

Session Chairs: Mingxin Huang, The University of Hong Kong; Ruslan Valiev, Ufa Aviation Technical University; Xiaolong Ma, Pacific Northwest National Lab.

2:00 PM Invited
Grain-boundary Delamination-induced Toughening in 2 GPa Deformed and Partitioned Steel: Li Liu1; 1University of Hong Kong

2:25 PM Invited
Enhanced Mechanical Properties in 3D Interface Metallic Multilayers: Justin Cheng1; 1University of California, Santa Barbara; Jon Baldwin2; 2Los Alamos National Laboratory; Nan Li3; 3University of Minnesota Twin Cities; Shouzi Xu3; 3University of Minnesota Twin Cities; Irene Beyerlein1; 1University of Minnesota Twin Cities; Nathan Mar2; 2University of Minnesota Twin Cities; Les Alamos National Laboratory; University of California, Santa Barbara

2:45 PM Invited
Enhanced Mechanical Properties of Interface-strengthened UFG Tungsten and Tungsten-based Nanocomposites: Michael Wurmshuber1; 1University of Münster; Simon Doppermann2; 2TU Braunschweig; Markus Alfreider1; 1Montanuniversitaet Leoben; Daniel Kiener1; 1Montanuniversitaet Leoben

3:05 PM Invited
Effect of Alloying Additions on the Strength of Confined Nanocrystalline Layers: Sevda Fatihpour1; 1Amir Molallezhadeh2; İstanbul Koç University; Özgür Duygulu1; 1Middle East Technical University; Sezer Ozerinc1; 1Middle East Technical University; Koç University; TUBITAK Marmara Research Center

3:25 PM Invited
Heterostructured Ultrafine-grained Metallic Materials with Enhanced Superplasticity and Superior Strength: Ruslan Valiev1; 1Ufa Aviation Technical University; Maxim Murashkin1; 1Ufa Aviation Technical University; Nguyen Chinh2; 2Eötvös Loránd University

3:50 PM Invited
Hierarchical 3D Nanolayered Duplex-phase Zr with High Strength, Strain Hardening, and Ductility: Weizhong Han1; 1Xi'an Jiaotong University
High Entropy Alloys IX: Alloy Development and Application II

Sponsored by: TMS Functional Materials Division, TMS Structural Materials Division, TMS: Alloy Phases Committee, TMS: Mechanical Behavior of Materials Committee

Program Organizers: Peter Liaw, University of Tennessee; Michael Gao, National Energy Technology Laboratory; E-Wen Huang, National Chiao Tung University; Srivatsan Tirumalai, The University of Akron; Xie Xie, FCA US LLC; Gongyao Wang, Alcoa Technical Center

Monday PM  March 15, 2021

Session Chairs: Veerle Keppens, Univ of Tennessee; Ke An, Oak Ridge National Laboratory

2:00 PM Invited
Synthesis and Mechanical Properties of High Entropy Oxide Spinels: Veerle Keppens1; Brianna Musico2; Kurt Sickafus3; Quinton Wright4; Joshua Smith5; 1University of Tennessee

2:25 PM Invited
Phase Formation, Structure Modulation and Property Optimization of High Entropy Alloys, Composites and Glasses: Jurgen Eckert6; 1Erich Schmid Institute of Materials Science

2:50 PM Invited
High Entropy Alloy Design Aided by Neutron Scattering: Ke An7; Rui Feng8; Sichao Fu9; 1Oak Ridge National Laboratory

3:15 PM Invited
Combining Elemental and Microstructure Heterogeneities in High-entropy Alloys to Enhance Radiation Resistance: Yanwen Zhang1; Miguel L. Crespillo2; Walker L. Boldman3; Philip D. Rack4; Hongbin Bei5; Yongqin Chang6; Li Jiang7; Lumin Wang8; William J. Weber9; 1Oak Ridge National Laboratory; 2University of Tennessee; 3University of Science and Technology Beijing; 4University of Michigan

3:40 PM Distinctive Room Temperature Deformation Behavior in Plastic BCC Refractory High-entropy Alloys: Chanho Lee1; Gian Song2; Michael Gao3; Wei Chen4; Ke An5; Peter Liaw6; 1University of Tennessee; 2Kongju National University; 3National Energy Technology Laboratory/Leidos Research Support Team; 4University of Michigan

4:00 PM Metastability and Phase Selection in High Entropy Alloys: Sebastian Kube1; Pamela Banner2; Sungwoo Sohn3; David Uhl4; Amit Datye5; Suchismita Sarker6; Apurva Mehta7; Jan Schroers8; 1Yale University; 2Southern Connecticut State University; 3SLAC National Accelerator Laboratory

High Entropy Alloys IX: Structures and Modeling — Structures and Modeling II

Sponsored by: TMS Functional Materials Division, TMS Structural Materials Division, TMS: Alloy Phases Committee, TMS: Mechanical Behavior of Materials Committee

Program Organizers: Peter Liaw, University of Tennessee; Michael Gao, National Energy Technology Laboratory; E-Wen Huang, National Chiao Tung University; Srivatsan Tirumalai, The University of Akron; Xie Xie, FCA US LLC; Gongyao Wang, Alcoa Technical Center

Monday PM  March 15, 2021

Session Chairs: Diana Farkas, Virginia Polytechnic Institute; Irene Beyerlein, University Of California, Santa Barbara

2:00 PM Invited
Mechanisms of Short-range Ordering and Cluster Formation and their Effects on Mechanical Properties of High-entropy Alloys: Shuai Chen1; Zachary Aitken1; Subrahmanyan Pattamatta2; Zhaoxuan Wu3; Zhi-Gen Yu4; Rajarshi Banerjee5; David Srolovitz6; Peter Liaw7; Yong-wei Zhang8; 1Institute of High Performance Computing, A*STAR; 2City University of Hong Kong; 3University of North Texas; 4University of Tennessee

2:25 PM Invited
Development of Interatomic Potentials to Model the Deformation Behaviors in Highly Concentrated/Entropy-stabilized Ni-base Superalloys: Ridwan Sakidja2; Andrew Duff3; Wai-Yim Ching4; Caizhi Zhou5; 1Missouri State University; 2STFC; 3University of Missouri-Kansas City; 4University of South Carolina

2:50 PM Invited
Structural Essentiality for Plasticity of High-entropy Alloys Profiled by Data Mining: Wei-Ren Chen1; Chi-Huan Tung2; Shou-Yi Chang3; Yue Fan4; Zhiting Bai5; Changwoo Do6; 1Oak Ridge National Laboratory; 2National Tsing Hua University; 3Oak Ridge National Laboratory; 4University of Michigan

3:15 PM Invited
Deformation Behavior of a Model High Entropy Alloy from Atomistic Simulations: Diana Farkas1; 1Virginia Polytechnic Institute

3:40 PM Phase-Field Dislocation Dynamics Modeling of Refractory Multi-Principal Element Alloys: Lauren Smith1; Abigail Hunter2; Irene Beyerlein3; 1University Of California, Santa Barbara; 2Los Alamos National Laboratory

4:00 PM Statistics of the NiCoCr Medium-entropy Alloy: Novel Aspect of an Old Puzzle: Zongrui Pei1; Rui Li2; G. Malcolm Stocks3; Michael Gao4; 1National Energy Technology Laboratory; 2University of Tennessee, Knoxville; 3Oak Ridge National Laboratory

4:20 PM Phase Stability of NbVZrMx (M = Ti, Mo; x = 0 – 1) Refractory Complex Concentrated Alloys: Zhaohan Zhang1; Mu Li2; Guodong Ren3; Arashdeep Thind4; Katharine Flores5; Rohan Mishra6; 1Washington University in St.Louis

4:40 PM EAM and RF-MEAM Potentials for Thermal Properties of Zirconium Diboride: Bikash Timalsina1; Alin Niraula1; William Fahrenholtz2; Gregory Hilmas3; Andrew Duff4; Ridwan Sakidja5; 1Missouri State University; 2Missouri University of Science and Technology; 3Science and Technology Facilities Council
MATERIALS DESIGN

Hume-Rothery Symposium: Accelerated Measurements and Predictions of Thermodynamics and Kinetics for Materials Design and Discovery — Session II

Sponsored by: TMS Structural Materials Division, TMS: Alloy Phases Committee

Program Organizers: Wei Xiong, University of Pittsburgh; Shuanglin Chen, CompuTherm LLC; Wei Chen, Illinois Institute of Technology; James Saal, Citrine Informatics; Greta Lindwall, KTH Royal Institute of Technology

Monday PM March 15, 2021

Session Chair: Wei Chen, Illinois Institute of Technology

2:00 PM Invited

An Atom-Probe Tomography Study of the Temporal Evolution of Concentration Retention Excursions and Depletions at gamma-fcc/gamma-prime-L12 Interfaces in a Ni-Al-Cr-Re Superalloy: David Seidman1; 1Northwestern University

2:40 PM Invited

Extended Applications of the CALPHAD Simulations: Fan Zhang1; Duchao Lv1; Weisheng Cao1; Shuanglin Chen1; Chuan Zhang1; Songmao Liang1; 1CompuTherm LLC

3:00 PM Invited

HREM Characterization of In Situ X-ray Nano-tomography of High Temperature Corrosion in Ni-Al-Cr-Re Superalloy: Yu Chen2; 2Argonne National Laboratory

3:20 PM Invited

HREM Characterization of In Situ X-ray Nano-tomography of High Temperature Corrosion in Ni-Al-Cr-Re Superalloy: Yu Chen2; 2Argonne National Laboratory

4:00 PM Invited

HREM Characterization of In Situ X-ray Nano-tomography of High Temperature Corrosion in Ni-Al-Cr-Re Superalloy: Yu Chen2; 2Argonne National Laboratory

MONDAY PM

NUCLEAR MATERIALS

Materials and Chemistry for Molten Salt Systems — Corrosion & Chemistry

Sponsored by: TMS Structural Materials Division, TMS: Corrosion and Environmental Effects Committee

Program Organizers: Stephen Raiman, Texas A&M University; Kumar Sridharan, University of Wisconsin-Madison; Nathaniel Hoyt, Argonne National Laboratory; Jinsuo Zhang, Virginia Polytechnic Institute and State University; Michael Short, Massachusetts Institute of Technology; Raluca Scarlat, University of California-Berkeley

Monday PM March 15, 2021

Session Chair: Jinsuo Zhang, Virginia Tech

2:00 PM

Corrosion Control of 316H Stainless Steel and Nickel-Based Alloys in Molten Chloride Salts: Kasey Hanson1; Krishna Moorthi Sankar2; Remi Dingreville2; Joshua Sugar2; Chaitanya Dee2; Preet Singh1; 1Virginia Institute of Technology; 2Sandia National Laboratories

2:20 PM

Analysis of Particulate Properties of Commercial FLiNaK in a 316 Stainless Steel System: Timothy Kennedy1; Timothy Head2; NEXT Lab2; 1Abilene Christian University; 2NEXT Lab

2:40 PM

Chemical Interaction Between Molten Fibre and Nitrate Solar Salt: Michael Hanson1; Michael Zupan1; Augustus Merwin1; Francesco Carotti1; Alan Kruizenga1; 1Kairos Power

3:00 PM

Mechanistic Understanding of 3D Morphological Evolution of Metals in Molten Salts by In Situ X-ray Nano-tomography: Xiaoyang Liu1; Arthur Ronne1; Lin-Chieh Yu1; Mingyuan Ge1; Lingfeng He2; Philip Halstenberg2; Cheng-Hung Lin1; Bobby Layne1; Sheng Dai1; Wah-Keat Lee2; Shannon Mahurin1; James Wishart2; Xianghui Xiao2; Yu-chen Karen Chen-Wiegart1; 1Stony Brook University; 2Oak Ridge National Laboratory; 3Stony Brook University/Brookhaven National Laboratory

3:20 PM

Effect of Impurities on Corrosion and Its Control in Molten FLiNaK: Krishna Moorthi Sankar1; Preet Singh1; 1Georgia Institute of Technology; 2Stony Brook University/Brookhaven National Laboratory
**MONDAY PM**

### 3:40 PM

**Complex Structure of Molten NaCl-CrCl2 and NaCl-CrCl3: Cr-Cl Octahedra Network and Intermediate-range Order**

**Boris Khlykovich**<sup>1</sup>; Qing-Jie Li<sup>1</sup>; David Sproutier<sup>2</sup>; Guiqiu (Tony) Zheng<sup>3</sup>; Joerg Neuefeind<sup>1</sup>; Alex Braatz<sup>2</sup>; Joanna McFarlane<sup>3</sup>; Stephen Tsz Tang Lam<sup>1</sup>; Daniel Olds<sup>4</sup>; Matthew Marshall<sup>5</sup>; Ju Li<sup>6</sup>; Massachusetts Institute of Technology; <sup>2</sup>Stony Brook University; <sup>3</sup>Oak Ridge National Laboratory; <sup>4</sup>Brookhaven National Laboratory; <sup>5</sup>Radiation Monitoring Devices

### 4:10 PM

**Electrochemistry and Corrosion Studies for Alloy Development for Molten Salt Reactors (MSRs):**

**William Doniger**<sup>1</sup>; Cody Falconer<sup>2</sup>; Matthew Weinstein<sup>1</sup>; Mohamed Elbakshwan<sup>1</sup>; Govindarajan Muralidharan<sup>2</sup>; Adrien Coutel<sup>1</sup>; Kumar Sridharan<sup>1</sup>; <sup>1</sup>University Of Wisconsin Madison; <sup>2</sup>Oak Ridge National Laboratory; <sup>3</sup>University of Wisconsin Madison

### 3:50 PM Invited

**Renewable Energy for Sustainable Mining:**

**Tom Xu**<sup>1</sup>; Jiann-Yang (Jim) Hwang<sup>2</sup>; <sup>1</sup>AGreatE Inc; <sup>2</sup>Michigan Technological University

### ADVANCED MATERIALS

**Materials for High Temperature Applications: Next Generation Superalloys and Beyond — Superalloys: Mechanical Behavior**

**Sponsored by:** TMS Structural Materials Division, TMS: Refractory Metals Committee

**Program Organizers:** Govindarajan Muralidharan, Oak Ridge National Laboratory; Martin Heilmayer, KIT Karlsruhe; Benjamin Adam, Portland State University; Mario Bochichio, Pratt & Whitney; Katerina Christofidou, University of Sheffield; Eric Lass, University of Tennessee-Knoxville; Jeremy Rame, Safran Aircraft Engines; Pierre Salot, Safran; Akane Suzuki, GE Research; Michael Titus, Purdue University

Monday PM March 15, 2021

### 2:00 PM

**Damage Mechanisms Involved during Very High Cycle Fatigue of a Coated and Grit-blasted Ni-based Single-crystal Superalloy:**

**Alice Cervellon**<sup>1</sup>; Luciana Bortoluci Ornastroni<sup>2</sup>; Tresa Pollock<sup>1</sup>; Fernando Pedraza<sup>2</sup>; Jonathan Cormier<sup>1</sup>; <sup>1</sup>University Of California Santa Barbara; <sup>2</sup>Institut Pprime; <sup>3</sup>LaSIÉ

### 2:20 PM Invited

**Enhancing the Creep Strength of Next Generation Disk Superalloys via Local Phase Transformation Strengthening:**

**Timothy Smith**<sup>1</sup>; Timothy Gabb<sup>2</sup>; Katelin Wertz<sup>2</sup>; Joshua Stickner<sup>1</sup>; Laura Evans<sup>2</sup>; Ashton Egan<sup>3</sup>; Michael Mills<sup>3</sup>; <sup>1</sup>NASA Glenn Research Center; <sup>2</sup>AFRL; <sup>3</sup>Ohio State University

### 2:50 PM

**Quantifying Deformation Processes Resulting in Local Phase Transformation Strengthening:**

**Ashton Egan**<sup>4</sup>; Veronika Mazanova<sup>1</sup>; Timothy Smith<sup>2</sup>; Timothy Gabb<sup>3</sup>; Timothy Hanlon<sup>3</sup>; Michael Mills<sup>3</sup>; <sup>1</sup>Ohio State University; <sup>2</sup>NASA Glenn Research Center; <sup>3</sup>GE Research

### 3:10 PM

**Solute Segregation at Intrinsic Stacking Faults in Disordered Face-centered Cubic Ni-Co Solid Solution: First-principles and Thermodynamic Modeling:**

**Dongsheung Wen**<sup>1</sup>; Longsheng Feng<sup>2</sup>; Yunzhi Wang<sup>3</sup>; Michael Titus<sup>2</sup>; <sup>1</sup>The Ohio State University; <sup>2</sup>NASA Glenn Research Center; <sup>3</sup>Purdue University

### 3:30 PM

**Partitioning of Cu and Si Contaminants in a Ni-based Superalloy and their Effect on Creep Properties:**

**Martin Detors**<sup>1</sup>; Zongrui Pei<sup>1</sup>; Kyle Rozman<sup>2</sup>; Michael Gao<sup>3</sup>; Jonathan Poplawsky<sup>2</sup>; Paul Jablonski<sup>3</sup>; Jeffrey Hawk<sup>1</sup>; <sup>1</sup>National Energy Technology Laboratory; <sup>2</sup>AFRL; <sup>3</sup>NASA Glenn Research Center

### 3:50 PM

**Deformation of the "-Ni2(Cr, Mo, W) Phase during Mechanical Testing:**

**Thomas Mann**<sup>1</sup>; Michael Fahrmann<sup>2</sup>; Michael Titus<sup>3</sup>; <sup>1</sup>Purdue University; <sup>2</sup>Haynes International

### 4:10 PM

**Mechanical Properties and Microstructural Characterization of Cast Haynes 282 for Advanced Ultra-supercritical (A-USC) Applications:**

**Ling Wang**<sup>1</sup>; Kinga Unocic<sup>2</sup>; Peter Tortorelli<sup>1</sup>; Xiang Chen<sup>1</sup>; Oak Ridge National Laboratory

### 4:30 PM

**Microstructure and Mechanical Properties of a Centrifugal Cast Ni-Based Alloy:**

**Govindarajan Muralidharan**<sup>1</sup>; Shivakant Shukla<sup>1</sup>; Jim Myers<sup>2</sup>; <sup>1</sup>Oak Ridge National Laboratory; <sup>2</sup>Metaltek International

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**Materials Engineering -- From Ideas to Practice: An EPD Symposium in Honor of Jiann-Yang Hwang — Mineral and Material Processing**

**Sponsored by:** TMS Extraction and Processing Division, TMS: Pyrometallurgy Committee

**Program Organizers:** Bowen Li, Michigan Technological University; Baojun Zhao, University of Queensland; Jian Li, CanmetMATERIALS; Sergio Monteiro, Instituto Militar de Engenharia; Zhwei Peng, Central South University; Dean Gregurek, RHI Magnesita; Tao Jiang, Central South University; Yong Shi, Futianbao Environment Technologies; Cuiping Huang, FuTianBio Environment Protection Technology Company Ltd.; Shadla Ikhmayes

Monday PM March 15, 2021

**Session Chairs:** Baojun Zhao, University of Queensland; Yong Shi, Futianbao Environment Technologies

### 2:00 PM Keynote

**Materials Processing: From Ideas to Practice:**

**Jiann-Yang Hwang**<sup>1</sup>; <sup>1</sup>Michigan Technological University

### 2:30 PM Invited

**Recent Progress in Microwave-assisted Pyrometallurgy at Central South University:**

**Liancheng Wang**<sup>1</sup>; Zhwei Peng<sup>2</sup>; Jie Wang<sup>1</sup>; Wenxing Shang<sup>1</sup>; Qiang Zhong<sup>1</sup>; Mingjun Rao<sup>1</sup>; Guanghui Li<sup>1</sup>; Tao Jiang<sup>1</sup>; <sup>1</sup>Central South University

### 2:50 PM Keynote

**Production and High Ratio Application of Iron Ore Pellets in Shougang:**

**Gele Qing**<sup>1</sup>; Minge Zhao<sup>2</sup>; Gang An<sup>3</sup>; Kai Wang<sup>1</sup>; xiaojiang Wu<sup>1</sup>; zhixing Zhao<sup>1</sup>; <sup>1</sup>Shougang Group

### 3:10 PM

**Comparison between Compression Strength of Two Castor Oil Polyurethane Resin Matrix Composites Reinforced with Coconut or Pliassaiva Fiber:**

**Felipe Lopes**<sup>1</sup>; Carlos Vieira<sup>2</sup>; <sup>1</sup>Purdue University; <sup>2</sup>Stony Brook University; <sup>3</sup>Michigan Technological University

### 3:30 PM

**Characterization of Mortars Incorporated with Natural Açai Fiber:**

**Afonso Azevedo**<sup>1</sup>; Marcio Barbosa<sup>1</sup>; Higor Azevedo Rocha Rocha<sup>1</sup>; Markssuel Marulva<sup>1</sup>; Sergio Monteiro<sup>1</sup>; Fluminense Federal University; <sup>2</sup>Universidade Estadual do Norte Fluminense; <sup>3</sup>Military Institute of Engineering

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All times listed are in EDT time zone (UTC-4:00).

TMS2021 VIRTUAL FINAL TECHNICAL PROGRAM
NUCLEAR MATERIALS

Mechanical Behavior of Nuclear Reactor Components — Defect Evolution

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS Structural Materials Division, TMS: Nanomechanical Materials Behavior Committee, TMS: Nuclear Materials Committee

Program Organizers: Clarissa Yablinsky, Los Alamos National Laboratory; Assel Aitkaliyeva, University of Florida; Eda Aydogan, Middle East Technical University; Laurent Capolungo, Los Alamos National Laboratory; Khalid Hatlal, Sandia National Laboratories; Kayla Yano, Pacific Northwest National Laboratory; Caleb Massey, Oak Ridge National Laboratory

Monday PM March 15, 2021

2:00 PM Invited Simulation of Intergranular Void Growth under the Combined Effects of Surface Diffusion, Grain Boundary Diffusion, and Bulk Creep: John Sanders; Negar Jamshidi; Niloofar Jamshidi; Mohsen Dadfarzadeh; Sankara Subramanian; James Stubbins; California State University, Fullerton; Seattle University; PhotoGAUGE; University of Illinois at Urbana-Champaign

2:30 PM A Novel Displacement Cascade Driven Irradiation Creep Mechanism in Pure Copper: Nargisse Khira; Fabien Onimus; Laurent Dupuy; Jean-Paul Crocombette; Stéphanie Jublot-Leclerc; Thomas Jourdan; Thomas Pardoën; Jean-Pierre Raskin; Yves Bréchet; CEA Saclay; Université Paris-Saclay; École Polytechnique de Louvain, Institute of Mechanics, Materials and Civil Engineering (IMMC), Materials and process engineering, Belgium; École Polytechnique de Louvain; SIMAP - Science et Ingénierie des Matériaux et Procédés, Grenoble-INP, France

2:50 PM Controlling Helium Morphology in Pure Metals: Dislocation-helium Interactions: Calvin Lear; Jonathan Gigax; Nan Li; Saryu Fensin; Los Alamos National Laboratory

3:10 PM Correlating the Neutron-irradiation Induced Hardening and Solute Nano-clustering in Oxide Dispersion Strengthened Alloys: Samara Levine; Arunodaya Bhattacharya; Andrew Lupini; David Hoelzer; Yutai Katoh; Steven Zinkle; Oak Ridge National Laboratory, University of Tennessee; Oak Ridge National Laboratory

3:30 PM Invited Effect of Cr Concentration On <111> and <100> Dislocation Loop Formation in Fe-Cr Alloys: Yaxuan Zhang; Ziqi Xiao; Xian-Ming Bai; Virginia Polytechnic Institute and State University

4:00 PM Void Swelling and Transmutation in Tungsten Metals and Alloys after Fusion Relevant Neutron Irradiation: Daniel Morrall; John Echols; Josina Geringer; Lauren Garrison; Chad Parish; Oak Ridge National Lab

4:20 PM Irradiation Resistance in Several Multi-principal Element Alloys: Yanqing Su; Utah State University

CHARACTERIZATION

Mechanical Response of Materials Investigated through Novel In-situ Experiments and Modeling — Session II

Sponsored by: TMS Structural Materials Division, TMS: Thin Films and Interfaces Committee, TMS: Advanced Characterization, Testing, and Simulation Committee

Program Organizers: Saurabh Puri, Microstructure Engineering; Amit Pandey, Lockheed Martin Space; Dhriti Bhattacharya, Australian Nuclear Science and Technology Organization; Dongchuan Jang, KAIST; Jagannathan Rajagopal, Arizona State University; Josh Kacher, Georgia Institute of Technology; Minh-Son Pham, Imperial College London; Robert Wheeler, Microtesting Solutions LLC; Shailendra Joshi, University of Houston

Monday PM March 15, 2021

Session Chair: Amit Pandey, Lockheed Martin Space

2:00 PM Low Temperature Failure Mechanism of [001] Niobium Micropillars under Uniaxial Tension: Seok-Woo Lee; Gyuhoo Song; Nicole Aragon; Ill Ryu; University Of Connecticut; University of Texas at Dallas

2:20 PM Quantifying Electron Beam Effects during In-situ TEM Nanomechanical Tensile Testing on Aluminum Thin Films: Sandra Stangeby; Olivier Pierron; Joshua Kacher; Georgia Institute of Technology

2:40 PM Deformation Tests of Al Thin Films Using In-situ TEM and Molecular Dynamics Simulations: Lucia Bajtsošová; Rostislav Králik; Barbora Krivská; Jozef Veselý; Jan Fikar; Miroslav Cieslar; Charles University; Ústav Fyziky Materiálu AV CR, v.v.i.

3:00 PM In-situ TEM Investigation of the Electroplasticity Phenomenon in Ti-6Al: Xiaoping Li; Shiting Zhao; John Turner; Karen Bustillo; Rohan Dhall; Andrew Minor; University of California, Berkeley; Lawrence Berkeley National Laboratory

3:20 PM Giant Superelasticity in SrNi2P2 Micropillars via Lattice Collapse and Expansion: Shuyang Xiao; Vladislav Borisov; Guillaume Gorgen-Lesseux; Gyuhoo Song; Roser Valentí; Paul Canfield; Seok-Woo Lee; University Of Connecticut; Goethe University; Iowa State University

3:40 PM Ripplocations: A Novel Deformation Mechanism in Layered Crystalline Solids: Hussein Badr; Drexel University
MONDAY PM

MATERIALS DESIGN

Metal-Matrix Composites: Advances in Analysis, Measurement and Observations — NanoComposites [Nanoscale + Nanoreinforcements]

Sponsored by: TMS Structural Materials Division, TMS: Composite Materials Committee

Program Organizers: Srivatsan Tirumalai, The University of Akron; William Harrigan, Gamma Alloys; Simona Hunyadi Murph, Savannah River National Laboratory

Monday PM March 15, 2021
Session Chair: Tirumalai Srivatsan, University of Akron

2:00 PM Keynote
A Study Aimed at Understanding the Use of Nanomaterial-treated Filters for the Uptake of Heavy Metals from Water Sources: Simona Hunyadi Murph1; Savannah River National Laboratory

2:40 PM Invited
Strengthening Effects of Multi-walled Carbon Nanotubes and Graphene Nanoplatelets Reinforced in Nickel Matrix Nanocomposites: Amit Patil1; Tushar Borkar1; Cleveland State University

3:10 PM
Influence of Tungsten Nanopowders on Enhancing the Aging Behavior of a Copper-chromium Alloy: Gongcheng Yao1; Shuaihang Pan1; Xiaochun Li1; University of California Los Angeles

3:30 PM Invited
In situ Atomic Study of Spontaneous Nanocrystallization of Intermetallic for Interconnection of High-power and Flexible Electronics: Ying Zhong2; Chunqing Wang3; Sungho Jin1; University of South Florida; Harbin Institute of Technology; University of California at San Diego

4:00 PM Invited
Correlation of Fine Scale Microstructure and Mechanical Properties of Copper-alumina Nanocomposites: Raman Goswami1; Naval Research Laboratory

4:30 PM
Influence of Sintering on the Development of Alumina Toughened Nanocomposites: Conventional Versus Microwave: Kunjee Meena1; Srivatsan Tirumalai1; Indian Institute of Technology Roorkee; University of Akron

MATERIALS PROCESSING

Ni-Co 2021: The 5th International Symposium on Nickel and Cobalt — Batteries

Sponsored by: The Metallurgy & Materials Society of the Canadian Institute of Mining, Metallurgy and Petroleum, TMS Extraction and Processing Division, TMS: Hydrometallurgy and Electrometallurgy Committee, TMS: Pyrometallurgy Committee

Program Organizers: Corby Anderson, Colorado School of Mines; Dean Gregurek, RHI Magnesita; Mari Lundström, Aalto University; Christina Meskers; Prabhat Tripathy, Batelle Energy Alliance (Idaho National Laboratory); Fiseha Tesfaye, Abo Akademi University; Yuabo Zhang, Central South University; Sari Muinonen, Glencore; Graeme Goodall, XPS- Glencore; Shijie Wang, Rio Tinto Kennecott Utah Copper Corp (Retired)

Monday PM March 15, 2021

2:00 PM
BATCircle – Towards CO2 Low Battery Recycling: Mari Lundstrom1; Antti Porvali1; Heini Elomaa2; Pyry Hannula1; Pertti Kauranen1; Aalto University; Outotec Reserach Center (Finland) Oy

2:20 PM
Selective Sulfidation and Electrowinning of Nickel and Cobalt for Lithium Ion Battery Recycling: Caspar Stinn1; Antoine Allanoire2; Massachusetts Institute of Technology

2:40 PM
Additive Manufacturing of 3D Microlattice Lithium-ion Battery Electrodes: A Review: Modupeola Dada1; Patricia Popoola1; Tshwane University of Technology

3:00 PM
A Strategy for Acid-free Waste Lithium Battery Processing: Mark Strauss1; Luis Diaz Aldana1; Mary Case1; Tedd Lister1; Idaho National Laboratory

3:20 PM
The Role of Nickel in Batteries: Ken Rudisuela1; Nickel Institute

3:40 PM
The Effect of Cu, Al and Fe Impurities on Leaching Efficiency of Two Lithium-ion Battery Waste Fractions: Alexander Chernyaev1; Jere Partinen1; Mari Lundstrom1; Aalto University

4:00 PM
A Sustainable Oxalate Process for Recovery of Metals from LiCoO2: Experimental and Modeling Study: Ankit Verma1, David Corbin1, Mark Shiflett1; University of Kansas

4:20 PM
Refining of Mixed Sulphide Precipitate to Produce Battery Grade Metals Using Outotec Pressure Oxidation Process: Christopher Ecott1; Outotec
PHYSICAL METALLURGY

Phase Transformations and Microstructural Evolution — Martensitic Transformation

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Phase Transformations Committee

Program Organizers: Rongpei Shi, Lawrence Livermore National Laboratory; Yipeng Gao, Idaho National Laboratory; Fadi Abdeljawad, Clemson University; Bharat Gwalani, Pacific Northwest National Laboratory; Qi An, University of Nevada-Reno; Eric Lass, University of Tennessee-Knoxville; Huajing (Wilson) Song, Los Alamos National Laboratory

Monday PM March 15, 2021

Session Chair: Yipeng Gao, Idaho National Laboratory

2:00 PM Monte Carlo Simulation and Three-dimensional Diffuse Scattering Study of Martensitic Transformation: Xiaoxu Guo; Yongmei Jin; Yu Wang; Yang Ren; 1Michigan Technological University; 2Argonne National Laboratory

2:20 PM Size Effects and Microstructural Evolution of Shape Memory Ceramics during Cyclic Phase Transformations: Isabel Crystal; Christopher Schuh; 1Massachusetts Institute Of Technology

2:40 PM Super-critical Elasticity: A Challenge to Martensitic Transformation Theory: Haiyang Chen; Yan-Dong Wang; Yang Ren; 1University of Science and Technology Beijing; 2Argonne National Laboratory

3:00 PM Uncovering the Role of Nanoscale Precipitates on Martensitic Transformation and Supereelasticity: Shivam Tripathi; Karthik Guda Vishnu; Michael Titus; Alejandro Strachan; 1Purdue University

MATERIALS PROCESSING

Phonons, Electrons and Dislons: Exploring the Relationships Between Plastic Deformation and Heat — Session II

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Shaping and Forming Committee

Program Organizers: Aashish Rohatgi, Pacific Northwest National Laboratory; Sean Agnew, University of Virginia; Thomas Bieler, Michigan State University

Monday PM March 15, 2021

Session Chairs: Thomas Bieler, Michigan State University; Sean Agnew, University of Virginia; Aashish Rohatgi, Pacific Northwest National Laboratory

2:00 PM Invited Do Moving Dislocations Induce Lattice Instabilities?: Benat Gurukruba-Lemna; 1University of Birmingham

2:20 PM Invited Thermal and Strain Rate Effects on Plasticity and Fracture of Gen 3 Steels: Louis Hector; 1General Motors Global Technical Center

2:40 PM Invited Thermomechanics of Large Deformation Shear Banding: Curt Bronkhorst; Charles Lieou; Hashem Mourad; Veronica Anghel; 1University of Wisconsin, Madison; 2Los Alamos National Laboratory

THERMOMECHANICAL BEHAVIOR

Thermomechanical Conversion in Metals: Dislocation Plasticity Model Evaluation of the Taylor-quinney Coefficient: Charles Lieou; Curt Bronkhorst; 1Los Alamos National Laboratory; 2University of Wisconsin-Madison

3:20 PM Unified Analysis of Temperature Fields Arising from Large Strain Deformation and Friction in Manufacturing Processes: Harish Dhami; Priti Panda; Debapriya Mohanty; Anirudh Udupa; James Mann; Koushik Viswanathan; Srinivasan Chandrasekar; 1Indian Institute of Science; 2Purdue University; 3M4 Sciences Corporation

3:40 PM Shear Bands, Thermal Profiles and Microstructure Stability in Large-strain Deformation of High Entropy Alloys: Shwetabhd Yadav; Dhruvil Shah; Andrew Kustas; Nicolas Argibay; Ping Lu; Dinshor Sagapuram; 1Texas A&M University; 2Sandia National Laboratories

NANOSTRUCTURED MATERIALS

Plasmons in Nanocomposite Materials — From Theory to Application Session II

Sponsored by: TMS Structural Materials Division, TMS: Composite Materials Committee

Program Organizers: Nasrin Hooshmand, Georgia Institute of Technology; Simona Hunyadi Murph, Savannah River National Laboratory; Mahmoud Abdelwahed, The University of Texas at San Antonio

Monday PM March 15, 2021

Session Chair: Sajanlal R Panikkanvalappil, Dana-Farber Cancer Institute

2:00 PM Invited Emerging Anisotropic 2D Layered Materials for Plasmonics and Polaritonics: Koray Aydin; 1Northwestern University

2:30 PM Invited Plasmonic Compound Nanohole Arrays: Yiping Zhao; 1University of Georgia

3:00 PM Invited Electron Transfer and Catalysis in Plasmonic Nanocomposite Systems: Patrick Ward; Simona Murph; 1Savannah River National Laboratory

All times listed are in EDT time zone (UTC-4:00).

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ENERGY & ENVIRONMENT

Powder Materials for Energy Applications — Ceramic Powder Materials

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Powder Materials Committee

Program Organizers: Kathy Lu, Virginia Polytechnic Institute and State University; Eugene Olevsky, San Diego State University; Hang Yu, Virginia Polytechnic Institute and State University; Ruigang Wang, The University of Alabama; Isabella Van Rooyen, Idaho National Laboratory

Monday PM  March 15, 2021

Session Chairs: Eugene Olevsky, San Diego State University; Isabella Van Rooyen, Idaho National Laboratory

2:00 PM Electric Current Effects in Spark Plasma Sintering: Heating Pathway Analysis: Eugene Olevsky1; Geuntak Lee2; Charles Maniere3; Elisa Torresani4; 1San Diego State University

2:20 PM Electrochemical Deposition Synthesis of CeO2 Nanoarrays: Ruihang Wang5; Yifan Wang6; 1The University of Alabama

2:40 PM Invited High Temperature Corrosion and Irradiation Behavior of Silicon Carbide and Nanostructured Ferritic Alloy Composites: Kaustubh Bawane1; Kathy Lu2; Xin-Ming Bai3; Kaijie Ning4; Wei-Ying Chen5; Meimei Li6; 1Idaho National Laboratory; 2Virginia Tech; 3Argonne National Laboratory

3:10 PM Oxidation Behaviors of Matrix-grade Graphite in Water Vapor Ingress Accidents for High Temperature Gas-cooled Reactors: Kathy Lu1; Yi Je Cho2; 1Virginia Polytechnic Institute and State University

3:30 PM Simulation of C-SiOC Coatings on Yttria Stabilized Zirconia Microspheres in a Fluidized Bed Coater Based on Multiphase Flow with Interface Exchange: Kathy Lu1; Sanjay Kumar2; 1Virginia Polytechnic Institute and State University

MATERIALS DESIGN

Practical Tools for Integration and Analysis in Materials Engineering — Session II

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS Structural Materials Division, TMS: Titanium Committee, TMS: Computational Materials Science and Engineering Committee, TMS: Integrated Computational Materials Engineering Committee

Program Organizers: Adam Pilchak, US Air Force Research Laboratory; Michael Gram, Titanium Metals Corporation; William Joost; Raymundo Arroyave, Texas A&M University; Charles Ward, AFRL/RXM

Monday PM  March 15, 2021

2:00 PM Invited Foundations and Applications of DAMASK: Philip Eisenlohr1; Martin Diehl2; Pratheek Shanthraj3; Franz Roter4; Dierk Raabe5; 1Michigan State University; 2KU Leuven; 3The University of Manchester; 4Max-Planck-Institut für Eisenforschung

2:40 PM Prisms-plasticity: An Open Source Crystal Plasticity Finite Element Software: Mohamadreza Yaghoobi6; Siram Ganesan7; Aaditya Lakshmanan8; Sririh Sundar9; Duncan Gready10; Shiva Rudra-araju11; John E. Allison12; Veera Sundararaghavan13; 1University of Michigan, Ann Arbor; 2University of Michigan; University of Wisconsin-Madison

3:00 PM A Fast Fourier Transform Based Crystal Plasticity Constitutive Model for Predicting Creep and Rupture Lifetime in Metallic Systems: Nathan Beets1; Laurent Capolungo2; Arul Mariyappan3; Ricardo Lebbensoh1; 1Los Alamos National Laboratory

3:20 PM PRISMS-PF: A High Performance Phase-field Modeling Framework to Simulate Microstructure Evolution: David Montiel1; Stephen DeWitt2; Yanjun Lyu3; Katsuyo Thornton4; John Allison5; 1University of Michigan

3:40 PM Invited Tools for Microstructural Analysis Using Computer Vision and Machine Learning: Elizabeth Holm1; Bo Lei2; Andrew Kitahara3; Nan Gao4; Ryan Cohn5; 1Carnegie Mellon University

4:20 PM AMPIS: Automated Materials Particle Instance Segmentation: Ryan Cohn1; Timothy Prost2; Iver Anderson3; Emma White4; Jordan Tiarks5; Elizabeth Holm6; 1Carnegie Mellon University; 2Ames Laboratory

4:40 PM A Method to Reconstruct Prior Beta Grain Orientations from Measured Alpha-phase Electron Backscatter Diffraction Data: Adam Pilchak1; 1US Air Force Research Laboratory

MATERIALS PROCESSING

Rare Metal Extraction & Processing — Li, Co, Au, Ag, PGMs, Te, Na, W, In

Sponsored by: TMS Extraction and Processing Division, TMS: Hydrometallurgy and Electrometallurgy Committee

Program Organizers: Gisele Azimi, University of Toronto; Takanari Ouchi, The University of Tokyo; Kerstin Forsberg, KTH Royal Institute of Technology; Hojong Kim, Pennsylvania State University; Shafiq Alam, University of Saskatchewan; Aalto University

Monday PM  March 15, 2021

2:00 PM Invited Environmental Aspects of the Electrochemical Recovery of Tellurium by Electrochemical Deposition-reodox Replacement (EDRR): Petteri Halli1; Marja Rinne2; Benjamin Wilson3; Kirsi Yliniemi4; Mari Lundstrom5; 1Aalto University

2:20 PM Sodium Metal from Sulfate: Jed Checketts1; Neale Neelameggham2; 1Powerball Industries; 2IND LLC

2:40 PM Preparation of High-grade Ammonium Metatungstate (AMT) as Precursor for Industrial Tungsten Catalyst: Aifara Baba1; Sadisu Girigisu2; Mustapha Raji3; Abdullah Ibrahim4; Daud Ololuw4; Kuranga Ayinla5; Christianan Adeyemi6; Aishat Abdulkareem7; Abdul Alabi8; Mohammed Abdul9; 1University of Ilorin; 2Kwara State University, Malete; 3Federal Polytechnic, Offa
3:00 PM Invited
Extraction of Platinum Group Metals from Spent Catalyst Material by a Novel Pyro-metallurgical Process: Ana Maria Martinez; Kai Tang; Camilla Sommerseth; Karen Olsen; SINTEF

3:20 PM
Developed Commercial Processes to Recover Au, Ag, Pt and Pd from E-waste: Reetha Panda; Manis Kumar Jha; Jae-chun Lee; Devendra Deo Pathak; CSIR-National Metallurgical Laboratory; Korea Institute of Geosciences and Mineral Resources (KIGAM); Indian Institute of Technology (ISM) Dhanbad

NANOSTRUCTURED MATERIALS

100 Years and Still Cracking: A Griffith Fracture Symposium — Fracture of Thin Films

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Nanomechanical Materials Behavior Committee

Program Organizers: Megan Cordill, Erich Schmid Institute of Materials Science; William Gerberich, University of Minnesota; David Bahr, Purdue University; Christopher Schuh, Massachusetts Institute of Technology; Daniel Kiener, Montanuniversität Leoben; Neville Moody; Nathan Mara, University of Minnesota; Erica Lilleoeden, Helmholz-Zentrum Geesthacht

Tuesday AM March 16, 2021

Session Chair: Megan Cordill, Erich Schmid Institute

8:30 AM Invited
Leveraging Griffith’s Energy Balance in Extreme Environments: Timothy Wehls; Johns Hopkins University

9:10 AM
Fracture-based Reuse of Single Crystal Wafers for High-Efficiency Photovoltaics: Jie Chen; Corinne Packard; Colorado School of Mines

9:30 AM
Modeling Insights into Micro Single-Edge Bend Fracture Toughness Testing of Multilayered Metal-ceramic Cu/TiN and Al/TiN Nanocomposite Thin Films: Daniel Savage; Shubhrodev Bhowmik; Cayla Harvey; Amit Misra; Nathan Mara; Jeffrey Wheeler; Johann Michler; Siddhartha Pathak; Marko Knezovic; University of New Hampshire/Los Alamos National Lab; University of New Hampshire; University of Nevada; University of Michigan; University of Minnesota; ETH Zürich; Empa, Swiss Federal Laboratories for Materials Science and Technology; University of Nevada/Iowa State University

9:50 AM Invited
Fracture and Adhesion in Small Scale Devices– Microswitches, Microcantilevers and Micron-thick Films: Maarten De Boer; Carnegie Mellon University

10:30 AM
Improving Metal-polymer Adhesion through Alloy Development: Megan Cordill; Patrice Krieml; Erich Schmid Institute

10:50 AM
Domain Nucleation in Ferroelastic Microcrystals: Competition between Twinning, Slip and Fracture: Jessica Krogsdad; Charles Smith; University of Illinois at Urbana-Champaign

ADDITIVE TECHNOLOGIES

2021 Young Innovator in the Materials Science of Additive Manufacturing Award Lecture — 2021 Young Innovator in the Materials Science of Additive Manufacturing Award Lecture

Tuesday AM March 16, 2021

11:00 AM
Introduction of Award Recipient: 2021 Young Innovator in the Materials Science of Additive Manufacturing Award Lecture: Allison Beese; Pennsylvania State University

11:05 AM Invited
Additive Manufacturing of High Temperature Metals: Present and Future Opportunities: Michael Kirka; Oak Ridge National Laboratory

11:35 AM Question and Answer Period Morderator: Allison Beese, Pennsylvania State University

ADVANCED MATERIALS

2D Materials – Preparation, Properties & Applications — Preparation & Properties

Sponsored by: TMS Functional Materials Division, TMS: Thin Films and Interfaces Committee

Program Organizers: Nuggehalli Ravindra, New Jersey Institute of Technology; Ramana Chintalapalle, University of Texas at El Paso; Gerald Ferblantier, Icube Laboratory - Strasbourg University; Sufian Abedrabbo, Khalifa University; Amber Shrivastava, Indian Institute of Technology Bombay

Tuesday AM March 16, 2021

Session Chairs: Ramana Chintalapalle, University of Texas - El Paso; Nuggehalli Ravindra (Ravi), New Jersey Institute of Technology

8:30 AM Invited
Pressure-induced Formation and Mechanical Properties of 2D Diamond Boron Nitride: Elisa Riedo; New York University

8:55 AM Keynote
Direct Conversion of Carbon into Graphene, Diamond or Q-carbon: A New Frontier in Materials Science and Applications: Jagdish Narayan; North Carolina State University

9:25 AM
Anisotropic Thermal Conductivity and Associated Heat Transport Mechanism in Roll-to-Roll Graphene Reinforced Copper Matrix Composites: Kunming Yang; Y.C. Ma; Z.Y. Zhang; J. Zhu; Yue Liu; T.X. Fan; Shanghai Jiao Tong University; Dalian University of Technology

9:45 AM Invited
Controlled Synthesis of Reduced Graphene Oxide-carbon Nanotube Hybrids and Their Applications in The Fabrication of Membranes for Water Purification: Samar Azizighannad; Oindrila Gupta; Somnath Mitra; New Jersey Institute of Technology

10:10 AM
Black Phosphorus Ink Formulation for Aerosol Jet Printing of Optoelectronics: Florent Muramutsa; Samuel Pedersen; Joshua Wood; Chad Husko; Brian Jacques; David Estrada; Boise State University; Promethean Consulting, LLC; Iris Light Technologies
NUCLEAR MATERIALS

Accelerated Discovery and Qualification of Nuclear Materials for Energy Applications — Challenges and Recent Progresses and in Nuclear Fuels and Materials Development

Sponsored by: TMS Structural Materials Division, TMS Materials Processing and Manufacturing Division, TMS: Integrated Computational Materials Engineering Committee, TMS: Nuclear Materials Committee, TMS: Additive Manufacturing Committee

Program Organizers: Yongfeng Zhang, University of Wisconsin-Madison; Adrien Couet, University of Wisconsin-Madison; Michael Tonks, University of Florida; Jeffery Aguilar, Idaho National Laboratory; Andrea Jokisaari, Idaho National Laboratory; Karim Ahmed, Texas A&M University

Tuesday AM March 16, 2021

Session Chairs: Tyler Gerczak, Oak Ridge National Laboratory; Robert Roach, Idaho National Laboratory

8:30 AM Invited

Materials Selection in Nuclear Applications a Challenge and an Opportunity for Advanced Material Design, Fabrication and Testing: Peter Hasemann1; Bernd Gludovatz2; Edward Ollard3; Michael Moschetti4; Ashley Reichardt1; Stuart Maloy3; 1University of California Berkeley; 2UNSW Sydney; 3Los Alamos National Laboratory

9:00 AM

High power irradiation testing of TRISO Mini-Fuel-Compacts in HFIR: Tyler Gerczak1; Christian Petrie1; Jason Harp1; Grant Helmreich2; John Hunn1; Andrew Kercher1; Zane Wallen1; Ryan Gallagher1; Kory Linton1; Annabelle Le Coq1; Ryan Latta1; Blaise Collin1; Nicholas Brown1; 1Oak Ridge National Laboratory; 2Kairos Power; 3University of Tennessee

9:20 AM Invited

Qualification of 316L Stainless Steel Components for ASME Pressure Retaining Applications: David Gandy1; Marc Albert1; Stephen Tate2; Clint Armstrong2; William Cleary1; 1Electric Power Research Institute; 2Westinghouse Electric Corporation

9:50 AM Invited

Overview of Nuclear Materials Discovery and Qualification Initiative (NMDQI): Robert Roach1; 1Idaho National Laboratory

10:20 AM

Development and Qualification of Ultrafine-grained and Nanocrystalline Steels for Nuclear Applications: Haiming Wen1; Andrew Hoffman1; Malavan Ariu1; Rinat Islamgaliev1; 1Missouri University of Science and Technology; 2Ufa State Aviation Technical University

10:40 AM

Development of Assembly Technique for Fuel Specimens for the MARCH-SERTTA TREAT Irradiation Testing Platform: Connor Woolum1; Lance Hone1; Korbin Tritthart1; 1Idaho National Laboratory

9:00 AM  Invited

Implementing Processing Strategies and Unique Hot Isostatic Pressing Treatments to Control Microstructure, Defect Content, and Mechanical Properties of Electron Beam Melted Ti-6Al-4V: Jake Benzing1; Nikolai Hrabe2; Enrico Lucon3; Timothy Quinn4; Julius Bonini4; Magnus Ahlors4; 1National Institute of Standards and Technology; 2Lucideon M+P; 3Quintus Technologies

9:40 AM

Quantifying Layer Uniformity in Ti6Al4V Hybrid Additively Manufactured Samples Using Ultrasound: Luz Sotelo1; Cody Pratt1; Rakesh Kumar Kunakaran1; Cody Kanger1; Michael Sealy1; Joseph Turner1; 1University of Nebraska Lincoln

ADDITIVE TECHNOLOGIES

Additive Manufacturing Fatigue and Fracture V: Processing-Structure-Property Investigations and Application to Qualification — Titanium

Sponsored by: TMS Structural Materials Division, TMS: Additive Manufacturing Committee, TMS: Mechanical Behavior of Materials Committee

Program Organizers: Nik Hrabe, National Institute of Standards and Technology; John Lewandowski, Case Western Reserve University; Nima Shamsaei, Auburn University; Mohsen Seifi, ASTM International/Case Western Reserve University; Steve Daniiewicz, University of Alabama

Tuesday AM March 16, 2021

Session Chair: Nik Hrabe, National Institute of Standards and Technology (NIST)

8:30 AM Invited

Effect of Oxide and Hydroxide on Cold Spray of Titanium Particles: Mobin Vandalad1; Arvnd Navabi1; Trevor Bond2; Nima Rahbar3; Winston Soboyejo1; 1Worcester Polytechnic Institute

9:20 AM

The Inhomogeneous Microstructure and Properties of Ti-6Al-4V Additively Manufactured with Electron Beam Freeform Fabrication: Samuel Present1; Karen Taminga2; Chris Domack2; Kevin Hemker3; 1Johns Hopkins University; 2NASA Langley Research Center

9:40 AM

Additive Manufacturing for Energy Applications III — Additive Manufacturing Applications in Nuclear

Sponsored by: TMS Structural Materials Division, TMS: Additive Manufacturing Committee, TMS: Nuclear Materials Committee

Program Organizers: Isabella Van Rooyen, Idaho National Laboratory; Indrajit Chait, University of Idaho; Subhashish Meher, Idaho National Laboratory; Michael Kirka, Oak Ridge National Laboratory; Kumar Sridharan, University of Wisconsin-Madison; Xiaoyuan Lou, Auburn University

Tuesday AM March 16, 2021

Session Chair: Kumar Sridharan, University of Wisconsin

8:30 AM Invited

Tailored Radiation Responses of 9-12 wt.% Cr Steels Through Additive Manufacturing: Kevin Field1; T.M. Kelsy Green1; Wei Cheng Zhong1; Pengyuan Xu1; Gabriella Bruno1; Niyanth Sridharan2; Lizhen Tan3; Maxim Gussev1; Ying Yang1; 1University of Michigan; 2Oak Ridge National Laboratory; 3Lincoln Electric
8:50 AM Functional Advanced Printings for Nuclear In-pile Sensing: Kunal Mondal; Michael McMurtrey; 1Idaho National Laboratory

9:10 AM Cold Spray Stainless Steel Deposition to Mitigate CISCC in Canisters for Used Nuclear Fuel Storage: Nicholas Pocquette; Hwasung Yeom; Hemant Agiwale; Kenneth Ross; John Kessler; Gary Cannell; Frank Pfefferkorn; Kumar Sridharan; 1University of Wisconsin Madison; 2Pacific Northwest Research Laboratory; 3The Ohio State University

9:30 AM A Review of Solution Based Processing Routes for Advanced Nuclear Fuel Materials: Elizabeth Zell; Milo Gill; Yazen Alfayez; Edward Herderick; Isabella Van Rooyen; 1Idaho National Laboratory; 2The Ohio State University

9:50 AM Cold Spray Mitigation of Chloride-induced Stress Corrosion Cracking in Austenitic Stainless Steel Welds: Haozheng Qu; Timothy Montoya; Rebecca Schaller; Eric Schindelholz; Kyle Johnson; Janelle Wharry; 1Purdue University; 2Sandia National Laboratories; 3The Ohio State University; 4ORNL VRC Metal Systems

10:10 AM Invited From Flight to Fission: Additive Manufacturing Advances at GE in Nuclear Energy: Vinup Gupta; Andrew Hoffman; Xiaoyuan Lou; Raul Rebak; 1GE Research; 2Auburn University

10:30 AM Laser Additive Manufacturing of Grade 91 Steel for Affordable Nuclear Reactor Components with Improved Radiation Tolerance: Stuart Maloy; Calvin Lear; Osman El-Atwani; Peter Hosemann; Jeff Bickel; Thomas Lienert; Tarasankar DebRoy; Tuinh Mukherjee; 1Los Alamos National Laboratory; 2University of California Berkeley; 3Optomec Inc; 4Penn State University

10:50 AM Cold Spray Chromium Deposition for Accident Tolerant Fuel Cladding: Tyler Dabney; Hwasung Yeom; Kyle Quillin; Nick Pocquette; Yinbin Miao; Kun Mo; Laura Jamison; Kumar Sridharan; 1University of Wisconsin Madison; 2Argonne National Laboratory

11:00 AM Evaluation of Oxide Dispersion Strengthened (ODS) Steel Fuel Cladding Tubes Manufactured by Cold Spray Technology: Hwasung Yeom; Vishnu Ramasawmy; Mia Lenling; Peter Hosemann; David Hoelzer; Stuart Maloy; Kumar Sridharan; 1University of Wisconsin Madison; 2University of California-Berkeley; 3Oak Ridge National Laboratory; 4Los Alamos National Laboratory

11:10 AM Infiltration for Fusion Energy Application: John Echols; Amy Elliott; Yutai Katoh; Lauren Garrison; 1Oak Ridge National Laboratory

ADDITIVE TECHNOLOGIES

Additive Manufacturing of Metals: Applications of Solidification Fundamentals — In Situ Characterization

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Additive Manufacturing Committee, TMS: Solidification Committee

Program Organizers: Alex Plotkowskii, Oak Ridge National Laboratory; Lang Yuan, University of South Carolina; Kevin Chaput, Northrop Grumman; Mohsen Aisle Zaeem, Colorado School of Mines; Wenda Tan, University of Utah; Lianyi Chen, University of Wisconsin-Madison

Tuesday AM March 16, 2021

Session Chairs: Mohsen Aisie Zaeem, Colorado School of Mines; Lang Yuan, University of South Carolina

8:30 AM Invited Characterization of Material Solidification Behaviors in Laser Powder Bed Fusion Using Operando Synchrotron X-ray Imaging: Tao Sun; Lianyi Chen; 1University of Virginia; 2University of Wisconsin-Madison

9:00 AM In-situHigh-speedX-ray Diffraction Study of Phase Transformation in a Laser-Processed 420 Stainless Steel: Xuan Zhang; Andrew Chhipin Chuang; Meimei Li; 1Argonne National Laboratory

9:20 AM In-situ Observation of Ferritic vs Austenitic Solidification Mode Competition in 316L Laser Powder Bed Fusion Welds with Synchrotron X-ray Diffraction: Joseph Aroh; Seungho Oh; Rachel Lim; Benjamin Gould; Andrew Chuang; 2P. Chris Pistorius; Anthony Rollett; 1Carnegie Mellon University; 2Argonne National Laboratory

9:40 AM In-situ X-ray Imaging of Melt Flow Dynamics in Laser Metal Additive Manufacturing: Qilin Guo; Cang Zhao; Minglei Qu; Lianghua Xiong; S. Mohammad H. Hojjatzadeh; Luis I. Escano; Niranjan D. Parab; Kamel Fezzaa; Tao Sun; Lianyi Chen; 1University of Wisconsin-Madison; 2Argonne National Laboratory; 3Missouri University of Science and Technology

10:00 AM In Situ Imaging of the Effect of Gas Flowrates on Directed Energy Deposition: Lorna Sinclair; Yunhui Chen; Samuel Clark; Oliver Hatfi; Sebastian Marussij; Saurabh Shah; Robert Atwood; Martyn Jones; Gavin Baxter; Chu Lun Alex Leung; Iain Todd; Peter Leel; 1University College London; 2University of Sheffield; 3Diamond Light Source Ltd; 4Rolls-Royce plc

10:20 AM Microstructure Evolution and Nanoindentation Measurements after Laser Re-solidification of Hypoeutectic Al-10 at %Cu: Mohammed Alamoudi; Vishwanath Bathula; Jörg Wiezorek; 1University of Pittsburgh

10:40 AM Simultaneous, In-situ Synchrotron X-ray Radiography and Thermal Imaging of Liquid-to-solid Phase Transformation during Laser Fusion Processing of Ti- and Ni-alloys: Rakesh Kamarthi; Ryan Heldt; Logan White; David Garcia; Rongxuan Wang; Zhenyu Kong; Kamel Fezzaa; Tao Sun; Hahn Cho; 1University of Tennessee Knoxville; 2Virginia Polytechnic Institute and State University; 3Argonne National Laboratory; 4University of Virginia
11:00 AM  
Ultrafast Dynamics of Solidification and Thermal Strain Evolution in Laser Powder Bed Additive Manufacturing Using High Energy X-ray Diffraction: Adrita Dass1; Chenxi Tian2; Shonak Bhattacharya2; Darren Pagan1; Atieh Moridi1; 1Cornell University; 2Cornell High Energy Synchrotron Source

11:20 AM  
In-situ X-ray Imaging of Porosity Formation in Directed Energy Deposition: Sarah Wolf1; Benjamin Gould2; Aaron Greco2; Tao Sun1; 1Texas A&M University; 2Argonne National Laboratory; 3University of Virginia

11:40 AM  
Undercooling in Laser Powder Bed Fusion Metal Additive Manufacturing: Meelap Coday1; Minglei Qu1; Qiliin Guo1; Lianyi Chen1; 1University of Wisconsin-Madison

TUESDAY AM

ADDITIVE TECHNOLOGIES

Additive Manufacturing: Materials Design and Alloy Development III -- Super Materials and Extreme Environments — Microstructural Aspects

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Additive Manufacturing Committee

Program Organizers: Behrang Poorganji, University of Waterloo; Hunter Martin, HRL Laboratories LLC; James Saal, Citrine Informatics; Orlando Rios, Oak Ridge National Laboratory; Atieh Moridi, Cornell University; Jiadong Gong, Questek Innovations LLC

Tuesday AM  
March 16, 2021

Session Chair: Orlando Rios, University of Tennessee

8:30 AM Invited  
Microstructure Evolution of Metallic Alloys under Additive Manufacturing Conditions: Amy Clarke1; Jonathan Pegues1; Benjamin Gould2; Raymond Puckett3; Brian Rodgers3; Jeremy Shin4; Kamel Fezzaa5; Sven Vogel5; Joseph McKeown6; Tresa Pollock1; 1Texas A&M University; 2Argonne National Laboratory; 3University of Wisconsin-Madison; 4Cornell University; 5University of California Santa Barbara; 6Oregon State University

9:00 AM Invited  
Solidification Condition and Its Effects on Microstructure in Metal-power Bed Fusion Processes: Yuichiro Koizumi1; 1Osaka University

9:30 AM  
Exploring the Structure-property Relationships of the Compositonally Graded WxCoCrFeMnNi High-entropy Alloy: Jonathon Pegues1; Michael Melia1; Benjamin Gould2; Raymond Puckett2; Shaun Whetten2; Nicolas Argibay1; Tomas Babuska1; Andrew Kustas1; 1Sandia National Laboratories; 2Argonne National Laboratory

9:50 AM  
Structure-property Relationships of Additively Manufactured Ni-Nb Binary Alloys: Andrew Kustas1; Jonathon Pegues1; N. Scott Bobbitt2; Raymond Puckett2; Morgan Jones1; Michael Chandross1; Nicolas Argibay1; 1Sandia National Laboratories

10:10 AM  
Microstructural and Mechanical Characterization of Additively Manufactured Al-Fe-V-Si: Paul Wilson1; Christopher Meyer2; Fatmata Barrie1; 1The Boeing Company

10:30 AM  
Bulk Single Crystals in Cubic Systems Produced via Electron Beam Melting Additive Manufacturing: Patxi Fernandez-Zelai1; Michael Kirka1; Sebastien Dryepondt1; Yousub Lee1; Christopher Ledford1; 1Oak Ridge National Laboratory

10:50 AM  
A Comparison between In-situ and Ex-situ Mixing of Nanoparticles with a Matrix in Additive Manufacturing of Metal Matrix Composite: Somayeh Poseban1; Milad Ghayoor2; Kijoob Lee2; Yujuan He2; Chih-hung Chang1; Brian Paul1; 1Oregon State University

ADDITIVE TECHNOLOGIES

Additive Manufacturing: Solid-State Phase Transformations and Microstructural Evolution — Simulation and Modelling

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Additive Manufacturing Committee, TMS: Phase Transformations Committee, TMS: Shaping and Forming Committee

Program Organizers: Bij-Na Kim, Carpenter Additive; Andrew Wessman, University of Arizona; Chantal Sudbrack, National Energy Technology Laboratory; Eric Lass, University of Tennessee-Knoxville; Katerina Christofidou, University of Sheffield; Peeyush Nandwana, Oak Ridge National Laboratory; Rajarshi Banerjee, University of North Texas; Whitney Poling, General Motors Corporation; Yousub Lee, Oak Ridge National Laboratory

Tuesday AM  
March 16, 2021

Session Chairs: Andrew Wessman, The University of Arizona; Yousub Lee, Oak Ridge National Laboratory

8:30 AM Invited  
Fundamental Investigation of Multi-Principal Element Alloy (MPEA) Design and Processing Research to Explore Additive Manufacturing (AM) Effects: Iver Anderson1; Emma White1; Duane Johnson1; Timothy Prost1; Ralph Napolitano2; Andrew Kustas1; Nicolas Argibay3; 1Iowa State University / Ames Laboratory; 2Sandia National Lab-NM

9:00 AM  
CALPHAD Based Thermo Kinetic Modeling for Additive Manufacturing (AM): A Case Study for Fusion Based and Supersolidus Liquid Phase Sintering During Binder Jet: Rangasayee Kannan1; Peeyush Nandwana1; 1Oak Ridge National Laboratory

9:20 AM  
Phase Field Modeling of Powder Densification in Sintering: Rui Dong1; Wenda Tan1; 1University of Utah

9:40 AM Invited  
Probabilistic Machine Learning Assisted Study of Directed Energy Deposited Alloys: Soumya Nag1; Yiming Zhang1; Sreekar Kannati1; Lee Kerwin2; Eric MacDonald2; Neil Johnson3; Sathyanarayanan Raghavan4; Dora Cheung4; Alex Kitt4; Changjie Sun1; Genghis Khan4; Chris Williams1; Thomas Broderick1; Mark Benedict1; Brandon Ribic1; 1GE Research; 2EVI - Buffalo Manufacturing Works; 3Youngstown State University; 4GE Aviation; 4Air Force Research Laboratory; 4America Makes

10:10 AM  
Prediction of Microstructure and Phase Evolution during Multitrack, Multi-layer Directed Energy Deposition of H13: Neil Bailey1; Christopher Katinas1; Yung Shin1; 1Purdue University
10:30 AM
New Insights on Cellular Structures Strengthening Mechanisms and Thermal Stability of L-PBF Stainless Steel 316L: Thomas Voisin1; Jean-Baptiste Forien2; Aurelien Perron3; Sylvie Aubry4; Nicolas Bertin5; Amit Samanta6; Alexander Baker7; Y. Morris Wang8; 1Lawrence Livermore National Laboratory

10:50 AM
Process Dependent Nanoscale Vanadium Clustering within Martensite Laths in Laser Powder Bed Fused Additively Manufactured Ti6Al4V: Mangesh Pantawane1; Sriswaroop Dasari2; Srinivas Mantri1; Rajarshi Banerjee3; Narendra Dahotre3; 1University of North Texas

CHARACTERIZATION

Advanced Characterization Techniques for Quantifying and Modeling Deformation — Session III

Sponsored by: TMS Extraction and Processing Division, TMS Materials Processing and Manufacturing Division, TMS Structural Materials Division, TMS: Characterization, Testing, and Simulation Committee, TMS: Materials Characterization Committee

Program Organizers: Rodney McCabe, Los Alamos National Laboratory; Marko Knezovic, University of New Hampshire; Irene Beyerlein, University of California-Santa Barbara; Wolfgang Pantleon, Technical University of Denmark; C. Tasan, Massachusetts Institute of Technology; Arul Kumar Mariyappan, Los Alamos National Laboratory; Olivia Underwood, Sandia National Laboratories

Tuesday AM March 16, 2021

8:30 AM
Characterization and Modeling of Deformation Twinning in Mg during Compression and Tension: Zhe Chen1; Mohammadreza Yaghoobi2; Veera Sundararaghavan3; John Allison4; Samantha Daly5; 1University of Michigan; 2University of California, Santa Barbara

8:50 AM
Recent Advances in Applying In-situ Electron Microscopy for Local Determination of Crack Processes: Daniel Kliener1; Markus Alfreider2; Inas Issa3; Michael Wurmshuber4; Michael Burtscher5; Klemens Schmuck1; 1University of Leoben

9:10 AM Invited
Materials Science Applications of Four Dimensional—scanning Transmission Electron Microscopy (4D-STEM): Colin Ophus1; 1Lawrence Berkeley National Laboratory

9:40 AM
Study of Slip Transmissibility and Its Correlation to Local Geometrically Necessary Dislocation Content in Grade 1 Pure Titanium: Harsha Phukan1; Thomas Bieler2; Rucjing Xu3; Philip Eisenlohr4; Martin Crimp5; Carl Biehler1; 1Michigan State University; 2Argonne National Laboratory

10:00 AM
Study of the Effect of Grain Boundary Parameters on the Micro Hall-Petch Slope in Mg Alloys: Mohsen Taheri Andani1; Aaditya Lakshmanan2; Veera Sundararaghavan3; John Allison4; Amit Misra5; 1University of Michigan

10:20 AM
Recent Advances in Bragg Coherent Diffraction for Nanoscale Imaging of Strain: Ross Harder1; 1Argonne National Laboratory

10:40 AM
Towards Accurate Absolute Stress and Orientation Measurement by Electron Backscatter Diffraction: Tijmen Vermeij1; Johan Hoefnagels2; 1Eindhoven University of Technology

ADVANCED MATERIALS

Advanced High Strength Steels V — Session III

Sponsored by: TMS Structural Materials Division, TMS: Steels Committee

Program Organizers: Ana Luiza Araujo, CBMM North America Inc.; Louis Hector, General Motors Global Technical Center; Igor Vieira, Nucor Steel; Lijia Zhao, ArcelorMittal USA; Krista Limmer, CCDC Army Research Laboratory; Jonah Klemm-Toole, Colorado School of Mines; Sebastien Allain, Institut Jean Lamour; MingXin Huang, University of Hong Kong

Tuesday AM March 16, 2021

8:30 AM
A Spatial Spin Average Approach to Model Austenitic Steels Using First Principle Calculations: Edwin Antillon1; Michelle Johannes2; Noam Bernstein2; 1Naval Research Lab

8:50 AM
Phase Evolution of Triple Nano-precipitate Strengthened Mn-stabilized Austenitic Steel: Colin Stewart1; Richard Fonda2; Keith Knipling3; Patrick Callahan3; 1National Research Council Associate at the U.S. Naval Research Laboratory; 2U.S. Naval Research Laboratory

9:10 AM
Microstructural Refinement and Homogenization of High Strength Austenitic Steels for Lightweighting Using Equal Channel Angular Pressing: Ibrahim Karaman1; Matthew Vaughan2; Sezer Picak3; 1Texas AM University

9:30 AM
Role of Metal Carbides in the Formation of Austenite in a High-Ni Martensitic Steel: Chia-Pao Lee1; Amir Farkoosh2; Paul Lambert3; David Seidman4; 1Northwestern University; 2Carderock Division, Naval Surface Warfare Center

9:50 AM
Effects of Cold Rolling on Austenite Formation in a QLT-Treated High-Ni Martensitic Steel: Chia-Pao Lee1; Amir Farkoosh2; Paul Lambert3; David Seidman4; 1Northwestern University; 2Carderock Division, Naval Surface Warfare Center

10:10 AM
Twinning-induced Plasticity of Austenitic Lightweight High-entropy Steel: Hung-Wei Yen1; Zen-Hao Lai2; Yi-Hsuan Sun3; Yi-Ting Lin4; Jui-Fan Tu5; 1National Taiwan University; 2China Steel Corporation
ENERGY & ENVIRONMENT

Advanced Magnetic Materials for Energy and Power Conversion Applications — Developments in Magnetic Materials for Sensors and Data Storage

**Sponsored by:** TMS Functional Materials Division, TMS: Magnetic Materials Committee

**Program Organizers:** Richard Beddingfield, North Carolina State University; Daniel Salazar, BCMaterials; Alex Leary, NASA Glenn Research Center; Huseyin Ucar, California Polytechnic University; Yongmei Jin, Michigan Technological University; Arcady Zhukov, University of the Basque Country

**Tuesday AM**

**Session Chair:** Manh-Huong Phan, University of South Florida

8:30 AM


8:50 AM


9:10 AM


9:30 AM Invited

Kondo-like Behaviour and GMR Effect in Co-Cu Granular Alloys and Multilayers: Ricardo Lopez Anton1; Hooman Sabarou2; Yu Zhong3; 1Worcester Polytechnic Institute

10:00 AM Invited

Magnetic Real-time Tracking of Coronavirus Progress: A New Approach Utilizing Magnetic Sensor and Machine Learning: Manh-Huong Phan1; 1University of South Florida

10:30 AM Invited

Oxide Thin-film Electronics for the Front-end Conditioning of Flexible Magnetic Field Sensors: Niko Münzenrieder1; 1Free University of Bozen-Bolzano

11:00 AM

The Development of On-chip-coil Type GSR Sensor: Yoshinobu Honkura1; Shinpin Honkura1; Mizue Uemura1; 1Magnedesign Corp.

ENERGY & ENVIRONMENT

Advanced Materials for Energy Conversion and Storage VII — Energy Conversion with Emphasis on SOFC

**Sponsored by:** TMS Functional Materials Division, TMS: Energy Conversion and Storage Committee

**Program Organizers:** Jung Pyung Choi, Pacific Northwest National Laboratory; Soumendra Basu, Boston University; Amit Pandey, Lockheed Martin Space; Paul Ohodnicki, University of Pittsburgh; Kyle Brinkman, Clemson University; Partha Mukherjee, Purdue University; Surojit Gupta, University of North Dakota

**Tuesday AM**

**Session Chairs:** Soumendra Basu, Boston University; Amit Pandey, Lockheed Martin Space

8:30 AM

Experimental and Computational Investigations of the Multiple Impurities Effect on the SOFC Cathode Materials: Rui Wang1; Hooman Sabarou2; Yu Zhong3; 1Worcester Polytechnic Institute

8:50 AM

Characteristics of Advanced Protective Layer for SOFC Stacks: Jung Pyung Choi1; John Hardy1; 1Pacific Northwest National Laboratory

9:20 AM Invited

Compositionally-stabilized Nickelate-Ceria Composite Oxygen Electrodes for Reversible Solid Oxide Fuel Cells and Electrolyzers: Srikanth Gopalan1; Jane Banner1; Ayesha Akta1; 1Boston University

9:50 AM

Computational Guided Investigations on LSM/YSZ Triple-phase Boundaries: Rui Wang1; Yu Zhong3; 1Worcester Polytechnic Institute

10:10 AM

In-situ Cathode Cleaning for Chromium Poisoning Recovery in Solid Oxide Fuel Cells: Zhikuan Zhu1; Michelle Sugimoto2; Srikanth Gopalan1; Soumendra Basu1; Uday Pal1; 1Boston University

10:40 AM

Three-dimensional Simulation of Electrochemical Impedance in Solid Oxide Fuel Cell (SOFC) Cathodes and Its Application in Cathode Characterization: Vishwas Goel1; Dalton Cox2; Scott Barnett3; Katsuyo Thornton1; 1University of Michigan; 2Northwestern University
CHARACTERIZATION

Advanced Real Time Imaging — Alloys

Sponsored by: TMS Functional Materials Division, TMS Structural Materials Division, TMS: Advanced Characterization, Testing, and Simulation Committee, TMS: Alloy Phases Committee, TMS: Biomaterials Committee

Program Organizers: Jinichiro Nakano, US Department of Energy National Energy Technology Laboratory; David Alman, National Energy Technology Laboratory; Il Sohn, Yonsei University; Hiroyuki Shibata, Imram, Tohoku University; Antoine Allano, Massachusetts Institute of Technology; Noritaka Salto, Kyushu University; Anna Nakano, US Department of Energy National Energy Technology Laboratory; Zuotai Zhang, Southern University of Science and Technology; Candan Tamerler, University of Kansas; Bryan Webler, Carnegie Mellon University; Wangzhong Mu, KTH Royal Institute of Technology; David Veysset, Stanford University

Tuesday AM March 16, 2021
Session Chairs: Wangzhong Mu, KTH Royal Institute of Technology; Bryan Webler, Carnegie Mellon University

8:30 AM Invited
In Situ Thermoelastic Property Evolution of Ni-based Concentrated Solid Solution Alloys under Extremes: Cody Dennett1; 1Idaho National Laboratory

8:50 AM
Atomic Scale Processes of Initial Oxidation of Cu and Cu-Ni Alloy Revealed by In Situ Environmental TEM: Meng Li1; Matthew Curnan1; Richard Garza1; Stephen House1; Wissam Saidi1; Judith Yang1; 1University of Pittsburgh

9:10 AM
In Situ Investigation of the Effect of Ion Irradiation and Carbon Addition in GST on Crystallization and Amorphization Thresholds: Trevor Clark1; David Adams1; Khalid Hattar1; 1Sandia National Laboratories

9:30 AM
High-velocity Microparticle Impact Modes for Mismatched Metals: David Veysset1; Mostafa Hassan1; Yuchen Sun1; Keith Nelson1; Christopher Schuh1; 1Massachusetts Institute of Technology; 2Cornell University

9:50 AM
Dynamics of Abnormal Grain Growth in a Particle-containing System Uncovered by Multimodal Three-dimensional X-ray Imaging: Jiaojong Kang1; Ning Lu1; Nancy Senabulya1; Nicolas Gueninault1; Ashwin Shahani1; 1University of Michigan; 2Carl Zeiss X-ray Microscopy, Inc.

MATERIALS PROCESSING

Advances in Powder and Ceramic Materials Science — Ceramic Particles and Powder

Sponsored by: TMS Extraction and Processing Division, TMS Materials Processing and Manufacturing Division, TMS: Materials Characterization Committee, TMS: Powder Materials Committee

Program Organizers: Bowen Li, Michigan Technological University; Shefford Baker, Cornell University; Huazhang Zhai, Beijing Institute of Technology; Kathy Lu, Virginia Polytechnic Institute and State University; Rajiv Soman, Eurofins EAG Materials Science LLC; Faqin Dong, Southwest University of Science and Technology; Jinhong Li, China University of Geosciences (Beijing); Ruigang Wang, The University of Alabama; Eugene Olevsky, San Diego State University

Tuesday AM March 16, 2021
Session Chairs: Bowen Li, Michigan Tech; Rajiv Soman, Eurofins EAG Materials Science LLC

8:30 AM Invited
Understanding the Role of Electric Field in the Manipulation of Particles in Aqueous Media and Fabrication of Ice-templated Ceramics: Dipankar Ghosh1; Sashanka Akurati1; Shizhi Qian1; Diego Terrones1; Bharath Gundrati1; 1Old Dominion University

8:50 AM
Chemical Etch/Modification Effect on CO Oxidation Performance of Ceria Supported Catalysts: Ruigang Wang1; Yifan Wang1; 1The University of Alabama

9:10 AM
Layered Ceramic Structures In1+x(Ti1/2Zn1/2)1-xO3(ZnO)m (m = 2, 4, and 6; x = 0.5): Synthesis, Phase Stability and Dielectric Properties: Victor Emmanuel Alvarez Montano1; Subhash Sharma2; Francisco Brown1; Alejandro Durán1; 1Universidad De Sonora; 2Catedra CONACYT CNyN-UNAM; 3Universidad Nacional Autonoma de Mexico CNyN-UNAM

9:30 AM
Mineralogical Characteristics of Sepiolite under Thermal Treatment: Huaguang Wang1; Bowen Li1; 1Michigan Technological University

9:50 AM
Dielectrophoretic Control of Ceramic Particles for Fabrication of Ice-templated Structures: Bharath Gundrati1; Sashanka Akurati1; Shizhi Qian1; Dipankar Ghosh1; 1Old Dominion University
TUESDAY AM  March 16, 2021

Session Chairs: Mitchell Wood, Sandia national lab; Oliver Johnson, Brigham Young University

8:30 AM
AI Guided High-throughput Exploration of Potential Energy Surfaces: Subramanian Sankaranarayanan1; 1University of Illinois Chicago

9:00 AM
Decision Trees in Continuous Action Space for High-throughput Exploration of Potential Energy Surfaces: Sukriti Manna1; Troy Loeffler1; Rohit Batra1; Suvo Banik1; Henry Chan1; Subramanian Sankaranarayanan1; 1Argonne National Laboratory

9:20 AM
Building a Better Database to Learn From: Application to Interatomic Potentials: Mitchell Wood1; Nicholas Lubbers2; Danny Perez2; Charles Sievers1; 1Sandia National Laboratories; 2Los Alamos National Laboratory

9:40 AM
Neural Network Reactive Force Field for C, H, N, O Systems: Pilsun Yoo1; Michael Sakano1; Saaketh Desai1; Mahbubul Islam1; Peilin Liao1; Alejandro Strachan1; 1Purdue University; 2Wayne State University

10:00 AM
Accelerating Phase-field Predictions via Machine Learning Trained Surrogate Models: David Montes de Oca Zapiain1; James Stewart1; Remi Dingreville1; 1Sandia National Laboratories

10:20 AM
Simultaneous Development and Robust Optimization of a Microstructure Dependent Material Model: Leveraging Sequential Monte-Carlo Methods to Enhance Symbolic Regression Analysis: Karl Garbrecht1; Nolan Strauss1; Geoffrey Bomarito2; Patrick Leser1; Jacob Hochhalter1; 1University of Utah; 2NASA

10:40 AM
Exploring Metastability and Mapping Metastable Phase Diagrams Using Machine Learning: Srilok Srinivasan1; Rohit Batra1; Duan Luo1; Troy Loeffler1; Sukriti Manna1; Henry Chan1; Liuxiang Yang1; Wenge Yang1; Jianguo Wen1; Pierre Darancet1; Subramanian Sankaranarayanan1; 1Argonne National Laboratory; 2Center for High Pressure Science and Technology Advanced Research

11:00 AM
Machine Learning Guided Discovery of Novel Oxide Perovskites for Scintillator Applications: Anjana Talapatra1; Blas Uberuaga1; Christopher Stanek1; Ghanshyam Pilania1; 1Los Alamos National Laboratory

Program Organizers: Kamal Choudhary, National Institute of Standards and Technology; Garvit Agarwal, Argonne National Laboratory; Wei Chen, Illinois Institute of Technology; Mitchell Wood; Sandia National Laboratories; Vahid Attari, Texas A&M University; Oliver Johnson, Brigham Young University; Richard Hennig, University of Florida

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Computational Materials Science and Engineering Committee

Session Chairs: Mitchell Wood, Sandia national lab; Oliver Johnson, Brigham Young University

8:30 AM
Exascale-motivated Algorithm Development for Nano and Mesoscale Materials Methods: Samuel Reeve1; Matthew Rolchigo1; Jim Belak1; 1Lawrence Livermore National Laboratory

8:50 AM
Preparing for Exascale Phase-field Simulations: Scalable, Performance-portable Precipitation Simulations: Stephen DeWitt1; Philip Fackler1; Younggil Song1; Bala Radhakrishnan1; John Turner1; 1Oak Ridge National Laboratory

9:10 AM
Tusas: A Modern Computational Approach for Microstructure Evolution Toward Exascale: Supriyo Ghosh1; Christopher Newman1; Marianne Francois1; 1Los Alamos National Laboratory

9:30 AM
Bayesian Data Assimilation for Phase-field Simulation of Solid-state Sintering: Akimitsu Ishii1; Akinori Yamanaka1; Yuki Okada1; Akiyasu Yamamoto1; 1Tokyo University of Agriculture and Technology

9:50 AM
Phase Field Dislocation Dynamics (PFDD) Modeling of Non-Schmid Effects in BCC Metals: Hyungjun Kim1; Nithin Mathew1; Darby J. Luscher1; Abigail Hunter1; 1Los Alamos National Laboratory

10:10 AM
A Quantitative Phase-field Model for Study of Shape Memory Behavior and Elastocaloric Effect in CuAlBe: Cheikh Cisse1; 1Colorado School of Mines

Program Organizers: Mohsen Asle Zaeem, Colorado School of Mines; Mikhail Mendelev, KBR; Bryan Wong, University of California, Riverside; Ebrahim Asadi, University of Memphis; Garritt Tucker, Colorado School of Mines; Charudatta Phatak, Argonne National Laboratory; Bryce Meredig, Citrine Informatics

Session Chairs: Cheikh Cisse, Colorado School of Mines; Mohsen Asle Zaeem, Colorado School of Mines

8:30 AM
Algorithm Development in Materials Science and Engineering — Large Scale Computational Simulations and Microscale Algorithms for Study Structure-Processing Relations


Program Organizers: Mohsen Asle Zaeem, Colorado School of Mines; Mikhail Mendelev, KBR; Bryan Wong, University of California, Riverside; Ebrahim Asadi, University of Memphis; Garritt Tucker, Colorado School of Mines; Charudatta Phatak, Argonne National Laboratory; Bryce Meredig, Citrine Informatics

Tuesday AM  March 16, 2021

Session Chairs: Cheikh Cisse, Colorado School of Mines; Mohsen Asle Zaeem, Colorado School of Mines

8:30 AM
Exascale-motivated Algorithm Development for Nano and Mesoscale Materials Methods: Samuel Reeve1; Matthew Rolchigo1; Jim Belak1; 1Lawrence Livermore National Laboratory

8:50 AM
Preparing for Exascale Phase-field Simulations: Scalable, Performance-portable Precipitation Simulations: Stephen DeWitt1; Philip Fackler1; Younggil Song1; Bala Radhakrishnan1; John Turner1; 1Oak Ridge National Laboratory

9:10 AM
Tusas: A Modern Computational Approach for Microstructure Evolution Toward Exascale: Supriyo Ghosh1; Christopher Newman1; Marianne Francois1; 1Los Alamos National Laboratory

9:30 AM
Bayesian Data Assimilation for Phase-field Simulation of Solid-state Sintering: Akimitsu Ishii1; Akinori Yamanaka1; Yuki Okada1; Akiyasu Yamamoto1; 1Tokyo University of Agriculture and Technology

9:50 AM
Phase Field Dislocation Dynamics (PFDD) Modeling of Non-Schmid Effects in BCC Metals: Hyungjun Kim1; Nithin Mathew1; Darby J. Luscher1; Abigail Hunter1; 1Los Alamos National Laboratory

10:10 AM
A Quantitative Phase-field Model for Study of Shape Memory Behavior and Elastocaloric Effect in CuAlBe: Cheikh Cisse1; 1Colorado School of Mines

Program Organizers: Mohsen Asle Zaeem, Colorado School of Mines; Mikhail Mendelev, KBR; Bryan Wong, University of California, Riverside; Ebrahim Asadi, University of Memphis; Garritt Tucker, Colorado School of Mines; Charudatta Phatak, Argonne National Laboratory; Bryce Meredig, Citrine Informatics

Tuesday AM  March 16, 2021

Session Chairs: Cheikh Cisse, Colorado School of Mines; Mohsen Asle Zaeem, Colorado School of Mines

8:30 AM
Algorithm Development in Materials Science and Engineering — Large Scale Computational Simulations and Microscale Algorithms for Study Structure-Processing Relations


Program Organizers: Mohsen Asle Zaeem, Colorado School of Mines; Mikhail Mendelev, KBR; Bryan Wong, University of California, Riverside; Ebrahim Asadi, University of Memphis; Garritt Tucker, Colorado School of Mines; Charudatta Phatak, Argonne National Laboratory; Bryce Meredig, Citrine Informatics
ELECTRONIC MATERIALS

Alloys and Compounds for Thermoelectric and Solar Cell Applications IX — Session III

Sponsored by: TMS Functional Materials Division, TMS Structural Materials Division, TMS: Alloy Phases Committee

Program Organizers: Hsin-Jay Wu, National Chiao Tung University; Sinn-wen Chen, National Tsing Hua University; Franck Gascoin, CNRS CRISMAT Unicaen; Philippe Jund, Montpellier University; Yoshisato Kimura, Tokyo Institute of Technology; Lan Li, Boise State University; Takao Mori, National Institute for Materials Science; Tiejun Zhu, Zhejiang University; Alexandra Zevakinka, Michigan State University; Wan-Ting Chiu, Tokyo Institute of Technology

Tuesday AM  March 16, 2021

Session Chairs: Yoshisato Kimura, Tokyo Institute of Technology; Chenguang Fu, Zhejiang University

8:30 AM Invited
Mg3(Sb,Bi)2 Thermoelectric Single Crystals: From p-type to n-type: Chenguang Fu1; Yu Pan2; Katsuki Imasato3; Mengyu Yao3; Tiejun Zhu3; G. Jeffrey Snyder1; Claudia Felser2; Zhejiang University; 1Max Planck Institute for Chemical Physics of Solids; 2Northwestern University

8:50 AM Invited
Optimization of n- and p-type Mg2X (X: Si, Ge, Sn): Understanding the Impact of Mg on the Thermoelectric Performance and the Change of the Valence Bands Under Solid Solution Formation: Johannes De Boor1; Hasbuna Kamila1; Mohammad Yasser1; Aryan Sankhla1; Eckhard Müller2; 1German Aerospace Center

9:10 AM Invited
Phase Interface Formation Induced by Phase Separation Process in Thermoelectric Mg(Si, Sn) Alloys and (Zr, Ti)NiSn Alloys: Yoshisato Kimura1; Yaw Wang Chai2; Manabu Watanabe3; Yonghoon Lee2; Tokyo Institute of Technology; 2KELK Ltd.

9:30 AM
Microstructure and Band Engineering for the High Performance of n-type Mg3Sb2-Mg3Bi2 Alloy: Kazuki Imasato1; G. Jeffrey Snyder1; 1Northwestern University

9:50 AM Invited
Self-tuning of Carrier Type and Improved Thermoelectric Performance in Skutterudite CoM1.5Te1.5 (M = Sn or Ge): Li-Chyong Chen1; Suneesh MV2; Ta-Lei Chou3; Kuei-Hsien Chen4; 1National Taiwan University; 2Academia Sinica

10:10 AM Invited
The Doping Effects on the Thermal Conductivity of GeTe: Jie Mo1; Jiong Yang2; Yangzhong Pei1; Siqi Lin3; 1Shanghai Jiao Tong University; 2Shanghai University; 3Tongji University

10:30 AM
High-performance GeTe-based Thermoelectric Materials via Carrier Optimization: Yi-Fen Tsao1; Hsin-Jay Wu1; 1National Chiao Tung University

10:50 AM
Phase Transition Behavior and Thermoelectric Property of Te doped Cu2Se: Wan-Ting Yen1; Hsin-jay Wu1; 1National Chiao Tung University

11:10 AM Invited
Functionalization of the Conductive Network and Structural Disorder Engineering: Two Strategies to Reach High ZT in Ternary and Quaternary Sulfides: Emmanuel Guilmneau1; 1Laboratoire CRISMAT

11:30 AM
Effect of Structural Disorder on the Thermoelectric Properties of Kesterite (Cu2ZnSnS4): Eleonora Isetta1; Binayak Mukherjee2; Carlo Fasciulli1; Nicola M. Pugno3; Paolo Scardi2; 1University of Trento; 2CNR-ICMATE, Lecco Unit

LIGHT METALS

Alumina and Bauxite — Novel Processes and Bauxite Residue

Sponsored by: TMS Light Metals Division, TMS: Aluminum Committee

Program Organizer: Anne Duncan, Hatch

Tuesday AM  March 16, 2021

8:30 AM Invited
Revisiting Alternative Smelter Grade Alumina Production Processes: Andrey Panov4; Alexander Senyuta5; Andrey Smirnov5; 4RUSAL Engineering and Technological Center

9:05 AM
Silicon Rich Iron Alloy from Bauxite Residue: Halvor Dalaker1; Casper van der Eijck2; 1Sintef

9:25 AM
Bauxite Residue Neutralization Potential Using Biogenic Sulfuric and Citric Acids: Patricia Silva1; Roseanne Holanda1; Andre Carmo2; Fernando Gomes2; Raphael Costa3; Caio Melo3; Adriano Lucheto3; Marcelo Montini3; 1SENAI Innovation Institute for Mineral Technologies; 2Norsk Hydro Brasil

9:45 AM
Gravity Methods Applied to Bauxite Residue for Mineral Precipitation: Paula Araújo1; Patricia Silva1; Andre Carmo2; Marcus Vinicius Gonçalves2; Raphael Costa3; Caio Melo3; Adriano Lucheto3; Marcelo Montini3; 1SENAI Innovation Institute for Mineral Technologies; 2SENAI Innovation Institute for Mineral Processing; 3Norsk Hydro Brasil

LIGHT METALS

Aluminum Alloys, Processing and Characterization — Material Processing and Modeling

Sponsored by: TMS Light Metals Division, TMS: Aluminum Committee

Program Organizer: Dimitry Sediako, University of British Columbia

Tuesday AM  March 16, 2021

Session Chair: Eric Taleff, University of Texas

8:30 AM
Simulations of Wear-induced Microstructural Evolution in Nanocrystalline Aluminum: Yeqi Shi1; Izabela Szulfarska2; 1University of Wisconsin-Madison

8:50 AM
High-throughput Aluminum Alloy Discovery Using Laser Additive Manufacturing: Qingyu Pan1; Monica Kapoor1; Sean Míleski2; John Carsley2; Xiaoyuan Lou1; 1Auburn University; 2Novelis Global Research and Technology Center
9:10 AM  Manufacturing A206 Aluminum Alloy by Step Sand Casting: Effect of Solidification Time on Mechanical and Surface Properties of the Cast Samples Using Mechanical and Simulation Results: Amir Kordjizaji1; Pradeep Rohatgi1; 1University of Wisconsin Milwaukee

9:30 AM  Experimental and Numerical Examinations Regarding the Material Flow of Combined Rolling Extrusion Process: Christoph Heinzel1; Aleksandr Salnikov2; Sören Müller3; 1SMS Group GmbH; 2RUSAL; 3FZS - TU Berlin

9:50 AM  Comparison of Simulation and Real Life to Set Up Holistic Approach for Extrusion Process: Zeynep Tutku Ozen1; Mehmet Bugra Güner1; Osman Halil Çelik1; Gökrem Özçelik1; Murat Konar1; Turgay Güler2; Cem Mehmetalioglu1; Mustafa Serkan Özcan1; Tolga Demirkiran1; 1ASAS

10:10 AM  Computational Simulation of Nanoparticle Distributions in Metal Matrix Composite Casting Processes: Gongyuan Zheng1; Juergen Jakumeit1; Thomas Pabel2; Christian Kneissl2; Luca Magagnini3; 1ACCESS e. V.; 2Austrian Foundry Research Institute (FOI); 3Politecnico di Milano

10:30 AM  Effect of Thermomechanical Processing on Strengthening of the 5181 Alloy (with 0.03 %Sc) Sheets for Preservation of 40 % Improved Strength Compared with 5083: Dmitry Fokin1; Aleksandr Alabin1; Sergey Valchuk1; Viktor Mann1; Aleksandr Krokhin1; 1Light Materials and Technologies Institute UC RUSAL; 2JSC RUSAL Management

10:50 AM  Question and Answer Period

LIGHT METALS

Aluminum Reduction Technology — Cell Operation (Performance and Operating Advances)

Sponsored by: TMS Light Metals Division, TMS: Aluminum Committee

Program Organizers: Nadia Ahli, Emirates Global Aluminium; Nancy Holt, Hydro Aluminium AS

Tuesday AM  March 16, 2021

Session Chairs: Nabeel Al Jallabi, ALBA; Nancy Holt, Hydro Aluminium AS

8:30 AM  Carbon Dust - Its Short-Term Influence on Potroom Operations: Matthias Dechant1; 1Trimet Aluminium SE

8:50 AM  Experience with Lengthy Pot Hibernation at Alcoa Baie-Comeau: Xiangwen Wang1; Marie-Eve Laframboise1; Patricia Gagnon1; Gilles Proulx1; 1Alcoa Corp

9:10 AM  Improvement to Alpys Instability and Alumina Feeding Control: Anne Gosselin1; 1Rio Tinto

9:30 AM  Hydro’s New Karmey Technology Pilot: Start-up and Early Operation: Pierre Reny1; Martin Segatz2; Haakon Haakonsen1; Havard Gikling1; Mona Assadian1; Jan Frode Holnes1; Espen Kvithaug1; Asgeir Bardal1; Erik Solbu1; 1Hydro

9:50 AM  AP12 Low Energy Technology at ALRO Smelter: Marian Cilianu1; Bertrand Allano2; Gheorghe Dobra1; Ion Maesescu1; Claude Ritter2; Andre Augé1; Yves Caratini1; 1Vimetco alro; 2Rio Tinto

10:10 AM  Question and Answer Period

ADVANCED MATERIALS

Bulk Metallic Glasses XVIII — Alloy Development and Application I

Sponsored by: TMS Structural Materials Division, TMS: Mechanical Behavior of Materials Committee

Program Organizers: Peter Liaw, University of Tennessee; Yanfei Gao, University of Tennessee-Knoxville; Hahn Choo, University of Tennessee; Yunfeng Shi, Rensselaer Polytechnic Institute; Robert Maass, Federal Institute for Materials Research and Testing (BAM); Xie Xie, FCA US LLC; Gongyao Wang, Alcoa Technical Center

Tuesday AM  March 16, 2021

Session Chairs: Peter Liaw, The University of Tennessee; Jinn Chu, National Taiwan University of Science and Technology

8:30 AM Invited Overview on Additive Manufacturing Techniques for Bulk Metallic Glasses: Douglas Hofmann1; Punnathat Bordeennikhisam2; Samad Firdosy1; Andre Pate2; Daniel East3; 1NASA JPL/Caltech; 2CSIRO

8:55 AM  Demisability of Bulk Metallic Glasses for Potential Satellite Applications: Punnathat Bordeennikhisam1; Scott Roberts2; Douglas Hofmann1; J. Martin Raitl3; Benton Greene1; John Bacon1; Sungwoo Sohn1; Jan Schroers1; 1NASA Jet Propulsion Laboratory; 2NASA Johnson Space Center; 3Yale University

9:15 AM  Nanomolding Far and Close to Equilibrium: Naijia Liu1; Guannan Liu1; Arindam Raj1; Sungwoo Sohn1; Jan Schroers1; 1Yale University

CHARACTERIZATION


Sponsored by: TMS Extraction and Processing Division, TMS: Materials Characterization Committee

Program Organizers: Jian Li, CanmetMATERIALS; Mingming Zhang, ArcelorMittal Global R&D; Bowen Li, Michigan Technological University; Sergio Monteiro, Instituto Militar de Engenharia; Shadia Ikhamayes; Yunus Kalay, Middle East Technical University; Jiann-Yang Hwang, Michigan Technological University; Juan Escobedo-Diaz, University of New South Wales; John Carpenter, Los Alamos National Laboratory; Andrew Brown, Army Research Laboratory; Rajiv Soman, Eurofins EAG Materials Science LLC; Alex Moser, US Naval Research Laboratory

Tuesday AM  March 16, 2021

Session Chairs: Andrew Brown, Army Research Laboratory; Yunus Kalay, Middle East Technical University

8:30 AM  On the Origins of the Discrepancies between Optical, SEM, and EBSD-based Grain Size Measurements: Eric Payton1; Kayla Evans1; 1Air Force Research Laboratory
8:50 AM
A Correlative Approach for Distinguishing Multiple BCC Phases in Thick-Section High Strength Steels: Virginia Bertolo; Guanxin Jiang; Carey Walters; Jitl Sietsma; Vera Popovich; Delft University of Technology; TNO

9:10 AM
Ultrasonic Scattering in Two-phase Polycrystalline Materials: Showmic Islam; Musa Norouzian; Joseph Turner; University of Nebraska-Lincoln

9:30 AM
Effects of Microstructural Features on the Crack Initiation Mechanism in AA6451 during Three-point Bending: Yung Suh Yoo; Sazol Das; Richard Hamerton; Josh Kacher; Georgia Institute of Technology; Nveloits Inc.

9:50 AM
Applying Stereological Characterisation to the Solidification Structure of Single Crystal Alloys to Deduce the 3D Macroscopic Solid/Liquid Interface Shape: Joel Strickland; Bogdan Nenchev; Karl Tassenberg; Samuel Perry; Gareth Sheppard; Hongbiao Dong; University of Leicester

10:10 AM
Development of Onboard Temperature Monitoring System for Axlebox in Railway Bogie: Jeongguik Kim; Korea Railroad Research Institute

10:30 AM
Influence of Morphology on Ultrasonic Scattering: A Theoretical Study: Showmic Islam; Musa Norouzian; Joseph Turner; University of Nebraska-Lincoln

10:50 AM
In Situ Study of High Temperature Oxidation of Alloys Using Ambient Pressure X-ray Photoelectron Spectroscopy: Richard Oleksak; John Baltrus; Tao Liu; Rafik Addou; J Trey Diulus; Gregory Herman; Bharat Gwalani; Arun Devaraj; Omer Dogan; National Energy Technology Laboratory; Oregon State University; Pacific Northwest National Laboratory

11:10 AM
Characterization of Reactive Metallic Nanolayers through High-speed Imaging: Ali Bagheri Behboud; Feyza Kazanci; Sezer Ozerinc; Middle East Technical University

NUCLEAR MATERIALS

Characterization of Nuclear Materials and Fuels with Advanced X-ray and Neutron Techniques — Neutron Diffraction and Imaging

8:30 AM Invited
Advanced Characterization of Nuclear Fuel Using Neutron Imaging: Yuxuan Zhang; Hassina Bilheux; Kristian Myhre; Jean Bilheux; Jiao Lin; Jared Johnson; Andrew Miskowiec; Rodney Hunt; Louis Santodonato; Jamie Molaison; Paris Cornwall; Erik Stringfellow; Oak Ridge National Laboratory; Satelytics; Advanced Research Systems, Inc.

8:55 AM Invited
Neutron Imaging at LANSCE: Characterizing Nuclear Materials for Next Generation Reactor Designs: Alexander Long; Sven Vogel; Los Alamos National Laboratory

9:20 AM
Characterization of Irradiated Nuclear Fuels with Pulsed Neutrons: Sven Vogel; Kenneth McClellan; Luca Capriotti; Jason Harp; Alexander Long; Danielle Schaper; Eric Larson; D. Travis Carver; Jay Lin; Peter Housemann; Thilo Balke; Los Alamos National Laboratory; Idaho National Laboratory; Oak Ridge National Laboratory; UC Berkeley; LANL/Purdue University

9:40 AM
Characterization of the Crystal Structure Evolution of U-Zr Alloys Utilizing Time-of-Flight Neutron Diffraction with In-situ- heating: Walter Williams; Sven Vogel; Jianzhong Zhang; Maria Okuniewski; Idaho National Laboratory; Los Alamos National Laboratory; Purdue University

10:00 AM
Microstructure and Crystal Structure Studies in the U-Zr System: Sven Vogel; Yi Xie; Luca Capriotti; Michael Benson; Jason Harp; Los Alamos National Laboratory; Purdue University; Idaho National Laboratory; Oak Ridge National Laboratory

10:20 AM
Non-destructive Characterization of Nuclear Materials using Neutron Imaging Techniques: Hassina Bilheux; Yuxuan Zhang; Jean Bilheux; Erik Stringfellow; Kristian Myhre; Brianne Beers; Brent Heuser; Tommy Thomasson; Amy Jones; Richard Ibberson; Oak Ridge National Laboratory

10:40 AM
Neutron Radiography Capabilities at LANSCE: Completing LANSCE’s Cold/Thermal/Epithermal Imaging Suite With Fast-neutron Radiography: Danielle Schaper; Jeremy Bundaard; Carl Carlson; Patrick Feng; Donald Gautier; Alexander Long; Darcy Newmark; Sven Vogel; Los Alamos National Laboratory; Nevada National Security Site; Sandia National Laboratory

TUESDAY AM
11:00 AM
Transmission Spectrum Estimation and Material Decomposition with Energy Resolved Neutron Imaging: Thilo Balke; Alexander Long; Sven Vogel; Brendt Wohlgemuth; Charles Bouman; Los Alamos National Laboratory

NUCLEAR MATERIALS

Composite Materials for Nuclear Applications — Ceramic Composites

Sponsored by: TMS Structural Materials Division, TMS: Composite Materials Committee, TMS: Nuclear Materials Committee

Program Organizers: Anne Campbell, Oak Ridge National Laboratory; Dong Liu, University of Bristol; Rick Ubic, Boise State University; Lauren Garrison, Oak Ridge National Laboratory; Peng Xu, Idaho National Laboratory; Johann (Hans) Riesch, Max Planck Institute for Plasma Physics

Tuesday AM  March 16, 2021

Session Chair: Peng Xu, Idaho National Laboratory

8:30 AM  Invited
SiGASiC-SiC Composites Development for Accident Tolerant Fuel: Christian Deck; Rolf Haefelfinger; Jon Sheeder; Lucas Borowski; Sarah Oswald; Joel Kosmatka; Ryan Hon; Kirill Shapovalov; Sean Gonderman; Jack Gazzia; Christina Back; General Atomics

9:00 AM
Development of PVD Cr Coatings for Hydrothermal Corrosion Mitigation of SiC-SiC Fuel Cladding in LWRS: Kyle Quillin; Hwasung Yeom; Tyler Dabney; John Lacy; Taeho Kim; Sergey Chemerisov; Adrien Couet; Kumar Sridharan; University of Wisconsin, Madison; Argonne National Laboratory

9:20 AM
Corrosion and TEM Analysis of CVD and PVD Coatings for BWR Accident Tolerant Fuel Cladding: Ryan Schoell; Joey Kabel; Sebastian Lam; Kirill Shapovalov; Peter Hosemann; Djamel Kaoumi; North Carolina State University; University of California Berkeley; General Atomics

9:40 AM
Novel Fiber Fretting Technique for Tribological Properties of Composite Interphases: Joseph Kabel; Thomas Edwards; Caroline Hain; Tatiana Kochetkova; Johann Michler; Peter Hosemann; University of California, Berkeley; EMPA

PHYSICAL METALLURGY

Computational Thermodynamics and Kinetics — Software Tools and Material Prediction / Thermodynamics and Phase Selection

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Chemistry and Physics of Materials Committee, TMS: Computational Materials Science and Engineering Committee

Program Organizers: Nana Ofori-Opoku, Canadian Nuclear Laboratories; Eva Zarkadoula, Oak Ridge National Laboratory; Enrique Martinez Saez, Clemson University; Vahid Attari, Texas A&M University; Jorge Munoz, University of Texas at El Paso

Tuesday AM  March 16, 2021

Session Chairs: Prashant Singh, Ames Laboratory; Vahid Attari, Texas A&M University; Enrique Martinez Saez, Clemson University; Carelyn Campbell, National Institute of Standards and Technology

8:30 AM  Invited
Application of CALPHAD-based Tools for Optimizing AM Microstructures and Properties: Carelyn Campbell; Mark Stoudt; James Zuback; Souzan Hammadi; National Institute of Standards and Technology; Royal Institute of Technology (KTH)

9:00 AM
Ga-Sn-Zn Alloys – Thermophysical Properties of Novel Liquid Metals: Alexandra Dobosz; Tomasz Gancarz; Institute of Metallurgy and Materials Science Polish Academy of Sciences

9:20 AM  Invited
Understanding Phase Stability and Diffusion Kinetics in Structurally Unstable Phases from First-principles: Sara Kadkhodaei; University of Illinois at Chicago

9:50 AM
First Principles Thermodynamics of Fe-Cr-Mn Carbides in High-Mn Steels: Lekshmi Sreekala; Tilmann Hickel; Jörg Neugebauer; Max-Planck-Institute For Iron Research

10:10 AM
Interplay between Chemical Interactions and Constituent Strain Energy during the Early Stages of Precipitations: Kang Wang; Du Cheng; Bi-Cheng Zhou; University of Virginia
CORSION

Corrosion in Heavy Liquid Metals for Energy Systems — Materials Compatibility with Liquid Metal Coolants III

Sponsored by: TMS Structural Materials Division, TMS: Corrosion and Environmental Effects Committee, TMS: Nuclear Materials Committee

Program Organizers: Osman Anderoglu; University of New Mexico; Alessandro Marino, SCK-CEN; Michael Short, Massachusetts Institute of Technology; Peter Hosemann, University of California; Mike Ickes, Westinghouse Electric Company

Tuesday AM March 16, 2021
Session Chairs: Osman Anderoglu, University of New Mexico; Alessandro Marino, SCK-CEN

8:30 AM
Electromagnetic Flow Sensor for Heavy Liquid Metals for Energy Systems: Heng Ban1; Osman Anderoglu2; Cetin Unal2; 1University of Pittsburgh; 2University of New Mexico; 3Los Alamos National Lab

8:50 AM
Report on the LBE-Irradiation-Corrosion Experiment (ICE): Peter Hosemann1; 1University of California, Berkeley

9:10 AM
Investigation on the Evaporation Rate of Liquid Lead and Radioisotope Retention Capability of Molten Lead as Coolant: Shuprio Ghosh1; Osman Anderoglu2; Cemal Cakez2; Khaleel Talaat3; Keith Woloshun4; Michael Epstein4; Sung Lee4; Paolo Ferroni5; Emre Tatli6; Matthew M Emmott7; 1University of New Mexico; 2Los Alamos National Laboratory; 3University of California, Berkeley; 4Sandia National Laboratories; 5University of California; 6Los Alamos National Laboratory; 7Westinghouse Electric Company, LLC; 8Fauske & Associates, LLC; 9Brigham Young University

PHYSICAL METALLURGY

Defect and Phase Transformation Pathway Engineering for Desired Microstructures — Invited Presentations

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Phase Transformations Committee

Program Organizers: Yufeng Zheng, University of Nevada-Reno; Rongpei Shi, Lawrence Livermore National Laboratory; Yipeng Gao, Idaho National Laboratory; Timofey Frolov, Lawrence Livermore National Laboratory; Stoichko Antonov, Max-Planck-Institut für Eisenforschung GmbH, Jessica Krogstad, University of Illinois at Urbana-Champaign; Bin Li, University of Nevada, Reno

Tuesday AM March 16, 2021
Session Chairs: Yufeng Zheng, University of Nevada Reno; Rongpei Shi, Lawrence Livermore National Laboratory

8:30 AM Invited
New Insights on Deformation Twinning- Mechanisms and Modeling: Huseyin Sehitoglu1; ASK Mohammed2; Orcun Celebi3; Gorkem Gengor1; Jessica Krogstad1; 1University of Illinois

8:50 AM Invited
Phase Transformation Pathways in High Entropy Alloys or Complex Concentrated Alloys mediated by Defects: Sriswaroop Dasari1; Bharat Gwalani2; Yao-Jen Chang3; Deep Choudhuri4; Stephane Gorse5; An-Chou Yeh6; Rajarshi Banerjee1; 1University of North Texas; 2National Tsing Hua University; 3University of Bordeaux, France

9:10 AM Invited
Microstructure and Tensile Behavior of Nanostructured Gradient TWIP Steel: Jie Ding1; Zhongxia Shang1; Jin Li2; Haiyan Wang1; Xinghang Zhang1; 1Purdue University

9:30 AM Invited
Kinetic Monte Carlo Simulations of Solute Clustering in Multicomponent Al Alloys: Mingfei Zhang1; Zhucong Xi1; Louis Hector Jr1; Chaoming Yang2; Liang Qi3; 1University of Michigan

9:50 AM Invited
Grain Boundary Segregation in Immiscible Alloys: Anisotropy and Trijunction Effects: Anne Barnett1; Michael Cox2; Derek Moore3; Maher Alghalayini1; Chris Barr2; Khalid Hattar1; Brad Boyce1; Fadi Abdeljawad1; 1Clemson University; 2Sandia National Laboratories

10:10 AM Invited
Development of Superalloys Driven by Atomic-scale Interactions of Solutes with Crystal Defects: Paraskevas Kontis1; Stoichko Antonov2; Philipp Kurnsteiner2; Shyam Katnagati1; Jabar Mianroodi1; Lola Liliensten1; 1Max-Planck-Institut für Eisenforschung GmbH; 2Karlsruhe Institute of Technology; 3CNRS - Institut de Recherche de Chimie Paris

10:30 AM Invited
Evolution of Metastable Grain Boundaries and Its Implications on Nanocrystals’ Hardness Variation: Zhitong Bai1; Glenn Balbus2; Daniel Gianola2; Yue Fan3; 1University of Michigan; 2UCSB

MATERIALS PROCESSING

Deformation Induced Microstructural Modification — Session III: Computational Studies of Deformation

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Shaping and Forming Committee

Program Organizers: Arun Devaraj, Pacific Northwest National Laboratory; Suveen Mathaudhu, University of California-Riverside; Kester Clarke, Colorado School of Mines; Bharat Gwalani, Pacific Northwest National Laboratory; Daniel Coughlin, Los Alamos National Laboratory

Tuesday AM March 16, 2021
Session Chairs: Peter Sushko, Pacific Northwest National Laboratory; Suveen Mathaudhu, University of California Riverside

8:30 AM Invited
Grain Boundary Segregation in Nanocrystalline Alloys: Multicomponent, Anisotropy, and Trijunction Effects: Malek Alkayalit1; Yasir Mahmood2; Josh Arrington2; Fadi Abdeljawad1; 1Clemson University

9:00 AM Invited
Effect of Loading Path on Grain Misorientation Evolution in Polycrystalline Al under Large Deformation: Wentai Fu1; Yulan Li2; Shenyang Hu3; Peter Sushko1; Suveen Mathaudhu2; 1Pacific Northwest National Laboratory; 2Pacific Northwest National Laboratory & University of California, Riverside
9:20 AM
A First Principles Criterion for Microstructure Evolution in Deformation Twinned FCC Materials: Matthew Daly; Ritesh Jagatramka; Junaid Ahmed; University of Illinois at Chicago

9:40 AM Invited Microstructure-based Modeling of Impact-Induced Plastic Deformation: Qi Tang; Mostafa Hassani; Cornell University

10:10 AM
Molecular Dynamics Simulations of Defect Structure Evolution under Shear Deformation in Polycrystalline Al: Nanjun Chen; Shenyang Hu; Wahyu Setyawan; Peter Sushko; Suveen Mathaudhu; Pacific Northwest National Laboratory; University of California, Riverside

10:30 AM
Modeling the Bonding and Structure of Non-metallic Inclusions within a Nickel Matrix during Forging: Brandon Macey; Thomas Siegmund; Michael Sangid; Purdue University

**ELECTRONIC MATERIALS**

**Electronic Packaging and Interconnections 2021 — Solder Joint Intermetallics**

**Sponsored by:** TMS Functional Materials Division, TMS: Electronic Packaging and Interconnection Materials Committee

**Program Organizers:** Mehran Maalekian, Mat-Tech; Christopher Gourlay, Imperial College London; Babak Arfaei, Ford Motor Company; Praveen Kumar, Indian Institute of Science; Sai Vadlamani, Intel Corporation; Kazuhiro Nogita, University of Queensland; David Yan, San Jose State University

**Tuesday AM** March 16, 2021

**Session Chairs:** Kazuhiro Nogita, The University of Queensland; Xin Fu Tan, The University of Queensland

**8:30 AM**
On Interface Formation in Zr-based BMG /6061 Al Interconnects Joined by µFSSW: David Yan; Logan Vahlstrom; San Jose State University

**8:50 AM**
Real-time Observation of the Accelerated Growth of Cu6Sn5 on Cu-xNi: Xin Tan; Sergey Belyakov; Te-Cheng Su; Stuart McDonald; Christopher Gourlay; Hideyuki Yasuda; Syo Matsumura; Kazuhiro Nogita; University of Queensland; Imperial College London; Kyoto University; Kyushu University

**9:10 AM**
Influence of Indium on the Microstructure and Properties of Interfacial IMC in Sn-rich Solder Joints: Experiments and First Principle Calculations: Amey Lukhtule; Arun Sundar; Nikhilesh Chawla; Purdue University

**9:30 AM**
Atomic Insights into the Role of Dopants in Cu6Sn5 toward Its Structural Stability: Wenhui Yang; Xuan Quy Tran; Tomokazu Yamamoto; Kazuhiro Nogita; Syo Matsumura; Kyushu University; University of Queensland

**9:50 AM Invited**
Reducing Cracking in BGA Solder Joint Cu6Sn5 by Controlling the Reflow Profile: Kazuhiro Nogita; Flora Somidin; Keith Sweatman; Tetsuya Akaiwa; Tetsuro Nishimura; Syo Matsumura; Xiaohou Ye; Stuart McDonald; University of Queensland; Universiti Malaysia Perlis (UniMAP); Nihon Superior Co. Ltd.; Kyushu University

**ENERGY & ENVIRONMENT**

**Energy Technologies and CO2 Management — Session III**

**Sponsored by:** TMS Extraction and Processing Division, TMS Light Metals Division, TMS: Energy Committee

**Program Organizers:** Alafara Baba, University of Ilorin; Lei Zhang, University of Alaska Fairbanks; Donna Guillen, Idaho National Laboratory; Xiaobo Chen, RMIT University; John Howarter, Purdue University; Neale Neelameggham, IND LLC; Cong Wang, Northeastern University; Ziqi Sun, Queensland University of Technology; Hong Peng, University of Queensland; Yu Lin Zhong, Griffith University

**Tuesday AM** March 16, 2021

**Session Chairs:** Hong Peng, University of Queensland; Xiaobo Chen, RMIT University

**8:30 AM**
Effects on Operational Capabilities and Lifecycle of Commercially Available Li-ion Batteries Due to Partial Nail Penetration from Drop Hammer Impact Test: Casey Jones; Bing Li; Vikas Tomar; Purdue University

**8:50 AM**
Excitonic Effects in Absorption Spectra of Carbon Dioxide Reduction Photocatalysts: Tathagata Biswas; Arunima Singh; Arizona State University

**9:10 AM**
Experimental Study and Numerical Modeling of Nanoparticle Injection Technology for Remediation of CO2 Storage: Linfei Li; Yige Zhang; Mija Hubler; Yunping Xi; Pania Newell; University of Colorado Boulder; University of Utah

**9:30 AM**
High Temperature Properties in Ferritic Heat Resistant Steels with Intermetallic Precipitates for High Efficient Heat Recovery Systems: Akio Mitani; Mari Miyoseta; Yukio Tachi; Sanyo Special Steel Co., Ltd.
**CORROSION**

**Environmentally Assisted Cracking: Theory and Practice — Hydrogen Embrittlement**

*Sponsored by:* TMS Structural Materials Division, TMS: Corrosion and Environmental Effects Committee

*Program Organizers:* Bai Cui, University of Nebraska-Lincoln; Raul Rebak, GE Global Research; Srijan Rokkam, Advanced Cooling Technologies Inc; Jenifer Locke, Ohio State University

**Tuesday AM**

**March 16, 2021**

**Session Chairs:** Ian Robertson, University of Wisconsin-Madison; Reiner Kirchheim, Georg-August-Universität Göttingen

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**8:30 AM Invited**

**Hydrogen Embrittlement — A Retrospective Opinion:** Ian Robertson¹; ¹University of Wisconsin-Madison

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**9:15 AM**

**Discrepancy Between Hydrogen-modified Dislocation Structures in the Surface and Interior Grain:** Shuai Wang²; Qingqing Sun¹; ¹Southern University of Science and Technology

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**9:35 AM**

**Macroscopic-based Approaches for Assessing the Influence of Hydrogen on the Deformation Behavior of Polycrystalline Ni:** Zachary Harris¹; Sean Agnew¹; James Burns¹; ¹University of Virginia

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**9:55 AM**

**Assessing the Susceptibility of Existing Pipelines to Hydrogen Embrittlement:** Tim Boot¹; Ton Riemslag¹; Elise Reinton¹; Carey Walters¹; Ping Liu²; Vera Popovich¹; ¹TU Delft; ²INTECEA BV

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**MATERIALS DESIGN**

**Fatigue in Materials: Fundamentals, Multiscale Characterizations and Computational Modeling — Multi-mechanical Interactions during Extreme Environment Fatigue Loading**


*Program Organizers:* Garrett Pataky, Clemson University; Ashley Spear, University of Utah; Antonios Kontsos, Drexel University; Brian Wisner, Ohio University; Jean-Charles Stinville, University of California-Santa Barbara

**Tuesday AM**

**March 16, 2021**

**Session Chair:** Brian Wisner, Ohio University

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**8:30 AM**

**Additively Manufactured Haynes 282 Superalloy Using L-PBF: Heat Treatment Effect on Mechanical Properties at Room and Elevated Temperatures:** Seyed Ghiaasiaan¹; Nabeel Ahmad¹; Paul Gradi²; Samuel Cordner²; Colton Katsarelis²; William Tilson²; Shuai Shao³; Nima Shasaæli³; ¹Auburn University; ²Georgia Institute of Technology

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**8:50 AM**

**Quantification of Fatigue Crack Growth Rates and Fatigue-creep Load Interaction Effects of Heterogeneous Fiber Networks via Thresholded Strain Fields:** Sarah Palushkiewicz³; Yoon Joo Na³; Christopher Muhlstein¹; ¹Georgia Institute of Technology

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**9:10 AM**

**Rapid Characterization of Cyclic Response of Small-volume Metal Samples Using Spherical Microrodentation Stress-strain:** Camilla Johnson¹; Soumya Mohan²; Reji John²; Adam Pilchak³; Surya Kalidindi¹; ¹Georgia Institute of Technology; ²Air Force Research Laboratory

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**9:30 AM**

**Fatigue Crack Growth in a Ni-rich NiTiHf High Temperature Shape Memory Alloy under Thermomechanical Loading:** Behrouz Haghpouryart³; Benjamin Young²; Ibrahim Karamani¹; Dimitris Lagoudas¹; ¹Texas A&M University

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**MATERIALS PROCESSING**

**Friction Stir Welding and Processing XI — Friction Stir Technologies**

*Sponsored by:* TMS Materials Processing and Manufacturing Division, TMS: Shaping and Forming Committee

*Program Organizers:* Yuri Hovanski, Brigham Young University; Piyush Upadhyay, Pacific Northwest National Laboratory; Yutaka Sato, Tohoku University; Nilesh Kumar, University of Alabama, Tuscaloosa; Anton Naumov, Peter the Great St. Petersburg Polytechnic University

**Tuesday AM**

**March 16, 2021**

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**8:30 AM**

**Effect of Die Geometry on Rate-controlled Friction Extrusion:** Xiao Li¹; Md. Reza-E-Rabbi¹; Lei Li¹; Ayoub Souliami¹; Glenn Grant¹; Anthony Reynolds¹; ¹University of Virginia; ²Pacific Northwest National Laboratory; ³University of South Carolina

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**8:50 AM**

**Engineered Metal Matrix Composites Produced Via Co-extrusion for High-temperature Friction Stir Welding:** Paul Brune¹; Greg Hilmas¹; Jeremy Watts¹; ¹Missouri University of Science and Technology

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**9:10 AM**

**Residual Stresses and Nanoscale Evolution in AA6061 Produced by Additive Friction Stir-deposition:** Luke Brewer¹; Ning Zhu¹; Dustin Avery¹; Paul Allison¹; James Jordon¹; Yan Chen²; Ke An³; ¹University of Alabama; ²Oak Ridge National Laboratory

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**9:30 AM**

**Additive Friction Stir Deposition for Repair and Cladding Applications:** Hang Yu¹; ¹Virginia Polytechnic Institute and State University

All times listed are in EDT time zone (UTC-4:00).

www.tms.org/TMS2021
PHYSICAL METALLURGY

Frontiers in Solidification Science VIII — Eutectic Growth

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Chemistry and Physics of Materials Committee, TMS: Phase Transformations Committee, TMS: Solidification Committee, TMS: Computational Materials Science and Engineering Committee

Program Organizers: Damien Tourret, IMDEA Materials; Amy Clarke, Colorado School of Mines; Ulrike Hecht, Access e.V.; Nana Ofori-Opoju, Canadian Nuclear Laboratories; Melis Serefoglu, Koc University; Tiberiu Stan, Northwestern University

Tuesday AM March 16, 2021

Session Chairs: Nathalia Mangelinck-Noël, Aix Marseille Univ. CNRS, IM2NP UMR 7334; Melis Serefoglu, Koç University; Sabine Bottin-Rousseau, Sorbonne University; Ulrike Hecht, Access e.V.

8:30 AM Invited
Coupled and Decoupled Eutectic Growth in a Transparent Irregular Eutectic Alloy: Sabine Bottin-Rousseau1; Samira Mohagheghi2; Silvaere Akamatsu3; Melis Serefoglu2; 1Sorbonne University; 2Koç University; 3European Synchrotron ESRF, CRG IF Beamline BM32

9:00 AM
Crystal-orientation Maps of Lamellar Eutectic Growth Microstructures in Thin Al-Al2Cu Films Obtained by Laue Microdiffraction: Mehdi Medjhoune1; Silvère Akamatsu3; Geoffroy Prévot1; Jean-Sébastien Micha2; Sabine Bottin-Rousseau1; 1Nanoscience institute of Paris; 2European Synchrotron ESRF, CRG IF Beamline BM32

9:20 AM
Coexistence of Rod-like and Lamellar Eutectic Growth Patterns: In Situ Experiments in Microgravity: Silvère Akamatsu3; Sabine Bottin-Rousseau1; Mathis Plapp1; Victor Witusiewicz2; Ulrike Hecht2; 1Cnrs; 2Sorbonne University; 3Ecole Polytechnique; 4Access eV

9:40 AM
Phase-field Simulations of the Lamella-to-rod Transition in Eutectic Solidification: Mathis Plapp1; Sabine Bottin-Rousseau1; Silvère Akamatsu3; 1Ecole Polytechnique, CNRS; 2Sorbonne Université, CNRS

10:00 AM
Orientation Relationships and Pattern Evolution in Directionally Solidified Al-Cu-Mg Ternary Eutectic: Dominic Ezenemaka1; Amber Genau1; 1University of Alabama at Birmingham

10:20 AM Invited
Phase Field Modeling of Solidification with Application to Template-directed Solidification: Erik Hanson1; Mojue Zhang1; Yanjun Lyu1; David Montiel1; Katsuyo Thornton1; 1University of Michigan

10:50 AM
Probing the Growth Dynamics of Eutectic Colonies in Zn-Al via X-ray Video Microscopy: Yeqing Wang3; Jianrong Gao2; Ashwin Shahani3; 1University of Michigan; 2Northeastern University

11:10 AM
Lamellar Spacing Selection during Oscillatory Eutectic Solidification: Paul Chao1; Ashwin Shahani3; 1University of Michigan

11:30 AM
Phase Field Modeling of Biomineralization? Microstructure Evolution in Mollusk Shells: Laszlo Granasy1; Laszlo Ratkai1; Tamas Pusztai1; 1Wigner Research Centre for Physics

SPECIAL TOPICS

Frontiers of Materials Award Symposium: 2021 Functional Nanomaterials: Translating Innovation into Pioneering Technologies — Session I

Program Organizer: Deep Jariwala, University of Pennsylvania

Tuesday AM March 16, 2021

8:30 AM Invited
Programmable Gold Nanowire Electronic Skins and Tattoos: Wenlong Cheng1; 1Monash University

9:00 AM Invited
Wearable Gas Sensors with Wireless Communication and RF Energy Harvesting Capabilities: Huanyu Cheng2; 1Pennsylvania State University

9:50 AM Invited
Engineering Self-folding and Shape Morphing in Patterned Materials: David Gracias1; 1Johns Hopkins University

10:30 AM Invited
Flexible Printable Bioelectronics Devices: Wearable Biosensors and Bioenergy Harvesters: Joseph Wang3; 1University California, San Diego

SPECIAL TOPICS

Frontiers of Materials Award Symposium: Low-Dimensional Materials and Interfaces for Next Generation Computing — Session II

Program Organizer: Huanyu Cheng, Pennsylvania State University

Tuesday AM March 16, 2021

8:30 AM Invited
Introductory Comments: Frontiers of Materials Award Symposium: Low-dimensional Materials and Interfaces for Next Generation Computing: Deep Jariwala1; 1University of Pennsylvania

8:35 AM Invited
Gate-tunable Neuromorphic Devices Enabled by Low-dimensional Materials: Mark Hersam1; 1Northwestern University

9:15 AM Invited
2D/3D Heterostructures for Low-power Logic and Memory Devices: Deep Jariwala1; 1University of Pennsylvania

9:55 AM Invited
Ferroelectrics: From Memory to Computing: Suman Datta1; 1University of Notre Dame
LIGHT METALS

Greater Than the Sum of Its Parts — Concurrent Alloy Design and Processing Science: An LMD Symposium Honoring Raymond Decker — Session II

Sponsored by: TMS Light Metals Division, TMS: Magnesium Committee

Program Organizers: Victoria Miller, University of Florida; Eric Nyberg, Tungsten Heavy Powder & Parts; J. Brian Jordon, University of Alabama; Wilhelmus Sillekens, European Space Agency; Neale Neelameggham, IND LLC; Vineet Joshi, Pacific Northwest National Laboratory

Tuesday AM  March 16, 2021

Session Chair: Victoria Miller, University of Florida

8:30 AM Invited
Thixomolded Magnesium: Quick, Light, and Mighty: Tracy Berman1; 1University of Michigan

9:00 AM Invited
Magnesium Sheet Alloy Development for Room Temperature Forming: Alan Luo1; Renhai Shi1; Jiashi Miao1; Thomas Avey1; 1Ohio State University

9:30 AM
Impacts of Grain Boundary Particle Characteristics on Twin Transmission: Benjamin Anthony2; Brandon Leu1; Irene Beyerlein2; Victoria Miller1; 1University Of Florida; 2University of California Santa Barbara

9:50 AM Keynote
Evolution of Alloy Design, It's Science/Instruments Base, Tech Transfer Routes and Market Pull, 1921-2021: Raymond Decker1; 1University of Michigan

10:35 AM Break

10:55 AM Panel Discussion

NANOSTRUCTURED MATERIALS


Sponsored by: TMS Structural Materials Division, TMS: Mechanical Behavior of Materials Committee

Program Organizers: Yuntian Zhu, City University of Hong Kong; Kei Arayama, Ritsumeikan University; Irene Beyerlein, University of California-Santa Barbara; Yves Breschet, Grenoble Institute of Technology; Huijian Gao, Nanyang Technological University; Hyong Seop Kim, Pohang University of Science and Technology; Ke Lu, Institute of Metal Research; Xiaolei Wu, Chinese Academy of Sciences

Tuesday AM  March 16, 2021

Session Chairs: Andrea Hodge, University of Southern California; Megumi Kawasaki, Oregon State University; Nobuhiro Tsuji, Kyoto University

8:30 AM Invited
Heterogenous Nanostructured Nickel Superalloy: Andrea Hodge1; 1University of Southern California

8:55 AM
Interface Affected Plasticity in Accumulative Roll Bonded FCC/BCC Metallic Laminates: Rodney McCabe1; Matthew Schneider2; Jonathan Gigax2; Nan Li1; Thomas Nizolek1; John Carpenter1; 1Los Alamos National Laboratory

9:15 AM
Mechanical Properties and Structural Stability of a Bulk Nanostructured Metastable Aluminum-magnesium: Megumi Kawasaki1; 1Oregon State University

9:35 AM Invited
Nucleation of New Deformation Modes in Nanostructured Metals: Nobuhiro Tsuji1; 1Kyoto University

10:00 AM Invited
Solid-state Additive Manufacturing of Heterostructured Materials via Additive Friction Stir Deposition: Hang Yu1; 1Virginia Polytechnic Institute and State University

10:25 AM
Optimizing Wear and Corrosion Resistance of Metallic Multilayers through Atomic-scale Design: Wenbo Wang1; Wenjun Cai1; 1Virginia Polytechnic Institute and State University

ADVANCED MATERIALS

High Entropy Alloys IX: Alloy Development and Properties — Structures and Mechanical Properties I

Sponsored by: TMS Functional Materials Division, TMS Structural Materials Division, TMS: Alloy Phases Committee, TMS: Mechanical Behavior of Materials Committee

Program Organizers: Peter Liaw, University of Tennessee; Michael Gao, National Energy Technology Laboratory; E-Wen Huang, National Chiao Tung University; Srivatsan Tirumalai, The University of Akron; Xie Xie, FCA US LLC; Gongyao Wang, Alcoa Technical Center

Tuesday AM  March 16, 2021

Session Chairs: Lei Lu, Institute of Metal Research, Chinese Academy of Sciences; Hyoung Kim, Pohang University of Science and Technology

8:30 AM Keynote
Current Perspectives in High Entropy Alloys: Diran Apelian1; Benjamin Macdonald2; Cheng Zhang3; Enrique Lavernia1; 1University of California, Irvine

9:00 AM Invited
FCC-HCP Transformation in Cr-Mn-Fe-Co-Ni High Entropy Alloys: Mechanical Property and Nanograin Formation: Koichi Tsuchiya1; Jangho Yi1; Baozheng Jiang1; Je In Lee2; 1National Institute for Materials Science; 2Pusan National University

9:25 AM
Low Cycle Fatigue Behavior and Cyclic Plastic Response of Equiatomic CrCoNi Medium-entropy Alloy: Milan Heczko1; Veronika Mazanova1; Connor Slone1; Ivo Kubena3; Jiri Tobias3; Tomas Kruml3; Easo George1; Maryam Ghazisaeidi1; Jaroslav Polak2; Michael Mills1; 1The Ohio State University; 2Institute of Physics of Materials CAS; 3Oak Ridge National Laboratory

9:45 AM Invited
Deformation Twinning in FCC High- and Medium-entropy Alloys: Haruyuki Inui1; Koudai Nitsui1; Kyosuke Kishida1; 1Kyoto University
10:40 AM Invited
High-strain-rate 2000% Superplasticity in A nanostructured High-entropy Alloy: Hyoung Seop Kim1; Nhungh Thi-Cam Nguyen1; Peyman Asghari-Rad2; Praveen Sathiyananthothri1; Ailrezza Zargaran3; Chong Soo Lee1; 1Pohang University of Science and Technology

10:35 AM
Intermediate Temperature Precipitation in the HfNbTaTiZr Multi-principal Element Alloy: Megan Emigh1; Noah Phillips2; Leah Mills3; Sean Murray4; Tresa Pollock5; 1University of California, Santa Barbara; 2ATI Specialty Alloys and Components

ADVANCED MATERIALS
High Entropy Alloys IX: Structures and Modeling — Structures and Modeling III

Sponsored by: TMS Functional Materials Division, TMS Structural Materials Division, TMS: Alloy Phases Committee, TMS: Mechanical Behavior of Materials Committee

Program Organizers: Peter Liaw, University of Tennessee; Michael Gao, National Energy Technology Laboratory; E-Wen Huang, National Chiao Tung University; Srivatsan Tirumalai, The University of Akron; Xie Xie, FUA US LLC; Gongyao Wang, Alcoa Technical Center

Tuesday AM March 16, 2021
Session Chairs: Michael Gao, National Energy Technology Lab; Louis Santodonato, Advanced Research Systems

8:30 AM Invited
Phase Stability of High Entropy Alloys: Effects of Pressure and Temperature: Michael Gao1; Xuesong Fan2; Sita Ram Aryal3; Lizi Ouyang1; Peter Liaw1; Jeffrey Hawk1; David Almani1; 1National Energy Technology Laboratory; 2University of Tennessee; 3Tennessee State University

8:55 AM Invited
Monte Carlo Study of the Entropy Hypothesis Associated with High-entropy Alloys: Louis Santodonato1; Peter Liaw2; 1Advanced Research Systems; 2University of Tennessee

9:20 AM Invited
Core Effect of Local Atomic Configuration and Design Principles in AlxCrFeNi High-entropy Alloys: Yu-Chia Yang1; Zhenhai Xia1; 1University of North Texas

9:45 AM
Atomistic Modeling of Screw Dislocations in Body-centered Cubic High-entropy Alloys: Sheng Yin1; Jun Ding2; Mark Asta3; Robert Ritchie4; 1Lawrence Berkeley National Laboratory

10:05 AM
Can We Control Lattice Distortions in Entropy-stabilized Oxides?: Keivan Esfarjani5; Jonathan Kaufman1; 1University of Virginia

MATERIALS PROCESSING
High Temperature Electrochemistry IV — Session II

Sponsored by: TMS Extraction and Processing Division, TMS: Nuclear Materials Committee, TMS: Hydrometallurgy and Electrometallurgy Committee

Program Organizers: Prabhpal Tripathy, Battelle Energy Alliance (Idaho National Laboratory); Guy Fredrickson, Idaho National Laboratory

Tuesday AM March 16, 2021
Session Chair: Vasant Kumar Ramachandran, University of Cambridge

8:30 AM
Electrochemical Reactions of Oxide Ions with Tungsten in Molten CaCl2; Chao Zhang1; Devin Rappe1; Michael Simpson1; 1Lawrence Livermore National Laboratory; 2University of Utah

9:00 AM
Optimizing Reaction Selectivity in High Temperature Molten Electrolytes: Mary Elizabeth Wagner1; Antoine Allonore2; 1Massachusetts Institute of Technology

9:30 AM
Fundamental Challenges for the Development of Electrolytic Reduction of Uranium Oxide in Molten LiCl-Li2O: Jarom Chamberlain1; Adam Burak1; Mario Gonzalez2; Michael Simpson3; 1University of Utah

10:00 AM
New Electrochemical Deposition Method of Ti Metal in Molten Salts Containing YCl3: Akihiro Iizuka1; Takanari Ouchi1; Toru Okabe2; 1The University of Tokyo

MATERIALS DESIGN
Hume-Rothery Symposium: Accelerated Measurements and Predictions of Thermodynamics and Kinetics for Materials Design and Discovery — Session III

Sponsored by: TMS Structural Materials Division, TMS: Alloy Phases Committee

Program Organizers: Wei Xiong, University of Pittsburgh; Shuanglin Chen, CompuTherm LLC; Wei Chen, Illinois Institute of Technology; James Saal, Citrine Informatics; Greta Lindwall, KTH Royal Institute of Technology

Tuesday AM March 16, 2021
Session Chair: Wei Zhong, University of Maryland

8:30 AM Invited
Unexpected Phenomena Observed in Metallurgical Studies: Sinn-wen Chen1; 1National Tsing Hua University

9:10 AM Invited
High-throughput Hot-isostatic-pressing Micro-synthesis for Accelerated Studies of High Entropy Alloys: Lei Zhao1; Shuying Chen1; Zi Wang2; Lixia Yang3; Hui Wang1; Haizhou Wang2; Liang Jiang3; 1Central Iron & Steel Research Institute, China; 2Yantai University; 3Central South University
9:50 AM Invited
Integration of Computational Tools and Advanced Characterization Methods to Understand Phase Transformations in Additively Manufactured Steels: Greta Lindwall1; Niklas Holländer Pettersson1; Chia-Ying Chou1; Durga Ananthanarayanan1; Benjamin Neding1; Peter Hedström1; Fan Zhang1; 1KTH Royal Institute of Technology; 2NIST

10:30 AM Invited
Computational Thermodynamics and Its Applications: Zi-Kui Liu1; 1Pennsylvania State University

11:00 AM Invited
High-throughput Experiments and Machine Learning Modeling for Designing Next Generation Superalloys: Akane Suzuki1; Chen Shen1; 1GE Research

NUCLEAR MATERIALS

Materials and Chemistry for Molten Salt Systems — Loops and Irradiation Effects

Sponsored by: TMS Structural Materials Division, TMS: Corrosion and Environmental Effects Committee

Program Organizers: Stephen Raiman, Texas A&M University; Kumar Sridharan, University of Wisconsin-Madison; Nathaniel Hoyt, Argonne National Laboratory; Jinsuo Zhang, Virginia Polytechnic Institute and State University; Michael Short, Massachusetts Institute of Technology; Raluca Scarlat, University of California-Berkeley

Tuesday AM March 16, 2021
Session Chair: Stephen Raiman, Texas A&M University

8:30 AM
Corrosion and Mass Transfer of 316H Stainless Steel in Flowing FLiNaK Salt: Stephen Raiman1; Matthew Kurley2; Dino Sulejmanovic2; Scott Nelson2; James Keiser2; Bruce Pint2; 1Texas A&M University; 2Oak Ridge National Laboratory

8:50 AM
Dutch Molten Salt Irradiation Program: Ralph Hania1; Uazir Bezerra de Oliveira1; 1NRG

9:10 AM
Design of Molten Salt Static Corrosion Experiments to Predict Phenomena Relevant to Corrosion in Non-isothermal Nuclear Reactor Salt Loops: Raluca Scarlat1; 1University of California, Berkeley

9:30 AM
Structural Health Impacts Due to Exposure of Irradiated Molten Chloride Salts: Nora Dianne Ezell1; Stephen Raiman2; Joel McDuffee2; Matt1; 1Oak Ridge National Laboratory; 2ORNL

9:50 AM
Alloy Compatibility in Flowing Cl and F Salts: Bruce Pint1; Dino Sulejmanovic1; J. Kurley1; Stephen Raiman1; 1Oak Ridge National Laboratory

10:10 AM
Chemical Effects of Ionizing Radiation on Molten Salt Systems: Simon Pimblott1; Ruchi Gakhar1; Gregory Horne1; Kazhiro Iwamatsu2; Alejandro Ramos3; Jay LaVerne4; James Wishart1; 1Idaho National Laboratory; 2Brookhaven National Laboratory; 3University of Notre Dame

10:40 AM
Microstructural Characterization of Grain Boundaries in Hastelloy N Corroded in Molten FLiBe Salt under Neutron Irradiation: Guiqiu Zheng1; David Carpenter1; 1Massachusetts Institute of Technology

11:00 AM
Exploration of the Corrosion Morphologies of Ni-Cr Alloys in Molten Fluoride Salts with/without Radiation: Weiyue Zhou1; Yang Yang1; Miaomiao Jin2; Andrew Minor2; Michael Short1; 1Massachusetts Institute of Technology; 2Lawrence Berkeley National Laboratory; 3Idaho National Laboratory

11:20 AM
Release Behavior of Tritium Generated inside FLiNaBe by Thermal Neutron: Kazunari Kato1; 1Kyushu University

MATERIALS PROCESSING

Materials Engineering -- From Ideas to Practice: An EPD Symposium in Honor of Jiann-Yang Hwang — Polymer Materials and Processes

Sponsored by: TMS Extraction and Processing Division, TMS: Materials Characterization Committee, TMS: Pyrometallurgy Committee

Program Organizers: Bowen Li, Michigan Technological University; Baojun Zhao, University of Queensland; Jian Li, CanmetMATERIALS; Sergio Monteiro, Instituto Militar de Engenharia; Zhilui Peng, Central South University; Dean Gregurek, RHI Magnesita; Tao Jiang, Central South University; Yong Shi, Fultanbao Environment Technologies; Cuiping Huang, Fultanbao Environment Protection Technology Company Ltd.; Shadia Ikhmayies

Tuesday AM March 16, 2021
Session Chairs: Sergio Monteiro, Military Institute of Engineering; Gele Qing, Shougang Group

8:30 AM Keynote
Improved Ballistic Armor with Composites Reinforced with Natural Fibers Functionalized with Graphene Oxide: Sergio Monteiro1; Fernanda da Luz2; Fabio Garcia Filho3; 1Military Institute of Engineering

8:50 AM Invited
Tensile Properties of Epoxy Matrix Reinforced with Fique Fabric: Michelle Oliveira1; Fabio Garcia Filho1; Fernanda da Luz2; Artur Pereira1; Luana Cristyne Demosthenes1; Lucio Fabio Nascimento1; Sergio Monteiro1; 1Military Institute of Engineering

9:10 AM Invited
Blending of Polystyrene-block-poly(ethylene-ran-butylene)-block-polystyrene with Polyethylene-graft-polystyrene for Cation Exchange Membrane Preparation with Enhanced Properties: Zhichao Chen1; Jiann-Yang Hwang2; Yong Shi2; Di Huang1; Weigang Zhao1; 1Futanbao Environmental Protection Technology Ltd; 2Michigan Technological University; 3Futanbao Environmental protection technology

9:30 AM Novel Route of Polymerization for Engineering Thermorrigid Biopolymer Based on Soybean Oil: João Gabriel Rodrigues1; Karolyonne Mores1; Suzanne Oliveira1; Sergio Monteiro1; Ricardo Weber1; 1Military Institute of Engineering
9:50 AM Novel Ballistic Composites: Performance Evaluation of Epoxy Composite Reinforced with Buriti Fabric as Component of a Multilayer Armor System: Luana Cristyne Demosthenes; Lucio Fabio Nascimento; Michelle Oliveira; Fabio Garcia Filho; Fernanda da Luz; Ulisses Costa; Sergio Monteiro; Artur Pereira; Fabio Braga; 1Military Institute of Engineering; 2Fluminense Federal University

10:10 AM Barcel Hardness of Green Composites for Cold Repair in Industrial Piping: Felipe Lopes; Noan Tonini Simonassi; Carlos Fontes Vieira; Sergio Neves Monteiro; 1Universidade Estadual do Norte Fluminense

10:30 AM Invited Comparison of Mechanical Properties of Banana Fibers Reinforcement in Different Thermoset Matrix Composites: Fabio Garcia Filho; Michelle Oliveira; Foluke de Assis; Artur Pereira; Fernanda da Luz; Luana Cristyne Demosthenes; Sergio Monteiro; 1Military Institute of Engineering

10:50 AM Tensile Strength of Synthetic and Green Composites Used as Wrapping Cold Repair in Piping: Felipe Lopes; Noan Tonini Simonassi; Carlos Fontes Vieira; Sergio Neves Monteiro; 1Universidade Estadual do Norte Fluminense

11:10 AM Influence of Mercerization Process on the Surface of Coconut Fiber for Composite Reinforcement: Gessica Nicolau; Ricardo Weber; Sergio Monteiro; Gabriela Loureiro; Amanda Lavinsky; Letícia da Fonseca; Eduardo da Silva; Pedro Luiz dos Santos; Rodrigo Abranches; Vinicius Machado; 1Military Institute of Engineering

ADVANCED MATERIALS

Materials for High Temperature Applications: Next Generation Superalloys and Beyond — Superalloys: Beyond Nickel-based Superalloys

Sponsored by: TMS Structural Materials Division, TMS: Refractory Metals Committee

Program Organizers: Govindarajan Muralidharan, Oak Ridge National Laboratory; Martin Heilmair, KIT Karlsruhe; Benjamin Adam, Portland State University; Mario Bochicheio, Pratt & Whitney; Katerina Christofidou, University of Sheffield; Eric Lass, University of Tennessee-Knoxville; Jeremy Rame, Safran Aircraft Engines; Pierre Salgot, Safran; Akane Suzuki, GE Research; Michael Titus, Purdue University

Tuesday AM March 16, 2021

8:30 AM Keynote Metallic Materials Beyond Nickel-base Superalloys: The Challenges and Potential: Tresa Pollock; 1University of California, Santa Barbara

9:50 AM Modeling Planar Fault Energies in Ordered D022 Structures: K V Vamsi; Tresa Pollock; 1University of California Santa Barbara

10:50 AM Inverse Design of Chemistry of High Temperature Ni-base Superalloys Using CALPHAD and Machine Learning: Rajesh Jha; George Dulikravich; 1Florida International University

11:10 AM Direct Production of Complex Metallic Alloys: Jawad Haidar; 1Kinaltek Pty Ltd

MATERIALS PROCESSING

Materials Processing Fundamentals — Molten Metal Processing and Modeling

Sponsored by: TMS Extraction and Processing Division, TMS Materials Processing and Manufacturing Division, TMS: Process Technology and Modeling Committee

Program Organizers: Jonghyun Lee, Iowa State University; Samuel Wuststaff, Oculatus; Alexandra Anderson, Gopher Resource; Fiseha Tesfaye, Abo Akademi University; Guillaume Lambotte, Boston Metal; Antoine Allano, Massachusetts Institute of Technology

Tuesday AM March 16, 2021

Session Chair: Jonghyun Lee, Iowa State University

8:30 AM Contactless Inductive Flow Tomography for Control of Liquid Metal Flow with Electromagnetic Actuators: Ivan Glavinic; Matthias Ratajczak; Frank Stefani; Sven Eckert; Thomas Wondrak; 1Helmholtz-Zentrum Dresden-Rossendorf

8:50 AM X-ray and Neutron Radiographic Experiments on Particle-laden Molten Metal Flows: Tobias Lappan; Martin Sarma; Sascha Heitkam; David Mannes; Pavel Trtik; Natalia Shevchenko; Kerstin Eckert; Sven Eckert; 1Helmholtz-Zentrum Dresden-Rossendorf; 2Technische Universität Dresden; 3Paul Scherrer Institut

9:10 AM Computational Fluid Dynamics Modeling of Damped Oscillations of Molten Metal Droplets: Ali Rabeh; Makrand Khanwale; Baskar Ganapathysubramani; Michael SanSoucie; Jonghyun Lee; 1Iowa State University; 2NASA MSFC

9:30 AM Numerical Simulation of the Influence of Particle Physical Properties on Flow Field during the Aeration Leaching Process: Mingzhao Zheng; 1Kinaltek Pty Ltd; 2Technische Universität Dresden; 3Paul Scherrer Institut
### TUESDAY AM

**8:30 AM Invited**

**In-situ Micro-tensile Studies on the Effects of Ion Irradiation on the Mechanical Properties of Small-grained Alloys:** Dhriti Bhattacharyya; Alan Xu; Mihail Ionescu; Tao Wei; Michael Salehi; 1Australian Nuclear Science and Technology Organization

**9:00 AM**

**Bridging the Length Scales via Femtosecond Laser Machining of Micro-mesoscale Tensile Specimens:** Andrew Dong; Hi Vo; Peter Hosemann; Stuart Maloy; 1University of California, Berkeley; 2Los Alamos National Laboratory

**9:20 AM**

**a' Precipitation and Hardness Change in Ion Irradiated High Purity FeCr Alloys:** Yajie Zhao; Anunodaya Bhattacharya; Cristelle Pareig; Pengcheng Zhu; Caleb Massey; Philip Edmondson; Jean Henry; Steven Zinkel; 1The University of Tennessee; 2Oak Ridge National Laboratory; 3GPM, Université et INSA de Rouen; 4CEA, DEN, Service de Recherches Métallurgiques Appliquées, Laboratoire d’Analyse Microstructurale des Matériaux, Université Paris-Saclay

**9:40 AM Invited**

**Nanomechanical Assessment of a Neutron Irradiated U-10Zr Fuel:** Maria Okuniewski; Jonova Thomas; Alejandro Figueroa; Fei Tang; Daniel Murray; Xiang Liu; 1Purdue University; 2Idaho National Laboratory

**10:10 AM**

**Challenges to Accurate Evaluation of Bulk Hardness with Nanoindentation Testing at Low Indent Depths:** Pengcheng Zhu; Yajie Zhao; Shradha Agarwal; Steven Zinkel; 1University of Tennessee

**10:30 AM**

**High Throughput Assessment of Creep Behavior of Advanced Alloys for Model Development and Validation:** Mouhuri Sauri; Zehou Li; Eric Hintzala; Douglas Staufer; Laurent Capulong; Nathan Mara; 1University of Minnesota; 2Bruker Corporation; 3Los Alamos National Labs

**10:50 AM**

**Creep Behavior of Helium Implanted Submicron Films under Irradiation:** Nargisse Khiara; Michaël Coulombier; Fabien Onimus; Jean-Pierre Raskin; Thomas Pardoen; Yves Bréchet; 1CEA Saclay; 2École Polytechnique de Louvain; 3Science et Ingénierie des Matériaux et Procédés

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**NUCLEAR MATERIALS**

**Mechanical Behavior of Nuclear Reactor Components — Small Scale Testing**

**Sponsored by:** TMS Materials Processing and Manufacturing Division, TMS Structural Materials Division, TMS: Nanomechanical Materials Behavior Committee, TMS: Nuclear Materials Committee

**Program Organizers:** Clarissa Yablinsky, Los Alamos National Laboratory; Assel Aitkaliyeva, University of Florida; Eda Aydogan, Middle East Technical University; Laurent Capulong, Los Alamos National Laboratory; Khalid Hattar, Sandia National Laboratories; Kayla Yano, Pacific Northwest National Laboratory; Caleb Massey, Oak Ridge National Laboratory

**Tuesday AM**  
March 16, 2021

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**CHARACTERIZATION**

**Mechanical Response of Materials Investigated through Novel In-situ Experiments and Modeling — Session III**

**Sponsored by:** TMS Structural Materials Division, TMS: Thin Films and Interfaces Committee, TMS: Advanced Characterization, Testing, and Simulation Committee

**Program Organizers:** Saurabh Puri, Microstructure Engineering; Amit Pandey, Lockheed Martin Space; Dhriti Bhattacharya, Australian Nuclear Science and Technology Organization; Dongchon Jang, KAIST; Jagannathan Rajagopalan, Arizona State University; Josh Kacher, Georgia Institute of Technology; Minh-Son Pham, Imperial College London; Robert Wheeler, Microtesting Solutions LLC; Shailendra Joshi, University of Houston

**Tuesday AM**  
March 16, 2021

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**8:30 AM Keynote**

**Observation of Microstructure Evolution in Pure Copper and Copper-8 wt. % Aluminium Alloy during Deformation:** Sandhya Verma; Prita Pant; M P Gururajan; 1Indian Institute of Technology Bombay

**9:10 AM**

**Sub-surface Microtensile Testing in Oxidized Equiatomic Alloy NbTiCr:** Robert Wheeler; Todd Butler; Marc Doran; Scott Apt; Melinda Ostendorf; 1Microtesting Solutions LLC; 2Air Force Research Laboratory; 3UES, Inc.

**9:30 AM**

**In-situ Micro-tensile Testing of Proton-irradiated HT-9 Steels:** Tanvi Ajantiwaly; Stuart Maloy; Khalid Hattar; Assel Aitkaliyeva; 1University of Florida; 2Los Alamos National Laboratory; 3Sandia National Laboratory

**9:50 AM**

**Dislocation Structure in FeCrAl Alloys through Advanced In-situ Microscopy Experiments:** Keyou Mao; Maxim Gussev; Caleb Massey; Kinga Unocic; Yukinori Yamamoto; Kevin Field; Philip Edmondson; 1Oak Ridge National Laboratory; 2University of Michigan

**10:10 AM**

**In-situ Nanomechanics of Ni-based Superalloys and Bond Coating at Room Temperature to 1000OC:** Sanjit Bhownick; Eric Hintzala; Praveena Manimunda; Douglas Staufer; 1Bruker

**10:30 AM**

**Analysis of Deformation Mechanisms in Advanced FeCrAl Alloy via SEM-EBSD In-situ Testing:** Nitish Bibhanshu; Maxim Gussev; Caleb Massey; Kevin Field; 1Oak Ridge National Laboratory; 2University of Michigan

**10:50 AM**

**MEMS-based In-situ Tensile Experiments Designed to Arrest Catastrophic Failure in Brittle Nanomaterials:** Daehyeok Ahn; Dongchan Jang; 1Korea Advanced Institute of Science & Technology; 2Korea Advanced Institute of Science & Technology

**11:10 AM**

**In-situ Characterization of the Damage Initiation and Evolution in Sustainable Cellulose-based Cottonid:** Ronja Scholz; Alexander Delp; Frank Wältcher; 1TU Dortmund University
MATERIALS DESIGN

Metal-Matrix Composites: Advances in Analysis, Measurement and Observations — Novel Composites and Coatings

Sponsored by: TMS Structural Materials Division, TMS: Composite Materials Committee

Program Organizers: Srivatsan Tirumalai, The University of Akron; William Harrigan, Gamma Alloys; Simona Hunyadi Murph, Savannah River National Laboratory

Tuesday AM March 16, 2021
Session Chair: William Harrigan, GAMMA Technology

8:30 AM Invited
Use of an Infrared Spectroscopic Method for Isotopic Analysis of Gaseous Uranium Hexafluoride: K. Alicia Strange Fessler1; Patrick O’Rourke1; Nicholas DeRoller1; Darrell Simmons2; Steven Serkiz2; 1Savannah River National Laboratory; 2Oak Ridge National Laboratory; 3Clemson University

9:00 AM Recent Advances in Analysis, Measurement and Properties of Composite Metal Foams: Afsaneh Rabiei1; Chullhee Cho2; Amir Taqieddin2; Yuhang Jing2; Keong Yong3; Jin Myung Kim3; Md Farhadul Haque3; Narayana R. Aluru3; SungWoo Nam2; 1George Mason University; 2University of Illinois at Urbana-Champaign

9:50 AM Invited
Effect of Heat Treatment on the Mechanical Properties of an Aluminum Alloy and Aluminum Alloy Composite: A Comparative Study: Shaik Mozammil1; Jimmy Karloopia2; Pradeep Jha2; Srivatsan Tirumalai3; 1Indian Institute of Technology Roorkee; 2University of Akron

10:20 AM A Method for Measuring Total Potassium and Total Deuterium in a Gas Mixture Containing Hydrogen, Deuterium and Hydrogen Deuterium Mixture Using Gas Chromatography: Henry Sessions, Jr.; Simona Hunyadi Murph3; 1University of Georgia; 2Savannah River National Laboratory; University of Georgia

10:40 AM Iron Oxide - Gold Composite Nanoparticles and Nanogap Junctions for Sensing Applications Using Surface Enhanced Raman Scattering: Simona Hunyadi Murph1; Emily Searles2; 1Savannah River National Laboratory; University of Georgia; 2Savannah River National Laboratory

MATERIALS PROCESSING

Ni-Co 2021: The 5th International Symposium on Nickel and Cobalt — Hydrometallurgy I

Sponsored by: The Metallurgy & Materials Society of the Canadian Institute of Mining, Metallurgy and Petroleum, TMS Extraction and Processing Division, TMS: Hydrometallurgy and Electrometallurgy Committee; TMS: Pyrometallurgy Committee

Program Organizers: Corby Anderson, Colorado School of Mines; Dean Gregurek, RHI Magnesita; Mari Lundström, Aalto University; Christina Meskers; Prabhat Tripathy, Batelle Energy Alliance (Idaho National Laboratory); Fiseha Tesfaye, Abo Akademi University; Yuanbo Zhang, Central South University; Sari Muinonen, Glencore; Graeme Goodall, XPS- Glencore; Shijie Wang, Rio Tinto Kennecott Utah Copper Corp (Retired)

Tuesday AM March 16, 2021

8:30 AM Alkaline Leaching of Nickel from Electric Arc Furnace Dust Using Ammonia-ammonium Glutamate as Lixiviant: Erik Prasetyo1; 1Indonesian Institute of Sciences

8:50 AM Chemical Leaching of Inactive Gold Mine Tailings as Secondary Source of Cobalt and Nickel – A Preliminary Case Study: Marouen Jouini1; Lucie Coudert2; Mathilde Perrin2; 1UQAT; 2Université de Lorraine

9:30 AM Sulfuric Acid Leaching for Low-nickel Matte under Atmospheric Pressure: Wanhai Xiao1; Fenglong Sun1; Xuheng Liu2; Zhongwei Zhao2; 1Central South University

9:50 AM Microbial Leaching for Recovery of Nickel & Cobalt from Lateritic Ore, A Review: Lota Behari Sukla1; Archana Pattanaik1; DP Krishna Samal1; Debabrata Pradhan; 1Siksha ‘O’ Anusandhan

10:20 AM Alkaline Leaching of Nickel from Electric Arc Furnace Dust Using Ammonia-ammonium Glutamate as Lixiviant: Erik Prasetyo1; 1Indonesian Institute of Sciences

10:40 AM Chemical Leaching of Inactive Gold Mine Tailings as Secondary Source of Cobalt and Nickel – A Preliminary Case Study: Marouen Jouini1; Lucie Coudert2; Mathilde Perrin2; 1UQAT; 2Université de Lorraine

9:30 AM Sulfuric Acid Leaching for Low-nickel Matte under Atmospheric Pressure: Wanhai Xiao1; Fenglong Sun1; Xuheng Liu2; Zhongwei Zhao2; 1Central South University

PHYSICAL METALLURGY

Phase Transformations and Microstructural Evolution — Microstructure and Precipitation

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Phase Transformations Committee

Program Organizers: Rongpei Shi, Lawrence Livermore National Laboratory; Yipeng Gao, Idaho National Laboratory; Fadi Abdeljawad, Clemson University; Bharat Gwalani, Pacific Northwest National Laboratory; Qi An, University of Nevada-Reno; Eric Lass, University of Tennessee-Knoxville; Huajing (Wilson) Song, Los Alamos National Laboratory

Tuesday AM March 16, 2021
Session Chairs: Thomas Voisin, Lawrence Livermore National Laboratory; Kaila Bertsch, Lawrence Livermore National Laboratory

8:30 AM Chemistry Effects on a’ Precipitation in FeCrAl Alloys: Andrew Hoffman1; Soumya Nag1; Chen Shen1; Chao Jiang2; Yongfeng Zhang2; Raul Rebak2; 1GE Research; 2Idaho National Lab; 3University of Wisconsin-Madison
8:50 AM
Effect of Slip and Twinning Microstructure on High Pressure Phase Transformation in Zirconium: Mariyappan Arul Kumar; Yanbin Wang; Rodney McCabe; Laurent Capolungo; Carlos Tome; Los Alamos National Laboratory; Argonne National Laboratory

9:10 AM
Probing the Plasticity and Microstructure Evolution of an Icosahedral Quasicrystal i-Al-Pd-Mn at Elevated Temperatures: Yu Zou; University of Toronto

9:30 AM
Spinodal Decomposition in a Nanostructured Cu-Ti Alloy: Julian Rosalie; Oliver Renk; University of Leoben, Austria; Erich Schmid Institute, Austrian Academy of Sciences

9:50 AM
The Synergistic Role of Mn and Zr/Ti in Producing ‘L12 Co-precipitates in Al-Cu Alloys: Jonathan Poplawsky; Brian Milligan; Patrick Shower; Lawrence Allard; Matthew Chisholm; Dongwon Shin; Amit Shyam; Oak Ridge National Laboratory; Colorado School of Mines; GE Global Research

10:10 AM
Understanding the Influence of Thermal Gyrations on Solid-solid Interfaces in Ti6Al4V during EBM PBF Process Using In Situ TEM: Sriram Vijayan; Meiyue Shao; Joerg Jinschek; The Ohio State University

10:30 AM
Variability of Grain Boundary Migration Behaviors among the Metastable Grain Boundary Structures: Eric Homer; Darcey Britton; Oliver Johnson; Lydia Serafin; Gus Hart; Brigham Young University

NANOSTRUCTURED MATERIALS

Plasmonics in Nanocomposite Materials — From Theory to Application Session III

Sponsored by: TMS Structural Materials Division, TMS: Composite Materials Committee

Program Organizers: Nasrin Hooshmand, Georgia Institute of Technology; Simona Hunyadi Murph, Savannah River National Laboratory; Mahmoud Abdelwahed, The University of Texas at San Antonio

Tuesday AM March 16, 2021

Session Chair: Simona Hunyadi Murph, Savannah River National Laboratory (SRNL)

8:30 AM Keynote
Plasmonics in Nanocomposite Materials — From Theory to Application: Mostafa El-Sayed; Georgia Institute of Technology

9:15 AM Invited
Fin p-n Heterojunctions for High Brightness Light Emitting Diodes and Lasers at Sub-micron Scale: Babak Nihooabakht; Robin Hansen; Yuxin Zong; Amit Agrawal; Michael Shur; Jerry Tersoff; National Institute of Standards and Technology; NIST; Rensselaer Polytechnic Institute; IBM T. J. Watson Research Center

9:45 AM Invited
Spectral Enhancement of Dye Molecules Adsorbed on Titania Prepared on Gold Nanoparticles: Hiromasa Nishihiron; Yosuke Kageshima; Katsuya Teshima; Shinshu University

10:05 AM Invited
Engineered Plasmonic Nanoparticle Based Detection: Advanced Sensitivity and Selectivity: Nasrin Hooshmand; Georgia Institute of Technology

ENERGY & ENVIRONMENT

Powder Materials for Energy Applications — Novel Powder Materials

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Powder Materials Committee

Program Organizers: Kathy Lu, Virginia Polytechnic Institute and State University; Eugene Olevsky, San Diego State University; Hang Yu, Virginia Polytechnic Institute and State University; Ruigang Wang, The University of Alabama; Isabella Van Rooyen, Idaho National Laboratory

Tuesday AM March 16, 2021

Session Chair: Kathy Lu, Virginia Polytechnic Institute and State University

8:30 AM Synthesis of Chicken Feather Fiber Bio-waste Derived Sustainable Nitrogen Doped-carbon Material: Vijaya Rangari; Zaheeruddin Mohammed; Zahria Duncan; Shaiq Jeelani; Tuskegee University

8:50 AM Invited
Mechanical Activation Enhanced Solid-state Synthesis of NaCrO2 Cathode Material for Na-ion Batteries: Leon Shaw; Mei Luo; Angel Ortiz; Illinois Institute of Technology; Universidad de Extremadura

9:20 AM Invited
Powder to Energy Application: Jung Pyung Choi; John Hardy; Pacific Northwest National Laboratory

9:50 AM Invited
Powder Characteristics of Perovskite Anodes on the Electrochemical Performance of Solid Oxide Fuel Cell: A Perspective: Manoj Mahapatra; University of Alabama at Birmingham

10:20 AM
Structural Evolution and Electrical Conductivity of Ti3C2-SIOC Systems: Kathy Lu; Sanjay Kumar; Virginia Polytechnic Institute and State University

MATERIALS PROCESSING

Rare Metal Extraction & Processing — REEs

Sponsored by: TMS Extraction and Processing Division, TMS: Hydrometallurgy and Electrometallurgy Committee

Program Organizers: Gisele Azimi, University of Toronto; Takanari Ouchi, The University of Tokyo; Kerstin Forsberg, KTH Royal Institute of Technology; Hojong Kim, Pennsylvania State University; Shafiq Alam, University of Saskatchewan; Alafara Baba, University of Ilorin; Neale Neelameggham, IND LLC

Tuesday AM March 16, 2021

8:30 AM Keynote
Innovative Reactors for Recovery of Rare Earth Elements (REE): Alison Lewis; Jemitias Chivavava; Jacolien DuPlessis; Dane Smith; Jody-Lee Smith; University of Cape Town

8:50 AM Invited
Study of the Recovery of Rare Earth Elements from Ion Adsorption Clays through Percolation Leaching Processes: Jochen Petersen; Megan Becker; Chad Naude; University of Cape Town; Univ of Cape Town
9:10 AM
Recovery of Rare Earth Elements from Recycled Hard Disk Drive Mixed Steel and Magnet Scrap: Tedd Lister; Michelle Meagher; Mark Strauss; Luis Aldana; Harry Rollins; Idaho National Laboratory; Colorado School of Mines

9:30 AM Invited
Extraction Chromatography for Separation of Rare Earth Elements: Meher Sanlitu; Kerstin Forsberg; Michael Svärd; KTH Royal Institute of Technology

9:50 AM Invited
Tool and Workflow for Systematic Design of Reactive Extraction for Separation and Purification of Valuable Components: Hana Benkoussas; David Leleu; Swagatika Satpathy; Zaeheer Shariff; Andreas Pfennig; University of Liège

10:10 AM Invited
Rethinking Mineral Processing and Extractive Metallurgy Approaches to Ensure a Sustainable Supply of High-tech and Critical Raw Materials: Yousef Ghorbani; Glen Nwaila; Steven Zhang; Jan Rosenkrantz; Luleå University of Technology; University of the Witwatersrand; Techno Wox, 43 Patrys Avenue, Helikon Park

10:30 AM Invited
Extraction of Rare Earth Metals: The New Thermodynamic Considerations towards Process Hydrometallurgy: Ajay Patil; Rudolf Struiks; Andrea Testino; Christian Ludwig; Paul Scherrer Institut and École Polytechnique Fédérale de Lausanne; Paul Scherrer Institut

NANOSTRUCTURED MATERIALS

100 Years and Still Cracking: A Griffith Fracture Symposium — Fracture in Complex Materials

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Nanomechanical Materials Behavior Committee

Program Organizers: Megan Cordill, Erich Schmid Institute of Materials Science; William Gerberich, University of Minnesota; David Bahr, Purdue University; Christopher Schuh, Massachusetts Institute of Technology; Daniel Kiener, Montanuniversität Leoben; Neville Moody; Nathan Mara, University of Minnesota; Erica Lilleodden, Helmholtz-Zentrum Geesthacht

Tuesday PM March 16, 2021

Session Chair: Neville Moody, Sandia National Laboratories - Retired

2:00 PM Invited
Fracture Resistance of Hierarchical Metallic Nanocomposite Thin Films: Amit Misra; Y. Cui; B. Derby; N. Li; University of Michigan; LANL

2:40 PM
In-situ Fracture along Distinct Interface Types: Michael Burtscher; Markus Alfreider; Michael Wurmshuber; Clemens Schmuck; Helmut Clemens; Svea Mayer; Daniel Kiener; Montanuniversität Leoben; Austria; Department Materials Science, Chair of Materials Physics, Montanuniversität Leoben, Austria; Department Materials Science, Chair of Physical Metallurgy and Metallic Materials, Montanuniversität Leoben, Austria

3:00 PM
The Clamped Beam Bending as a Length Scale Compatible Fracture Test Geometry: Balita Nagamani Jayaprakash; Ashwini Kumar Mishra; Hrushikesh Sahasrabudhe; Neha Kumari; Deepesh Yadav; Tanmayee More; Tejas Chaudhari; Indian Institute of Technology Bombay

3:20 PM
A Griffith’s Theory-based Model for Strength of Silicon Nitride Nanoporous Membranes from Atomic Simulation Perspective: Ali Khourshaei Sharif; Gregory Madejski; James McGrath; Niaz Abdolrahim; University of Rochester

3:40 PM Invited
Transformation-induced Cracking in ZrO₂ Shape-memory Ceramics: towards Cyclic Stability in Polycrystals: Edward Pang; Isabel Crystal; Christopher Schuh; Massachusetts Institute of Technology

SPECIAL TOPICS

2021 Institute of Metals Lecture/Robert Franklin Mehl Award — 2021 Institute of Metals Lecture/Robert Franklin Mehl Award

Tuesday PM March 16, 2021

12:00 PM Introduction of Award Recipient: 2021 Institute of Metals Lecture/Robert Franklin Mehl Award: James Williams; The Ohio State University

12:05 PM Keynote
New Superalloys in the Co-Ni Design Space: Tresa Pollock; University of California, Santa Barbara

12:45 PM Question and Answer Period Moderator: Jim Williams, The Ohio State University

SPECIAL TOPICS

2021 TMS Special Sessions — EPD/MPMD Awards Ceremony & Special Lecture

Tuesday PM March 16, 2021

12:00 PM EPD Awards Ceremony: Christina Meskers

12:30 PM MPMD Awards Ceremony & Introduction of Special Lecturer: Edward Glaessgen; NASA Langley Research Center

12:45 PM MPMD Special Lecturer: Qualification and Certification Strategies for Additive Manufactured Parts for Manned Spaceflight: Richard Russel; NASA Kennedy Space Center

SPECIAL TOPICS

2021 TMS Special Sessions — LMD Awards Ceremony & Special Lecture

Tuesday PM March 16, 2021

12:00 PM LMD Awards Ceremony: Eric Nyberg; Tungsten Heavy Powder & Parts

12:30 PM LMD Scholarship Lecturer: Zachary Wolff; University of Nevada Reno

12:40 PM LMD Special Lecturer Introduction: Eric Nyberg; Tungsten Heavy Powder & Parts
12:00 PM
Young Professional Tutorial Lecture Introduction: Abby Cisko1; 1US Army ERDC

12:05 PM
Early Career Faculty Fellow Recipient: Electrochemical Healing of Metals: A New Way to Repair Additive and Cellular Metals at Room Temperature: James Pikul1; 1University of Pennsylvania

12:35 PM
Early Career Faculty Fellow Recipient: Integrated Computational Materials Design for Alloy Additive Manufacturing: Wei Xiong1; 1University of Pittsburgh

ADVANCED MATERIALS

2D Materials – Preparation, Properties & Applications — Modeling & Simulations I

Sponsored by: TMS Functional Materials Division, TMS: Thin Films and Interfaces Committee

Program Organizers: Nuggehalli Ravindra, New Jersey Institute of Technology; Ramana Chintalapalle, University of Texas at El Paso; Gerald Ferblantier, Icube Laboratory - Strasbourg University; Sufian Abedrabbo, Khalifa University; Amber Shrivastava, Indian Institute of Technology Bombay

Tuesday PM March 16, 2021

Session Chairs: Gerald Ferblantier, University of Strasbourg; Sufian Abedrabbo, Khalifa University

2:00 PM
Computational Synthesis of 2D Materials: A High-throughput Approach to Materials Design: Tara Boland1; Arunima Singh1; 1Arizona State University

2:20 PM Invited
Assessment of Gas Sensing Properties of 2D Materials by Comprehensive Density Functional Theory Calculations: Siby Thomas1; Mohsen Asle Zaeem1; 1Colorado School of Mines

2:45 PM Invited
Computational Modeling of Two-Dimensional Materials for Sustainable Energy Storage: Dibakar Datta1; 1New Jersey Institute of Technology

3:00 PM Invited
Thermal Laser Assisted Manufacturing of Two-dimensional Atomic Layers Heterostructures: Yingtao Wang1; Xian Zhang1; 1Stevens Institute of Technology

3:15 PM Invited
Energetics and Electronic Properties of Dopants and Defect Complexes in 2D Transition Metal Dichalcogenides from First-principles: Anne Marie Tan1; Christoph Freysoldt1; Richard Hennig1; 1University of Florida; 2Max-Planck-Institut f "ur Eisenforschung GmbH

3:30 PM Invited
Stabilization of a Ferroelectric Phase in Two Dimensional MXene Monolayers: Joshua Young1; Mo Li1; Olamide Omisakin1; 1New Jersey Institute of Technology

4:00 PM Invited
Tracking Structural Flexibility and Dynamics in 2D Metal-Organic Frameworks and their Effects on Electrical Conductivity and Catalytic Activity: Farnaz Shakib1; Mohammad Momeni1; 1New Jersey Institute of Technology

NUCLEAR MATERIALS

Accelerated Discovery and Qualification of Nuclear Materials for Energy Applications — High Throughput Testing, Advanced Characterization and Property Measurement

Sponsored by: TMS Structural Materials Division, TMS Materials Processing and Manufacturing Division, TMS: Integrated Computational Materials Engineering Committee, TMS: Nuclear Materials Committee, TMS: Additive Manufacturing Committee

Program Organizers: Yongfeng Zhang, University of Wisconsin-Madison; Adrien Couet, University of Wisconsin-Madison; Michael Tonks, University of Florida; Jeffery Aguilar, Idaho National Laboratory; Andrea Jokisaari, Idaho National Laboratory; Karim Ahmed, Texas A&M University

Tuesday PM March 16, 2021

Session Chairs: Janelle Wharry1, Purdue University; Tiankai Yao, Idaho National Laboratory

2:00 PM Invited
A Standards Perspective on Nanomechanical Testing to Accelerate Nuclear Materials Development & Qualification: Janelle Wharry1; Priyam Patki1; George Warren1; Patrick Warren1; J Hall1; 1Purdue University; 2Westinghouse Electric Company, LLC

2:30 PM
A Rapid Turnaround Approach Studying Helium Effects in Materials: Peter Hosemann1; Andrew Scott1; Sarah Stevenson1; Mehdi Balooch1; 1University of California Berkeley

2:50 PM
High-throughput Heavy Ion Irradiation of CrFeMnNi Magnetron-sputtered Combinatorial Thin Film: Calvin Parkin1; Michael Moorehead1; Mohamed Elbakshwan1; Kumar Sridharan1; Chuan Zhang1; Alan Savan1; Alfred Ludwig1; Adrien Couet1; 1University of Wisconsin Madison; 2Computherm, LLC; 3Ruhr-Universität Bochum

3:10 PM Invited
Accelerated Study of Thermal and Irradiation Creep in Fe-based Multi-principal Element Alloys: Marcus Parry1; Colin Judge1; Cheng Sun1; Wen Jiang1; Boopathi Kombaiah1; Gary Was1; Jeffery Aguilar1; Taylor Sparks1; 1University of Utah; 2Idaho National Laboratory; 3University of Michigan
3:30 PM
High-temperature, High-throughput Ion Irradiation Enabled by Additive Technologies: Michael Moorehead; Calvin Parkin; Rajagopalan Sridharan; Dan Thoma; Adrien Couet; University of Wisconsin - Madison

3:50 PM
In-situ TEM Heating Chip Experiments to Study Thermal Behavior of U-Zr Metallic Fuel: Tiankai Yao; Fei Teng; Daniel Murray; Jian Gan; Michael Benson; Lingfeng He; Idaho National Laboratory

4:10 PM
Multiscale Characterization of Defects in Ion Irradiated Ceramics for Validation of Atomistic Models: Morad Khojazadeh; Vinay Chauhan; Lingfeng He; Janne Pakarinen; David Hurley; Ohio State University; Idaho National Laboratory; Studsvik

4:30 PM
In-situ Thermal Conductivity Measurement of SiC Composite: Di Chen; Wei-Kan Chu; Piyush Sabharwall; University of Houston; Idaho National Laboratory

SPECIAL TOPICS
Acta Materialia Symposium — Acta Materialia Award Session

Program Organizer: Carolyn Hansson, University of Waterloo

Tuesday PM March 16, 2021

2:00 PM
Introductory Comments: Acta Materialia Symposium: Carolyn Hansson; University of Waterloo

2:05 PM Invited
Acta Materialia Gold Medal Lecture: Modeling Microstructure Complexity for Better Property Predictions: Günter Gottstein; RWTH Aachen University

2:25 PM Invited
Acta Materialia Silver Medal Lecture: Measuring Hydrogen in Steels by Using Atom Probe Tomography: Julie Cairney; The University of Sydney

2:45 PM Invited
Acta Materialia Hollomon Materials and Society Award: Global Energy Challenges and Development of Thermoelectric Materials and Systems in China: Qingjie Zhang; Wuhan University of Technology

3:05 PM Invited
Acta Materialia Mary Fortune Global Diversity Lecture: STEM Mentor Programs and New Opportunities for Women and Other Under Represnted Groups in the Materials Science: Kataelin Balazs; Centre for Energy Research

ADDITIVE TECHNOLOGIES
Additive Manufacturing Fatigue and Fracture V: Processing-Structure-Property Investigations and Application to Qualification — Inconel, New Alloys, and Functional Gradients

Sponsored by: TMS Structural Materials Division, TMS: Additive Manufacturing Committee, TMS: Mechanical Behavior of Materials Committee

Program Organizers: Nik Hrabe, National Institute of Standards and Technology; John Lewandowski, Case Western Reserve University; Nima Shamsaei, Auburn University; Mohsen Seifi, ASTM International/Case Western Reserve University; Steve Daniewicz, University of Alabama

Tuesday PM March 16, 2021

Session Chair: Mohsen Seifi, ASTM International/Case Western Reserve University

2:00 PM Invited
Laser Powder Bed Fusion of TiTa Alloys: Process Optimisation and Fatigue Properties: Andrey Molotnikov; Erin Brodie; Thomas Niendorf; RMIT University, Centre for Additive Manufacturing; Monash University; University of Kassel

2:30 PM
Synchrotron Imaging of the Influence of TiB2 in Suppressing Hot Cracking during Laser Powder Bed Fusion of Al-2139: David Rees; Chu Lun Alex Leung; Joe Elambasseril; Sebastian Marussi; Saurabh Shah; Shashidhara Marathe; Milan Brandt; Mark Easton; Peter Lee; University College London; RMIT University; Diamond Light Source Ltd

2:50 PM
Microstructural Heterogeneity and Mechanical Anisotropy of 18Ni-330 Maraging Steel Fabricated by Selective Laser Melting: The Effect of Build Orientation and Height: Yao Yi; Kaiwen Wang; Xiaqing Wang; Lin Li; Wenyun Cai; Samuel Kelly; Natalia Esparragoza; Matthew Rosser; Feng Yan; The University of Alabama; Virginia Polytechnic Institute and State University; Jacksonville State University

3:10 PM
Characterization of 3D-printed Metals with Ultrasonic Technique: Terence Costigan; Ping-Chuan Wang; Robert Van Pelt; Aaron Nelson; SUNY New Paltz; Sono-Tek Corporation

3:30 PM Invited
Tensile and Fatigue Behavior of Cold Sprayed Material Using Heat Treated Feedstock Powders: Luke Brewer; A. R. Webb; Ning Zhu; J. Brian Jordon; The University of Alabama
ADDITIVE TECHNOLOGIES

Additive Manufacturing for Energy Applications III — Modeling and Non-destructive Testing in Additive Manufacturing

Sponsored by: TMS Structural Materials Division, TMS: Additive Manufacturing Committee, TMS: Nuclear Materials Committee

Program Organizers: Isabella Van Rooyen, Idaho National Laboratory; Indrajit Charit, University of Idaho; Subhashish Meher, Idaho National Laboratory; Michael Kirka, Oak Ridge National Laboratory; Kumar Sridharan, University of Wisconsin-Madison; Xiaoyuan Lou, Auburn University

Tuesday PM March 16, 2021

Session Chair: Xiaoyuan Lou, Auburn University

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<tr>
<th>Time</th>
<th>Title</th>
<th>Authors</th>
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<tbody>
<tr>
<td>2:00 PM Invited</td>
<td>Porosity in Metal Additive Manufacturing: X-ray Tomography Insights</td>
<td>Anton du Plessis; Research Group 3D Innovation, Stellenbosch University</td>
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<tr>
<td>2:20 PM</td>
<td>Effects of Void Configuration on the Overall Thermal and Mechanical Behavior of Porous Materials: A Numerical Modeling Approach</td>
<td>Yu-lin Shen; Mohammad Abdo; Binh Pham; Isabella Van Rooyen; University of New Mexico; Idaho National Laboratory</td>
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<tr>
<td>2:40 PM Experimental and Numerical Investigation of Single Clads Generated by Directed Energy Deposition Additive Manufacturing Processes</td>
<td>Luis Nunez; John Shelton; Kyu Cho; Northern Illinois University</td>
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<tr>
<td>3:00 PM</td>
<td>Multi-scale Multi-fidelity Metamodeling for Advanced Materials</td>
<td>Mohammad Abdo; Yu-Lin Shen; Cam Pham; Isabella Van Rooyen; Idaho National Laboratory; University of New Mexico</td>
</tr>
<tr>
<td>3:20 PM Detection of Defects in Additively Manufactured Metals Using Thermal Tomography</td>
<td>Alexander Heifetz; Dmitry Shribak; Zoe Fisher; William Cleary; Argonne National Laboratory; Westinghouse Electric Company</td>
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<td>3:40 PM</td>
<td>Real Time Non-destructive Evaluation during 3D Manufacturing of Metal Parts</td>
<td>Araz Yacoubian; LER Technologies, Inc.</td>
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<tr>
<td>4:00 PM Combining Modelling and Microstructural Studies in Explaining the Laser Parameter Effect on Superalloy Cracking during Selective Laser Melting</td>
<td>Marcus Lam; Monash University</td>
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<tr>
<td>4:20 PM Simulation of Part Printability in Electron Beam Melting Additive Manufacturing</td>
<td>Yousub Lee; Patxi Fernandez-Zelaita; Srdjan Simunovic; Mike Kirka; Oak Ridge National Laboratory</td>
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<tr>
<td>4:40 PM Defect Analysis in Selectively Laser Melted Parts via Surface Topography Characterization</td>
<td>Qingyang Lu; Matteo Seita; Nanyang Technological University</td>
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ADDITIVE TECHNOLOGIES

Additive Manufacturing of Metals: Applications of Solidification Fundamentals — Solidification Structure and Defects

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Additive Manufacturing Committee, TMS: Solidification Committee

Program Organizers: Alex Plotkowski, Oak Ridge National Laboratory; Lang Yuan, University of South Carolina; Kevin Chaput, Northrop Grumman; Mohsen Asle Zaeem, Colorado School of Mines; Wenda Tan, University of Utah; Lianyi Chen, University of Wisconsin-Madison

Tuesday PM March 16, 2021

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<tbody>
<tr>
<td>2:00 PM</td>
<td>A Phase-field Study of Epitaxial Effect on Solidification Microstructure in Metal Additive Manufacturing</td>
<td>Jiwon Park; Joohoe Kang; Chang-Seok Oh; Korea Institute of Materials Science</td>
</tr>
<tr>
<td>2:20 PM Composition and Equilibrium Phase Diagram Feature Effects on the Printability of Alloys</td>
<td>Rajaen Seedle; Xueqin Huang; Bing Zhang; Austin Whitt; Alaa Elwany; Raymouno Arroyave; Ibrahim Karaman; Texas A&amp;M University</td>
<td></td>
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<tr>
<td>2:40 PM Influence of Process Parameters on the Microstructure Evolution and Mechanical Properties of Additively Manufactured 316L Stainless Steel</td>
<td>Ankur Kumar Agrawal; Dan Thoma; University of Wisconsin Madison</td>
<td></td>
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<tr>
<td>3:00 PM</td>
<td>LPBF Processing of the Al-Ni Eutectic Alloy: Experiments and Phase Field Simulations</td>
<td>Guillaume Boussinot; Markus Apel; Markus Döring; Access e.V.; LPT University Erlangen</td>
</tr>
<tr>
<td>3:20 PM Modeling Grain Refinement for Metallic Additive Manufacturing</td>
<td>Yijia Gu; Missouri University of Science and Technology</td>
<td></td>
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<tr>
<td>3:40 PM New Composition Based Index for Solidification Cracking Resistance</td>
<td>Rafael Giorjao; Benjamin Sutton; Antonio Ramirez; The Ohio State University</td>
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<tr>
<td>4:00 PM Phase-Field Modeling of CET During Alloy Solidification: An Insight for Additive Manufacturing</td>
<td>Nima Najafzadeh; Yijia Gu; University of Missouri Science and Technology</td>
<td></td>
</tr>
<tr>
<td>4:20 PM</td>
<td>Quantifying the Influence of Local Layer Thickness on Pore Evolution during Laser Powder Fusion Using High-speed X-ray Imaging</td>
<td>Chu Lun Alex Leung; Yuze Huang; Samuel J. Clark; Yunhui Chen; Sebastian Marussi; Lorna Sinclair; Iain Todd; Margie P. Olbinado; Elodie Boller; Alexander Rack; Peter D. Lee; University College London; University of Sheffield; Paul Scherrer Institute; European Synchrotron Radiation Facility</td>
</tr>
</tbody>
</table>
ADDITIVE TECHNOLOGIES

Additive Manufacturing: Materials Design and Alloy Development III -- Super Materials and Extreme Environments — High Temperature and Heavy Materials

**Sponsored by:** TMS Materials Processing and Manufacturing Division, TMS: Additive Manufacturing Committee

**Program Organizers:** Behrang Poorganjii, University of Waterloo; Hunter Martin, HRL. Laboratories LLC; James Saal, Citrine Informatics; Orlando Rios, Oak Ridge National Laboratory; Aleth Moridi. Cornell University: Jiadong Gong. Questek Innovations LLC

**Tuesday PM**

**March 16, 2021**

**Session Chair:** Aleth Moridi, Cornell

**2:00 PM**

Process Development for the Selective Laser Melting of Tungsten Carbide-nickel Matrix Composites: Edgar Mendoza Jimenez; Baby Reea-Jayan; Jack Beuth; *Carnegie Mellon University*

**2:20 PM**

Laser Powder-bed Fusion Austenitic Steels with Superior Creep Resistance: Sebastien Dreponfli; Peeyush Nandwana; Kinga Unocic; Patxi Fernandez-Zelaia; Ying Yang; Rangasayee Kannan; Yousub Lee; Fred List; *Oak Ridge National Laboratory*

**2:40 PM**

Development of Multi-principle Element Alloys for Oxidation Resistant Coatings Applied with Additive Manufacturing: Jose Loli; Yining He; Amish Chovatiya; Zachary Ulissi; Bryan Weberl; Maarten De Boer; Jack Beuth; *Carnegie Mellon University*

**3:00 PM**

Reactive Selective Laser Synthesis and Additive Manufacturing of Ultra-high Temperature Ceramics: Adam Peters; Daijie Zhang; Alberto Hernandez; Michael Brupbacher; Dennis Nagle; Tim Mueller; James Spicer; *Johns Hopkins University; The Johns Hopkins Applied Physics Laboratory*

**3:20 PM**

The Mechanisms Behind the Effect of Oxygen on DED AM Ti Alloy Build: Caterina Iantaffi; Yunhui Chen; Samuel J. Clark; Robert C. Atwood; Eral Bele; Martina Meisnar; Thomas Rohr; Lerrthanasam Jedsada; Minh-Son Pham; Peter D. Lee; *UCL Mechanical Engineering; Diamond Light Source Ltd; ESA-RAL Advanced Manufacturing Laboratory; ESA-ESTEC; Imperial College London*

**3:40 PM**

A Novel Heat Treatment Design to Overcome Inferior Creep Behaviour of SLM Processed IN738LC Alloy: Haoyu Song; *MCAM, Monash University*

ADDITIVE TECHNOLOGIES

Additive Manufacturing: Solid-State Phase Transformations and Microstructural Evolution — Ni-based Superalloys

**Sponsored by:** TMS Materials Processing and Manufacturing Division, TMS: Additive Manufacturing Committee, TMS: Phase Transformations Committee, TMS: Shaping and Forming Committee

**Program Organizers:** Bij-Na Kim, Carpenter Additive; Andrew Wessman, University of Arizona; Chantul Sudbrack, National Energy Technology Laboratory; Eric Lass, University of Tennessee-Knoxville; Katerina Christofidou, University of Sheffield; Peeyush Nandwana, Oak Ridge National Laboratory; Rajarshi Banerjee, University of North Texas; Whitney Poling, General Motors Corporation; Yousub Lee, Oak Ridge National Laboratory

**Tuesday PM**

**March 16, 2021**

**Session Chairs:** Katerina Christofidou, The University of Sheffield; Chantul Sudbrack, National Energy Technology Laboratory

**2:00 PM Invited**

Impact of Post-processing on the Performances of Laser Additively Manufactured High-Ni Superalloys: Ning Zhou; Austin Dicus; Stephane Forsik; Tao Wang; Gian Colombo; Mario Eppler; *Carpenter Technology*

**2:30 PM**

Improving the Creep Properties on Gamma prime-strengthened Nickel-based Superalloy by Selective Laser Melting: Marcus Lam; *Monash University*

**2:50 PM**

New Superalloy ABD-900AM for Additive Manufacturing: The Role of Heat Treatment on Mechanical Properties: Yuanbo Tang; Joseph Ghoussoub; John Clark; Andre Nemeth; Roger Reed; *University of Oxford; OxMet Technologies*

**3:10 PM**

Microstructure and Texture Evolution During Printing and Post Processing of Ni-based Superalloy: Colleen Hilla; Mei Zhang; Michael Mills; Alber Sadek; Hyeyun Song; *The Ohio State University; Edison Welding Institute; Edison Welding Institute*

**3:30 PM Invited**

Applying Additive Manufacturing Itself as a High-throughput Tool to Accelerate Heat Treatment Design of Additively Manufactured Alloys: Yunhao Zhao; Noah Sargent; Kun Li; Wei Xiong; *University of Pittsburgh*

**4:00 PM**

Simulation of Solid State Precipitation during Post Process Annealing of Additively Manufactured alloys 625: Bala Radhakrishnan; Younggil Song; John Turner; *Oak Ridge National Laboratory*

**4:20 PM**

Assessing Compositional Gradients in DED Inconel 718 Builds via Directional Reflectance Microscopy: Elita Jain; Yeoh Yong Chen; Bernard Gaskey; Guido Macchi; Antonio Mattia Grande; Matteo Seita; *NTU Singapore; Politecnico di Milano, Italy*

**4:40 PM**

Effect of Stress-relief Treatments on The Microstructure and Mechanical Response of Additively Manufactured IN625 Thin-walled Elements: Arunima Banerjee; Mo-Rigen He; William Musinski; Paul Shade; Marie Cox; Edwin Schwalbach; Kevin Hemker; *Johns Hopkins University; Air Force Research Laboratory*
CHARACTERIZATION

Advanced Characterization Techniques for Quantifying and Modeling Deformation — Session IV

**Sponsored by:** TMS Extraction and Processing Division, TMS Materials Processing and Manufacturing Division, TMS Structural Materials Division, TMS: Advanced Characterization, Testing, and Simulation Committee, TMS: Materials Characterization Committee

**Program Organizers:** Rodney McCabe, Los Alamos National Laboratory; Marko Knezevic, University of New Hampshire; Irene Beyerlein, University of California-Santa Barbara; Wolfgang Pantleon, Technical University of Denmark; C. Tasan, Massachusetts Institute of Technology; Arul Kumar Mariyappan, Los Alamos National Laboratory; Olivia Underwood, Sandia National Laboratories

**Tuesday PM**

2:00 PM Invited
A Framework for Quantitative Measurement of Plastic Deformation in Relation to 3D Microstructure: Jean-Charles Stinville1; M. A. Charpagne2; A. Cervellon1; J. Hestroffer1; M. P. Echlin1; V. Vallee1; D. Texier2; I.J. Beyerlein1; T. M. Pollock1; 1University of California, Santa Barbara; 2Institut de Physique du Globe - UMR CNRS 5312

2:30 PM

2:50 PM
Elastoplastic Transition in a Metastable B-titanium Alloy, Timetal 18 by In-situ High Energy X-ray Diffraction: Jishnu Bhattacharyya1, Siramaya Nair2, Darren Pagan2, Vahid Tari3, Ricardo Lebensohn3, Anthony Rollett4; Sean Agnew5; 1University of Virginia; 2Cornell University; 3Cornell High Energy Synchrotron Source, Cornell University; 4Eaton Corporate Research and Technology; 5Los Alamos National Laboratory; 6Carnegie Mellon University

3:10 PM
A Strain Gradient Crystal Plasticity Constitutive Model for Hexagonal Close-packed Polycrystals: Omid Sedaghat1, Hamidreza Abdolvand1; 1Western University

3:30 PM
Estimating Stress on the Microstructural Length Scale Using the Measured Strain Field: Benjamin Cameron1, Cem Tasan1, 1Massachusetts Institute of Technology

3:50 PM Invited
FFT-based Modeling of Strain Localization in Nano-metallic Laminates: Miroslav Zecovic1, Ricardo Lebensohn3, Thomas Nizolek1, Rodney McCabe1, Laurent Capolungo3; 1Los Alamos National Laboratory

4:20 PM
Dynamic Recovery Observed in Distinct Grains Within A Polycrystalline Nickel-based Superalloy During Cyclic High Temperature Loading via High Energy X-ray Diffraction Microscopy: Sven Gustafsson1, Darren Pagan2, Paul Shade3, Michael Sangid4; 1Purdue University; 2Cornell High Energy Synchrotron Source; 3Air Force Research Laboratory

4:40 PM
Statistical Assessment of Strain Localization in Inconel 718 Informed by Digital Image Correlation Coupled with 3D EBSD: Marie Charpagne1, J.C. Stinville2, Andrew Polonsky3, McLean Echlin1, Valery Valle2, Tresa Pollock1; 1University of California, Santa Barbara; 2Purdue University; 3Purdue University

5:00 PM
Analysis of Slip Transfer in Ti-Sal-2.5 (Wt. %) at Two Temperatures in Comparison to Pure Aluminum: Chelsea Edge1, Thomas Bieler2; 1Michigan State University

ADVANCED MATERIALS

Advanced Functional and Structural Thin Films and Coatings — Coating Technologies and Surface Structuring for Tools I

**Sponsored by:** TMS Functional Materials Division, TMS: Thin Films and Interfaces Committee

**Program Organizers:** Adele Carrado, IPCMS - CNRS; Ramana Chintalapalle, University of Texas at El Paso; Gerald Ferblantier, Icube Laboratory - Strasbourg University; Nancy Michael, University of Texas at Arlington; Karine Mougin, Is2m Cnrs; Heinz Palkowski, Clausthal University of Technology; Nuggehalli Ravindra, New Jersey Institute of Technology; Vikas Tomar, Purdue University

**Tuesday PM**

2:00 PM Invited
Investigations on the Process Stability of Dry Deep Drawing with Volatile Lubricants Injected through Laser-drilled Microholes: Gerd Reichardt1; Manuel Henn2; Kim Riedmüller2; Rudolf Weber2; Thomas Graf2; Mathias Liewald1; Daniel Hemming1; Georg Umlauf3; Paul Reichele3; Jakob Barz4; Günter E.M. Tovar5; 1Institut für Metallforaging Technology; 2Institut für Strahlwerkzeuge; 3Institute of Interfacial Process Engineering and Plasma Technology; 4Institut für Friedrich Schiller University Jena; 5University of Texas at El Paso; 6Center for Nanostructure Materials Sciences, Oak Ridge National Laboratory

2:30 PM
Laboratory-on-a-Crystal for Multifunctional, Multiscale Testing of Thin Films: Iliia Ivanov1; 1Center for Nanophase Materials Sciences, Oak Ridge National Laboratory

2:50 PM Keynote
**Nanomanipulation and Nanolithography Experiments on Monolayer and Multilayer MoS2 Surfaces:** Enrico Gnecco1, Alper Özogul1, Felix Cassin1, Roberto Guerra2, Andrey Turchanin1, Franciszek Krok2, 1Friedrich Schiller University Jena; 2University of Milan; 3Jagiellonian University Krakow

3:30 PM
Development of a Laboratory Test to Identify Permanent PVD Coating Candidates for Lube-free Aluminum Die Casting: Nelson Delfín de Campos Neto1, András Korenyi-Both2, Stephen Midson3, Michael Kaufman3; 1Colorado School of Mines; 2University of California

3:50 PM
Molten Aluminum Test for the Identification of PVD Coating Candidates for Lube-free Aluminum Die Casting: Thomas Bieler1, 1Michigan State University
TUESDAY PM

ADVANCED MATERIALS

Advanced High Strength Steels V — Session IV

Sponsored by: TMS Structural Materials Division, TMS: Steels Committee

Program Organizers: Ana Luiza Araujo, CBMM North America Inc.; Louis Hector, General Motors Global Technical Center; Igor Vieira, Nucor Steel; Lijia Zhao, ArcelorMittal USA; Krista Limmer, CCDC Army Research Laboratory; Jonah Klemm-Toole, Colorado School of Mines; Sebastien Allain, Institut Jean Lamour; MingXin Huang, University of Hong Kong

Tuesday PM March 16, 2021

2:00 PM
A Novel Study on Plasticity Mechanisms during Yield Point Elongation in Medium Manganese Steels: Poornachandra Satyampet1; Saurabh Kundu2; Prita Pant3; 1Indian Institute of Technology Bombay, Mumbai; 2Tata Steels

2:20 PM
Strain Path Effect on Martensitic Transformation in Medium Mn Steels: Poornachandra Satyampet1; Saurabh Kundu2; Prita Pant3; 1Indian Institute of Technology Bombay, Mumbai; 2Tata Steels; 3Indian Institute of technology Bombay, Mumbai.

2:40 PM
Static Recrystallization during Hot Deformation of HSLA Nb-Bearing Steels: Rami Almatani1; Juha Uusitalo2; Anthony Deardo3; 1University of Pittsburgh; 2University of Oulu

3:00 PM
Correlation of Rolling Schedules, Mechanical Properties, and SCC Susceptibility of API X70 Steel. Anthony Roccisano1; Shahroz Nafsi2; Douglas Stalheim3; Reza Ghomashchi4; 1University of Adelaide; 2DGS Metallurgical Solutions, Inc.

3:20 PM
High-resolution Digital Image Correlation Study of Plasticity and Damage at Lamellar Scales in Ferrite -- Pearlite Steel: Tijmen Vermeij1; Johan Hoefnagels2; 1University of Oulu; 2Eindhoven University of Technology

ENERGY & ENVIRONMENT

Advanced Materials for Energy Conversion and Storage VII — Functional Materials for Energy I

Sponsored by: TMS Functional Materials Division, TMS: Energy Conversion and Storage Committee

Program Organizers: Jung Pyung Choi, Pacific Northwest National Laboratory; Soumendra Basu, Boston University; Amlt Pandey, Lockheed Martin Space; Paul Ohodnicki, University of Pittsburgh; Kyle Brinkman, Clemson University; Partha Mukherjee, Purdue University; Surojit Gupta, University of North Dakota

Tuesday PM March 16, 2021

2:00 PM
Assessment of Grain Boundary Composition on the Thermodynamics Structural Properties in Concentrated Ceramic Oxides: Tara Boland1; Arunima Singhi2; Peter Rez3; Peter Crozier4; 1Arizona State University

2:20 PM
A Novel and Practical Water-reactive Aluminum Fuel from Scrap: Peter Godart1; Douglas Hart1; 1MIT

2:50 PM
Aging Behavior of Advanced Martensitic Steels for Next Generation Diesel Engine Pistons: Dean Pierce1; Govindarajan Muralidharan1; Larry Allard2; Jon Poplawsky3; Erkan Cakmak4; Artem Trofimov5; Hsin Wang6; Allen Haynes7; 1Oak Ridge National Laboratory

3:10 PM
Breaking Atomic-level Ordering via Biaxial Strain in Functional Oxides: A DFT Study: KanishthRawat1; Dipuneeet Aidhy2; Dillon Fong2; 1University of Wyoming; 2Argonne National Laboratory

3:30 PM
Direct Correlation of Anion Conductivity with Grain Boundary Defect Chemistry in Concentrated Oxide Solid Solutions: Hasti Vahidi1; Shengquan Xuan1; William Bowman1; 1University of California, Irvine

3:50 PM
Effect of Alloying Elements (Ni, Co) on Low Pt-transition Metals Nanowires for Oxygen Reduction Electrocatalysts: Jaeyoung Yoo1; Youngtae Park2; Changsoo Lee3; Hyuck Mo Lee3; 1KAIST; 2KIER
CHARACTERIZATION

Advanced Real Time Imaging — Energy & Biomaterials

**Sponsored by:** TMS Functional Materials Division, TMS Structural Materials Division, TMS Advanced Characterization, Testing, and Simulation Committee, TMS Alloy Phases Committee, TMS: Biomaterials Committee

**Program Organizers:** Jinichiro Nakano, US Department of Energy National Energy Technology Laboratory; David Alman, National Energy Technology Laboratory; Il Sohn, Yonsei University; Hiroyuki Shibata, Imram, Tohoku University; Antoine Allanoare, Massachusetts Institute of Technology; Noritaka Saito, Kyushu University; Anna Nakano, US Department of Energy National Energy Technology Laboratory; Zuotai Zhang, Southern University of Science and Technology; Candan Tamerler, University of Kansas; Bryan Webler, Carnegie Mellon University; Wangzhong Mu, KTH Royal Institute of Technology; David Veysset, Stanford University

**Session Chairs:** Anna Nakano, USDOE National Energy Technology Laboratory; Jinichiro Nakano, USDOE National Energy Technology Laboratory

**Tuesday PM March 16, 2021**

**2:00 PM Invited**
Ultrafast Synchrotron X-ray Imaging and Modelling of Multiphase Flow in Ultrasound Based Materials Processing: Ling Qin; Jiawei Ma; 1University of Hull, UK

**2:20 PM Invited**
In-operando Non-invasive Optical Visualization of Battery Reactions and Processes: Nian Liu; 1Georgia Institute of Technology

**2:40 PM**
In-operando Investigations of Refractory Materials Interacting with Ash/Slag from Mixed Feedstock Gasification: Jinichiro Nakano; Anna Nakano; Ömer Dogan; Matthew Lambert; Dana Gospki; 1U.S. Department of Energy National Energy Technology Laboratory; 2Allied Mineral Products, LLC

**3:00 PM**
Evaluating Amplitude Variation of Frequency Spectrum in Ultrasound Imaging by Through Transmission Method: Koushik Paul; Leila Ladani; 1Arizona State University

**3:20 PM**
In-situ Analysis of Select Oxygen Carrier Materials under Chemical Looping Combustion Conditions: Anna Nakano; Jinichiro Nakano; Ömer Dogan; 1U.S. Department of Energy National Energy Technology Laboratory/ Leidos Research Support Team; 2U.S. Department of Energy National Energy Technology Laboratory/ Leidos Research Support Team; 3U.S. Department of Energy National Energy Technology Laboratory

**3:40 PM Invited**
Synchronized High-speed Microscopy and Thermo-analytical Measurement for Sub-mm/sub-ms-scale Cathodic Behavior in Molten Salt Electrolysis: Shungo Natsui; Ryota Shibuya; Hiroshi Nogami; Tatsuya Kikuchi; Ryosuke Suzuki; 1Tohoku University; 2Hokkaido University

**4:00 PM Break**

**4:20 PM Panel Discussion**

## MATERIALS PROCESSING

**Advances in Powder and Ceramic Materials Science — Ceramic-based Composites**

**Sponsored by:** TMS Extraction and Processing Division, TMS Materials Processing and Manufacturing Division, TMS: Materials Characterization Committee, TMS: Powder Materials Committee

**Program Organizers:** Bowen Li, Michigan Technological University; Shefford Baker, Cornell University; Huazhong Zhai, Beijng Institute of Technology; Kathy Lu, Virginia Polytechnic Institute and State University; Rajiv Soman, Eurofins EAG Materials Science LLC; Faqin Dong, Southwest University of Science and Technology; Jinhong Li, China University of Geosciences (Beijing); Ruigang Wang, The University of Alabama; Eugene Olevsky, San Diego State University

**Tuesday PM March 16, 2021**

**Session Chair:** Dipankar Ghosh, Old Dominion University

**2:00 PM**
Low-cost Forming and Reactive Melt Infiltration Processing of High-temperature, Thermally-cyclable Carbide/Metal Composites in Complex, Near Net Shapes for Renewable Energy Applications: Yujie Wang; Priyatham Tumurugoti; Zhenhui Chen; Alex Strayer; Adam Caldwell; Saeed Bagherzadeh; Grigoris Itskos; Kevin Trumble; Mario Caccia; Kenneth Sandhage; 1Purdue University

**2:20 PM**
Diamond Graphitization and Its Effect on Hardness of Diamond Particulate Ceramic Composites: Jerry LaSalvia; Anthony DiGiovanni; Kristopher Behler; William Shoulders; Scott Walck; 1CCDC Army Research Laboratory

**2:40 PM**
Bulk High-entropy Nitrides and Carbonitrides: Olivia Dippo; Neda Mesgarzadeh; Tyler Harrington; Grant Schrader; Kenneth Vecchio; 1University of California San Diego

**4:00 PM Break**
AI/Data Informatics: Applications and Uncertainty Quantification at Atomistics and Mesoscales — Session IV

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Computational Materials Science and Engineering Committee

Program Organizers: Kamal Choudhary, National Institute of Standards and Technology; Garvit Agarwal, Argonne National Laboratory; Wei Chen, Illinois Institute of Technology; Mitchell Wood, Sandia National Laboratories; Vahid Attari, Texas A&M University; Oliver Johnson, Brigham Young University; Richard Hennig, University of Florida

Tuesday PM March 16, 2021

Session Chairs: Sukriti Manna, Argonne National Laboratory; Noah Paulson, Argonne National Laboratory

2:00 PM
Fast Crystal Structure Reconstruction and Prediction Method: Based on X-ray Diffraction Dataset and Neural Network: Cheng-Chie Tung; Yan-Zhen Chen; Yuan-Yu Lin; Nan-Yow Chen; An-Cheng Yang; Po-Yu Chen; National Tsing Hua University; National Chiao Tung University; National Center for High-Performance Computing

Finding and Sharing Atomistic Materials Data and Software with the NIST Materials Resource Registry: Chandler Becker; Raymond Plante; Laura Bartolo; Robert Hanisch; James Warren; Gretchen Greene; Material Measurement Laboratory, National Institute of Standards and Technology; Center for Hierarchical Materials Design, Northwestern University

2:40 PM
Accelerating High Throughput Materials Simulation Studies Using Machine Learning Based Application Programming Interface (API): Jason Gibson; Stephen Xie; Richard Hennig; University of Florida

3:00 PM
Coupling Machine Learning and Global Structure Optimization in GASP 2.0: Stephen Xie; Shreyas Honrao; Venkata Kolluru; Richard Hennig; University of Florida

3:20 PM
Harnessing Materials Data and Simulation Capabilities for the Accelerated Discovery of Photocathode Materials: Evan Antoniuk; Yumeng Yue; Yao Zhou; Peter Schindler; W. Schroeder; Theodore Vecchione; Bruce Dunham; Piero Pianetta; Evan Reed; Stanford University; University of Illinois at Chicago; SLAC; SLAC

3:40 PM
De Novo Design of Therapeutic Agents Against COVID-19 Using Artificial Intelligence: Sriroth Srinivasan; Rohit Batra; Henry Chan; Ganesh Kamath; Mathew Cherukara; Subramanian Sankaranarayanan; Argonne National Laboratory; Dalzielfever LLC

4:00 PM
AI Guided Discovery of Self-assembly Peptide Sequences using Monte Carlo Tree Search and Coarse-grained Simulations: Rohit Batra; Troy Loeffler; Henry Chan; Sriroth Srinivasan; Christopher Fry; Subramanian Sankaranarayanan; Argonne National Laboratory

AI/Data Informatics: Design of Structural Materials — AI/ML for Design of Structural Alloys & Additively Manufactured Materials


Program Organizers: Jennifer Carter, Case Western Reserve University; Amit Verma, Carnegie Mellon University; Natasha Vermaak, Lehigh University; Jonathan Zimmerman, Sandia National Laboratories; Darren Pagan, Pennsylvania State University; Chris Haines, Ccdc Army Research Laboratory; Judith Brown, Sandia National Laboratories

Tuesday PM March 16, 2021

2:00 PM Invited
Zoning Processing Spaces for Additive Manufacturing: Applications for Inverse Design: Sean Donegan; Edwin Schwalbach; Matthew Krugi; Air Force Research Laboratory

2:30 PM
High-throughput Alloy Design via Additive Manufacturing: Olivia Dippo; Kevin Kaufmann; Grant Schrader; Kenneth Vecchio; University of California San Diego

2:50 PM
Alloy Design for Additive Manufacturing: Mariam Assi; Julien Favre; Anna Fraczeklewicz; Franck Tancret; Mines Saint-Etienne, Univ Lyon, LGF – UMR 5307 CNRS/ Centre SMS; Université de Nantes, Institut des Matériaux Jean Rouxel (IMN), Polytech Nantes, BP 50609

3:10 PM Invited
Multi-objective Lattice Optimization Using an Efficient Neural Network Approach: Anthony Garland; Ben White; Brad Boyce; Ryan Alberdi; Sandia National Labs

3:40 PM
Design of Ti-Al-Cr-V Alloys for Maximum Thermodynamic Stability: Rajesh Jha; George Dulikravich; Florida International University

4:00 PM
Prediction of the Mechanical Properties of Aluminum Alloy Using Bayesian Learning for Neural Networks: Shimpei Takemoto; Kenji Nagata; Takeshi Kaneshita; Yoshishige Okuno; Katsuki Okuno; Masamichi Kitano; Junya Inoue; Manabu Enoki; Showa Denko K.K.; National Institute for Materials Science; The University of Tokyo

4:20 PM
Machine Learning Assisted Exploration of FeCoCrNi Based Nanocrystal-amorphous Dual-phase Alloys: Yi Yao; Xiaobing Hu; Xiaoxiang Yu; Jiaqi Gong; Feng Yan; Lin Li; The University of Alabama; Northwestern University

4:40 PM
Topology Optimization for Design of Stress-dependent Material Properties: Justin Unger; Matthew Vaughn; Andrew Gaynor; Brandon McWilliams; James Guest; Kevin Hemker; Johns Hopkins University; CDC US Army Research Laboratory
**MATERIALS DESIGN**

Algorithm Development in Materials Science and Engineering — Computational Models and Algorithms in Atomistic Scale

**Sponsored by:** TMS Materials Processing and Manufacturing Division, TMS: Computational Materials Science and Engineering Committee, TMS: Integrated Computational Materials Engineering Committee, TMS: Phase Transformations Committee, TMS: Solidification Committee

**Program Organizers:** Mohsen Asle Zaeem, Colorado School of Mines; Mikhail Mendelev, KBR; Bryan Wong, University of California, Riverside; Ebrahim Asadi, University of Memphis; Garrett Tucker, Colorado School of Mines; Charudatta Phatak, Argonne National Laboratory; Bryce Meredig, Citrine Informatics

**Tuesday PM**

**March 16, 2021**

**Session Chair:** Ebrahim Asadi, University of Memphis

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**2:00 PM**

Characterizing Atomistic Geometries and Potential Functions Using Strain Functionals: Edward Kober; Colin Adams; Jacob Taverner; Nithin Mathew; Los Alamos National Laboratory; Colorado School of Mines

**2:20 PM**

Modeling Static Recrystallization within the SPParKS Kinetic Monte Carlo Framework for Polycrystalline Materials: Austin Gertl; David Newell; Adam Pilchak; Eric Payton; The Ohio State University; Air Force Research Lab

**2:40 PM Invited**

Characterizing the Temperature Dependence of High-Peierls-Stress Dislocations’ Mobility in BCC Crystals under Deformation at Finite Temperature from the Atomistic to the Mesoscale: Liming Xiong; Iowa State University

**3:10 PM**

Dislocation Dipole Study on Material Hardening/Softening: Abu Siddique; Tariq Khrashi; Hojun Lim; University of New Mexico; Sandia National Laboratories

**3:30 PM**

Continuum Dislocation Dynamics with Junction Reactions: Computational Modeling and Preliminary Results: Kyle Starkey; Anter El-Azab; Purdue University

**3:50 PM**

Advancements in Discrete Dislocation Modeling of Slip Transmission through Equilibrium and Non-equilibrium Grain Boundaries: Darshan Bamney; Laurent Capolungo; Douglas Spearot; University of Florida; Los Alamos National Laboratory

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**ELECTRONIC MATERIALS**

Alloys and Compounds for Thermoelectric and Solar Cell Applications IX — Session IV

**Sponsored by:** TMS Functional Materials Division, TMS Structural Materials Division, TMS: Alloy Phases Committee

**Program Organizers:** Hsin-Jay Wu, National Chiao Tung University; Sinn-wen Chen, National Tsing Hua University; Franck Gascoin, CNRS Crismat Unicaen; Philippe Jund, Montpellier University; Yoshisato Kimura, Tokyo Institute of Technology; Lan Li, Boise State University; Takao Mori, National Institute for Materials Science; Tiejun Zhu, Zhejiang University; Alexandre Zevakink, Michigan State University; Wan-Ting Chiu, Tokyo Institute of Technology

**Tuesday PM**

**March 16, 2021**

**Session Chairs:** Wan-Ting Chiu, Tokyo Institute of Technology; Ping-Yuan Deng, National Chiao Tung University

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**2:00 PM Invited**

Structure and Physical Properties of Complex Chalcogenides: Fundamental Research with an “Eye” Towards Lower Temperature Applications: George Noia; University of South Florida

**2:20 PM**

Phase Boundary Mapping to Improve Na solubility, Band Convergence, and Thermoelectric Properties in p-type PbTe: James Mate; Priyanka Jod; Shashwat Anand; G. Snyder; Northwestern University; National Institute of Advanced Industrial Science and Technology

**2:40 PM**

Defect Evolution Enabling Low Thermal Conductivity and High Thermoelectric Performance for n-type PbTe: Ping-Yuan Deng; Kuang-Kuo Wang; Jia-Yu Du; Hsin-Jay Wu; National Chiao Tung University; National Sun Yat-sen University; National Tsing Hua University

**3:00 PM Invited**

Thermal and Electrical Transport in Zintl Thermoelectrics: From Ab Initio Understanding to Materials Discovery: Geoffroy Hautier; Université catholique de Louvain

**3:20 PM Invited**

The “Grand Challenge” of Thermoelectric Materials: David Parham; ORNL

**3:40 PM Invited**

The Origin of Low Thermal Conductivity in Tetrahedrites: A Jahn-Teller Electronic Instability: Paz Vaqueiro; University of Reading

**4:00 PM Invited**

Effect of Phonon Drag on Seebeck Coefficient Based on Linear Response Theory: Masao Ogata; Junya Endo; Hiroyasu Matsuura; Hideaki Maebashi; Hidetoshi Fukuyama; University of Tokyo; Tokyo University of Science

**4:20 PM Invited**

Strategies for the Balance of Oxide/Metal Composites Towards the Applications of Flexible Solar Energy Harvesters: Wan-Ting Chiu; Chang Tso-Fu Mark; Masato Sone; Agnes TIXIER-MITA; Hiroshi Toshiyoshi; Hideki Hosoda; Tokyo Institute of Technology; The University of Tokyo

**4:40 PM**

Effect of Zn and Cr Co-doping on the Thermoelectric Properties of Colusite Cu26V2M6S32 (M=Ge,Sn): Paulina Kaminska; Cédric Bourgès; Piotr Spiewak; Takao Mori; Warsaw University of Technology; National Institute for Materials Science

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All times listed are in EDT time zone (UTC-4:00).

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LIGHT METALS

Aluminum Alloys, Processing and Characterization — Mechanical Properties, Applications, and Fitness for Service Testing

Sponsored by: TMS Light Metals Division, TMS: Aluminum Committee

Program Organizer: Dimitry Sediako, University of British Columbia

Tuesday PM March 16, 2021

Session Chair: Nima Shamsaei, Auburn University

2:00 PM
The Effect of Rare Earth Mischmetal on the High Temperature Tensile Properties of an A356 Aluminum Alloy: Joshua Stroh1; Dimitry Sediako2; David Weiss2; 1University of British Columbia Okanagan; 2Eck Industries

2:20 PM
Effects of Ultrasonic Melt Processing on Microstructure, Mechanical Properties and Electrical Conductivity of Hypereutectic Al-Si, Al-Fe and Al-Ni Alloys with Zr Additions: Suwaree Chankitmunkong1; Dmitry Eskin2; Chaowalit Limmaneevichitr3; 1King Mongkut’s University of Technology Thonburi; 2Brunel University London

2:40 PM
The Corrosion Behavior of 5xxx and 6xxx Aluminum Alloys with Trace Calcium: Saugat Singh1; Kumar Sundaram2; B. Pesic3; 1University of Idaho; 2Novelis Molten Metal Processing, Novelis Corporation

3:00 PM
Review of Retrogression Forming and Reaging for AA7075-T6 Sheet: Katherine Rader1; Jon Carter2; Louis Hector2; Eric Taleff3; 1University of Texas at Austin; 2General Motors

3:20 PM
Fatigue and Failure Analysis of an Additively Manufactured Contemporary Aluminum Alloy: P.D. Nezhadfar1; Spencer Thompson2; Ankit Saharan3; Nam Phan4; Nima Shamsaei5; 1Auburn University; 2EOS North America; 3Structures Division, Naval Air Systems Command (NAVAIR)

3:40 PM
Investigation of Weld Quality for Friction Stir Welding of Extruded 6XXX Series Aluminium Alloys: Mehmet Bugra Guner1; Murat Konar2; Arif Fatih Yigit3; Gökşen Özçelik4; Tolga Demirkiran5; 1Asas Aluminium

4:00 PM
The Effect of Al3Er Particles on the Structure and Mechanical Properties of an Al-Mg Alloy: Anton Khrustalev1; Ilya Zhukov2; Vladimir Platon3; Alexander Vorozhtsov4; 1Tomsk State University

4:20 PM Question and Answer Period

LIGHT METALS


Sponsored by: TMS Light Metals Division, TMS: Aluminum Committee

Program Organizers: Arne Ratvik, SINTEF; Marc Dupuis, GeniSim Inc.; Kristian Etienne Einarsrud, Norwegian University of Science and Technology

Tuesday PM March 16, 2021

Session Chair: Marc Dupuis, GeniSim Inc.

2:00 PM
Introductory Comments: Aluminum Reduction Technology Across the Decades: An LMD Symposium Honoring Alton T. Tabereaux and Harald A. Øye: Marc Dupuis1; 1GeniSim Inc.

2:05 PM
Alton Tabereaux: A Humble Individual Who Dedicates His Lifetime to Aluminum - An Aluminum Legend of Our Time: Xiangwen Wang1; 1Alcoa Corp

2:45 PM
Awakening of the Aluminum Industry to PFC Emissions and Global Warming: Alton Tabereaux1; David Wong1; 1Consultant

3:05 PM
Application and Adaptability of MHD Stability Computation for Modern Aluminium Reduction Cells at Extreme Conditions of Low ACD: Valdis Bojarevics1; Marc Dupuis2; 1University of Greenwich; 2GeniSim Inc.

3:25 PM
Investigation of Cyclic Process Variations within Hall-Héroult Reduction Cells: Jayson Tessier1; Samuel Duplessis2; 1Alcoa

3:45 PM
In Line Cell Position and Anode Change Effects on the Alumina Dissolution: Valdis Bojarevics1; 1University of Greenwich

4:05 PM
History of Computer Control of Aluminum Reduction Cells: Vinko Potocnik1; Michel Reverdy2; 1Vinko Potocnik Consulting

4:25 PM Question and Answer Period
**ADVANCED MATERIALS**

**Bulk Metallic Glasses XVIII — Alloy Development and Application II**

*Sponsored by:* TMS Structural Materials Division, TMS: Mechanical Behavior of Materials Committee

**Program Organizers:** Peter Liaw, University of Tennessee; Yanfei Gao, University of Tennessee-Knoxville; Hahn Choo, University of Tennessee; Yunfeng Shi, Rensselaer Polytechnic Institute; Robert Maass, Federal Institute for Materials Research and Testing (BAM); Xie Xie, FCA US LLC; Gongyao Wang, Alcoa Technical Center

*Tuesday PM*  
*March 16, 2021*  
*Session Chairs:* Eun Park, Seoul National University; David Browne, University College Dublin

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**2:00 PM**  
Fabrication of Fe-based Metallic Glassy Microparts Through Unprecedented Processes: *Rui Yamada*; Noriharu Yodoshii; Naoyuki Nomura; Junji Saida; Akira Kawasaki; Tohoku University

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**2:20 PM**  
Invited Selection and Testing of Bulk Metallic Glass Alloys for Space-based Mechanisms: *Andrew Murphy*; Andrew Norman; David Browne; University College Dublin; European Space Agency

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**2:45 PM**  
Measuring Metallic Glass Viscosities Over Wide Composition Ranges: *Sebastian Kube*; Theo Evers; Will Polsky; Rodrigo Miguel Ojeda Mota; Kevin Ryan; Jan Schroers; Yale University

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**3:05 PM**  
Machine Learning from Elemental and Simulation Features for Predicting Glass Forming Ability: *Dane Morgan*; Benjamin Afflerbach; Lane Schultz; Janine Erickson; Dan Thoma; University of Tennessee; John Perepezko; Carter Francis; Paul Voyles; George Bokas; Jianqi Xi; Izabela Sztufarska; University of Wisconsin-Madison; Siemens Industry Software

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**3:50 PM**  
Compaction of Aluminium Foil and Its Effect on Oxidation and Recycling Yield: *Alcina Vallejo Olivares*; Harald Philippsen; Mortel Gökelma; Hans Roven; Trond Furu; Anne Kvithyld; Gabriella Tranell; Norwegian University of Science and Technology; Izmir Institute of Technology; Norsk Hydro; SINTEF

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**3:55 PM**  
Influence of Mg Concentration on the Inhibiting Effect of CO₂ on the Oxidation Rate of Aluminium Alloys 5182 and 6016: *Cathrine Solen*; Egil Solberg; Gabriella Tranell; Ragnar Aune; Norwegian University of Science and Technology (NTNU); Alcoa Norway ANS

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**4:20 PM**  
Automated Chemical Analysis of Liquid Aluminium for Process Control: *Sveinn Hinrik Gudmundsson*; Halldor Gudmundsson; Kristjan Leosson; DT Equipment; Nordural ehf.

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**4:40 PM**  
Characteristic Impurities of Silicon Metal SI-441 as Additive Material to Produce Aluminium Foundry Alloy A356.2: *Reggy Zurcher*; Rainaldy Harahap; Edi Mugiono; Yaser Parapat; Masrut Ponirin; PT Indoesia Asahan Aluminium

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**5:05 PM**  

*Sponsored by:* TMS Extraction and Processing Division, TMS: Materials Characterization Committee

**Program Organizers:** Jian Li, CanmetMATERIALS; Mingming Zhang, ArcelorMittal Global R&D; Bowen Li, Michigan Technological University; Sergio Monteiro, Instituto Militar de Engenharia; Shadia Ikhmayies; Yunus Kalay, Middle East Technical University; Jiann-Yang Hwang, Michigan Technological University; Juan Escobedo-Díaz, University of New South Wales; John Carpenter, Los Alamos National Laboratory; Andrew Brown, Army Research Laboratory; Rajiv Soman, Eurofins EAG Materials Science LLC; Alex Moser, US Naval Research Laboratory

*Tuesday PM*  
*March 16, 2021*  
*Session Chairs:* Sergio Monteiro, Military Institute of Engineering; Kelvin Xie, Texas A&M University

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**2:00 PM**  
Composite Binder and Particle Size Effects on Mechanical Properties of Non-hazardous High Explosive Surrogates: *Matthew Herman*; Caitlin Woznick; Amanda Duque; John Yeager; Los Alamos National Laboratory

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**2:20 PM**  
Mechanical Testing and Microstructural Investigation into the Effects of Heat Treatment on Additively Manufactured TIC Reinforced Ti-Ni Matrix Composites (TNCMs): *Andrew Dodd*; Jianshen Wang; Daniel East; Evgeny Morozov; Juan Escobedo-Díaz; University of New South Wales;CSIRO Manufacturing

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**2:40 PM**  
Influence of Graphene Oxide Fuctionalization Strategy on the Dynamic Mechanical Response of Natural Fiber Reinforced Polymer Matrix Composites: *Fabio Garcia Filho*; Michelle Oliveira; Fernanda Luz; Sergio Monteiro; Military Institute of Engineering
3:00 PM  
Charpy Impact Tests of Castor Oil Derived Polyurethane Matrix Composites Reinforced by Wood Industry Waste: Juliana de Faria1; Noan Simonassi2; Carlos Mauricio Vieira3; Felipe Lopes4; 
1State University of Northern Rio de Janeiro; 2UENF

3:20 PM  
Flexural Strength of Castor Oil Derived Polyurethane Matrix Composite Reinforced with Luffa Fibers: Anna Carolina Cerqueira Neves1; Noan Simonassi2; Felipe Lopes3; Carlos Mauricio Vieira3; 
1UENF; 2State University of Northern Rio de Janeiro

3:40 PM  
Spall Damage Characterization of Additively Manufactured Ti-Ni-C Composites: Warwick Absolon1; Jianshen Wang2; Daniel East3; Ali Ameri4; Hongxu Wang5; Evgeny Morozov6; Paul Hazell7; 
1University of New South Wales; 2CSIRO Manufacturing; 3University of Technology; 4Pennsylvania State University; 5Shantou Huaxing Metallurgical Equipment Co., Ltd.

4:00 PM  
Characterization of Additively Manufactured Ti-Ni-C Composites: Warwick Absolon1; Jianshen Wang2; Daniel East3; Ali Ameri4; Hongxu Wang5; Evgeny Morozov6; Paul Hazell7; 
1University of New South Wales; 2CSIRO Manufacturing; 3University of Technology; 4Pennsylvania State University; 5Shantou Huaxing Metallurgical Equipment Co., Ltd.

4:40 PM  
Preparation of Ceramic Coating on Copper Substrate with Transitional Layer by Low-temperature Slurry Method: Zefei Zhang1; Hao Bai2; Lihong Li3; Min Zhong4; 
1University of Science and Technology Beijing; 2Shantou Huaxing Metallurgical Equipment Co., Ltd.

NUCLEAR MATERIALS

Charaterization of Nuclear Materials and Fuels with Advanced X-ray and Neutron Techniques — X-ray Tomography and Microscopy

Sponsored by: TMS Structural Materials Division, TMS: Advanced Characterization, Testing, and Simulation Committee, TMS: Nuclear Materials Committee

Program Organizers:  Xuan Zhang, Argonne National Laboratory; Jonathan Almer, Argonne National Laboratory; Maria Okuniewski, Purdue University; Joshua Kane, Idaho National Laboratory; Donald Brown, Los Alamos National Laboratory; J. Kennedy, Idaho National Laboratory; Arthur Motta, Pennsylvania State University

Tuesday PM  March 16, 2021

Session Chairs: Joshua Kane, Idaho National Laboratory; Xuan Zhang, Argonne National Laboratory

2:00 PM  
Characterization of Nuclear Energy Materials in 2D and 3D using Laboratory-based X-ray Microscopy: Nikolaus Cordes1; Joshua Kane2; Aaron Craft3; 
1Idaho National Laboratory

2:20 PM  
Non-destructive Correlative 3D Characterization of Nuclear Graphite: From the Microscale to the Nanoscale: Stephen Kelly1; Robin White2; William Harris3; Tobias Volkenand4; Benjamin Tordoff5; 
1University of Plymouth

2:40 PM  
Irradiation Effects on Precipitate Distributions in High-temperature Ultrafine-precipitate-strengthened Steel Characterized by Synchrotron Micro-computed Tomography: Alejandro Figueroa1; Sri Nori2; Peter Kene5; Jonathan Almer6; Maria Okuniewski7; 
1Purdue University; 2Argonne National Laboratory

3:00 PM  
Identifying the Microstructural Origins of Creep Damage in Alloy 617: Mark Messner1; Xuan Zhang2; Meinme Li3; Michael McMurtrey4; 
1Argonne National Laboratory; 2Idaho National Laboratory

3:20 PM  
Getting “Around” the High Mass Attenuation Issue for µX-ray Computed Tomography of Nuclear Fuels: Joshua Kane5; Nikolaus Cordes1; Aaron Craft1; Douglas Marshall2; John Stempient3; 
1Idaho National Laboratory

NUCLEAR MATERIALS

Composite Materials for Nuclear Applications — Composite Fuels/Graphite Carbon

Sponsored by: TMS Structural Materials Division, TMS: Composite Materials Committee, TMS: Nuclear Materials Committee

Program Organizers:  Anne Campbell, Oak Ridge National Laboratory; Dong Liu, University of Bristol; Rick Ubic, Boise State University; Lauren Garrison, Oak Ridge National Laboratory; Peng Xu, Idaho National Laboratory; Johann (Hans) Riesch, Max Planck Institute for Plasma Physics

Tuesday PM  March 16, 2021

Session Chair:  Anne Campbell, Oak Ridge National Laboratory

2:00 PM  Invited  
Improved Techniques for Determining Local Thermal Transport in Composite Nuclear Fuels: Scott Middlemas1; Joshua Kane2; Tsvetoslav Pavlov3; Boopathy Kombaiah1; Daniel LaBrier4; Yu-lin Shen5; Isabella Van Rooyen6; 
1Idaho National Laboratory; 2Idaho State University; 3University of New Mexico

2:30 PM  Invited  
Overview of the Westinghouse Accident Tolerant and High Burnup Fuel Program: Edward Lahoda1; Zeses Karoutas2; Luke Olson3; Luther Hallman1; Kathryn Metzger1; Jorie Walters1; Michael Sivack1; John Lyons2; Luke Czerniak1; Allan Jaworski1; Ben Maier1; 
1Idaho National Laboratory; 2Boise State University; 3Idaho National Laboratory; 4University of Wisconsin; 5University of Utah

3:00 PM  Development of UN/UO2 Composite Fuels for LWR Applications: Peng Xu1; Lingfeng He1; Brian Jaques2; Kumar Sridharam; Darryl Butt3; 
1Idaho National Laboratory; 2Boise State University; 3University of Wisconsin; 4University of Utah

3:20 PM  Uranium Nitride Advanced Fuel: An Evaluation of the Oxidation Resistance of Coated and Doped Grains: Yulia Mishchenko1; Denise Adorno Lopes2; Kyle Johnson3; Janne Wallenius4; 
1KTH; 2Westinghouse Electric Company; 3Studsvik Nuclear AB

3:40 PM  Fabrication, Characterization and Oxidation Resistance of an Innovative Composite Fuel: UN Microspheres Embedded in UO2: 
Matrix: Dörge Cosset1; Marcus Hedberg2; Simon Middleburgh3; 
1Swedish University of Technology; 2Chalmers University of Technology; 3Bangor University; 4KTH Royal Institute of Technology, Westinghouse Electric Sweden AB
4:00 PM Invited
Use of Carbon Fibre-reinforced Carbon in Wendelstein 7-X. Jean Boscary1; Henri Greuner1; Boris Mendelewitsch1; Gunnar Ehrke2; Patrick Junghanns1; Reinhold Studtler1; 1Max-Planck-Institut für Plasmaphysik

4:30 PM Sub-critical Crack Initiation, Coalescence and Propagation in Nuclear Graphite Studied by High-speed Pink Beam Synchrotron Tomography. Thomas Zillhardt1; Dong Liu2; James Marrow2; 1University of Oxford; 2University of Bristol

TUESDAY PM
March 16, 2021

Session Chairs: Mira Todorova, Max Planck Institute for Eisenforschung; Jorge Munoz, University of Texas at El Paso

Tuesday PM

2:00 PM Invited
Integrated Models for the Design of Precipitation Hardenable Mg and Al Alloys. Hong Liu1; Ioannis Papadimitriou1; Fengxiang Lin2; Javier Llorca3; Jian-Feng Nie4; Moelans Nele5; 1KU Leuven; 2IMDEA Materials; 3UC Louvain; 4IMDEA Materials; 5Monash University

2:30 PM Competing and Collaborating Phase Transitions Studied within Cluster Variation Method. Tetsuo Mohri1; Tohoku University

2:50 PM First principles Study of Precipitation in Al-Cu, Al-Li and Al-Cu-Li Alloys. Sha Liu1; Javier Llorca2; 1IMDEA Materials Institute; 2IMDEA Materials Institute & Technical University of Madrid

3:10 PM Invited
Insights into Processes at Electrochemical Solid/Liquid Interfaces from Ab Initio Molecular Dynamics Simulations. Mira Todorova1; Sudarsan Sureshnan2; Stefan Wippermann1; Florian Deissenbeck1; Christoph Freysoldt1; Joerg Neugebauer1; 1Max Planck Institut fur Eisenforschung

3:40 PM Effect of Oxygen on Joining Magnesium and Iron: Insights from Ab Initio Simulations. Peter Sushko1; Yingge Du2; Hirshkesh Das1; Piyush Upadhyay1; 1Pacific Northwest National Laboratory

4:00 PM A First-principles Analysis of the Temperature Dependence of Stacking Fault Energies in Mg and Ti. Julian Brodie1; Maryam Ghaeziaie1; 1Ohio State University

4:20 PM Invited
Vacancy-mediated Phase Selection in High-entropy Alloys. Prashant Singh1; Shalabh Gupta1; A V Smirnov1; Matthew J Kramer1; Duane D Johnson1; 1Ames Laboratory

4:50 PM Lattice Dynamics of FeTi at Simultaneous High Temperature and High Pressure from First Principles. Adrian De la Rocha1; Jorge Munoz2; Armando Garcia3; Vanessa Mera3; Bethuel Khamaia4; Bert de Jong5; Yu-Hang Tang2; 1The University of Texas at El Paso; 2Lawrence Berkeley National Laboratory

PHYSICAL METALLURGY

Defect and Phase Transformation Pathway Engineering for Desired Microstructures — Simulation and Modeling

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Phase Transformations Committee

Program Organizers: Yufeng Zheng, University of Nevada-Reno; Rongpei Shi, Lawrence Livermore National Laboratory; Yipeng Gao, Idaho National Laboratory; Timofey Frolov, Lawrence Livermore National Laboratory; Stoichko Antonov, Max-Planck-Institut für Eisenforschung GmbH; Jessica Krogslad, University of Illinois at Urbana-Champaign; Bin Li, University of Nevada, Reno

Tuesday PM
March 16, 2021

Session Chair: Yipeng Gao, Idaho National Laboratory

2:00 PM Interactions between Lattice Dislocations and 3D Metallic Interfaces. Shuozhi Xu1; Justin Cheng2; Nathan Mara3; Irene Beyerlein1; 1University of California, Santa Barbara; 2University of Minnesota, Twin Cities

2:20 PM Interfacial Segregation and Segregation-induced Transitions in a Polycrystalline Grain Boundary Network. Pulhit Garg1; Zhiliang Pang2; Vladyslav Turlo3; Timothy Rupert4; 1Arizona State University; 2Gililin University of Electronic Technology; 3Swiss Federal Laboratories for Materials Science and Technology (Empa); 4University of California, Irvine

2:40 PM Twin Boundaries Continue to Surprise Us: Understanding Type II Twin in NiTi and (1012) Twin in HCP Materials. Mohammad Shahriar Hooshmand1; Yan Chong1; Ruopeng Zhang1; Andrew Minor1; Mark Asta2; 1University of Illinois Urbana-Champaign

3:00 PM New Insights into The Effect of Solutes on Twinning in Ti Alloys. Mohammad Shahriar Hooshmand1; Yan Chong1; Ruopeng Zhang1; Andrew Minor1; Mark Asta2; 1University of Illinois Urbana-Champaign

3:20 PM Evolving Core Structures in Dislocation-twin Boundary Interactions. Orcun Koray Celebi1; Ahmed Sameer Khan Mohammed2; Francisco Andrade Chavez2; Jessica Krogstad3; Huseyin Sehitoglu1; 1University of Illinois Urbana-Champaign

3:40 PM Characterizing and Modeling Collective Atomic Displacements during Grain Boundary Migration. Ian Chesser1; Anqi Qiu2; Ankit Gupta3; 1Ames Laboratory

4:00 PM Assessment and Design of Complex Microstructural Features in Zirconia Shape Memory Ceramics via Elasto-Plastic Phase-field Modeling. Chelth Cissé4; Mohsen Asle Zaeem1; 1Colorado School of Mines; 4University of Colorado Colorado Springs

4:20 PM Modeling of Carbon Fibre-reinforced Carbon in Wendelstein 7-X. Jean Boscary1; Henri Greuner1; Boris Mendelewitsch1; Gunnar Ehrke2; Patrick Junghanns1; Reinhold Studtler1; 1Max-Planck-Institut für Plasmaphysik

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4:20 PM
Pseudoelastic Response of Ion-implanted Nickel-titanium Shape Memory Alloy: Combining Experimentation and Forward Modeling: Daniel Hong1; Harshad Paranjape2; Peter Anderson3; Alejandro Hinajos1; Michael Mills4; Khalid Hattar2; Nan Li5; Jeremy Schaffer1; 1The Ohio State University; 2Confluent Medical; 3CINT Sandia National Laboratories; 4CINT Los Alamos National Laboratories; 5Fort Wayne Metals

4:40 PM
Investigation of Nucleation Mechanisms Associated with Formation of Co-precipitates in Ni-based Superalloys: Haritharan Srimani1; Semanti Mukhopadhyay1; Rongpei Shi2; Michael Mills3; Yunzhi Wang1; 1The Ohio State University; 2Lawrence Livermore National Laboratory

MATERIALS PROCESSING
Deformation Induced Microstructural Modification — Session IV: Deformation of Alloys I

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Shaping and Forming Committee

Program Organizers: Arun Devaraj, Pacific Northwest National Laboratory; Suveen Mathaudhu, University of California—Riverside; Kester Clarke, Colorado School of Mines; Bharat Gwani, Pacific Northwest National Laboratory; Daniel Coughlin, Los Alamos National Laboratory

Tuesday PM March 16, 2021

Session Chair: Daniel Coughlin, Los Alamos National Laboratory

2:00 PM Invited
Deformation Induced Precipitation (DIP) in Light Alloys: Theory and Experiments: Suhas Eswarappa Prameela1; Peng Yi1; Yannick Hollenweger2; Laszlo Kecskes3; Dennis Kochmann2; Michael Falk2; Timothy Weihs1; 1Johns Hopkins University; 2ETH Zurich

2:30 PM
Cyclic Deformation and Fatigue Behavior of 316L Stainless Steel Processed by Surface Mechanical Rolling Treatment: Luiz Carneiro1; Xiaogui Wang2; Yanyao Jiang2; 1University of Nevada, Reno; 2Zhejiang University of Technology

2:50 PM
High Pressure Torsion Processed Maraging Steels: Microstructure and Mechanical Behaviour: Kevin Jacob1; Deepesh Yadav1; Saurabh Dixit1; Anton Hohenwarter1; Ballal Jaya1; 1ILT Bombay; 2Mishra Dhatu Nigam Ltd. (Midhani); 3Montanuniversität Leoben

3:10 PM Invited
Fabrication of Ultrafine Grained Ferritic Steels by Combining Dynamic Transformation and Dynamic Recrystallization: Nobuhiro Tsuji1; Lijia Zhao1; Nokeun Park2; Yanzhong Tian1; Akinobu Shibata1; 1Kyoto University; 2ArcelorMittal; 3Yeungnam University; 4Northeastern University; 5National Institute for Materials Science

3:40 PM Invited
Microstructural Evolution and Deformation Mechanisms in Segregation-Engineered Nanocrystalline Al Alloys: Glenn Babbus1; Johann Kappacher2; David Sproston3; Jungho Shin4; Fulin Wang5; Jason Trelewicz1; Daniel Kiener1; Verena Maier-Kiener1; Daniel Gianola1; 1UCSB; 2Montanuniversität Leoben; 3Stony Brook University; 4University of California, Santa Barbara

4:10 PM
The Effect of Processing Parameters on the Microstructure and Performance of Ni-Mn-Ga Alloys. Pino Ari-Gur1; Pranav Bhatia1; Irek Musabirov1; Ronald Noebe4; Vladimir Shavrov5; Victor Kolegov6; 1Western Michigan University; 2Russian Academy of Sciences, Ufa; 3NASA Glenn Research Center; 4Russian Academy of Sciences, Moscow

4:30 PM
Thermomechanical Processing of Dilute Mg-Zn-Ca Alloys. Jenna Krynicki1; Laszlo Kecskes2; John Gibbins3; Zhigang Xu2; Timothy Weihs1; 1Johns Hopkins University; 2North Carolina A&T State University

ELECTRONIC MATERIALS
Electronic Packaging and Interconnections 2021 — Pb-free Solder Alloys II

Sponsored by: TMS Functional Materials Division, TMS: Electronic Packaging and Interconnection Materials Committee

Program Organizers: Mehran Maalekian, Mat-Tech; Christopher Gourlay, Imperial College London; Babak Arfaei, Ford Motor Company; Praveen Kumar, Indian Institute of Science; Sai Vadlamani, Intel Corporation; Kazuhiro Nagita, University of Queensland; David Yan, San Jose State University

Tuesday PM March 16, 2021

Session Chairs: Christopher Gourlay, Imperial College London; David Yan, San José State University

2:00 PM Invited
Effect of Current Stress on the Microstructure of SnBiAg-SAC Mixed Solder Joints: Eric Cotts1; Faramarz Hadian1; Randy Owen1; 1Binghamton University

2:20 PM
Effects of Antimony on the Microstructure and Reliability of Sn-Ag-Cu-based Solder Joints: Sergey Belyakov1; Richard Coyle2; Babak Arfaei3; 1Christopher Gourlay4; 1Imperial College London; 2Nokia Bell Laboratories; 3Ford Motor Company

2:40 PM Invited
Sn-Ag-Cu and Sn-Bi Solder Powders for Fine Pitch Printing: Amir Nobari5; Arslane Bouchemiti6; Gilles L’Espérance2; 15N Plus Inc - Micro Powders; 2École Polytechnique de Montréal

3:00 PM Invited
Single Solder Joint Shear with In-situ Current Stressing: Kendra Young1; Choong-Un Kim2; Tae-Kyu Lee3; 1Portland State University; 2University of Texas, Arlington

3:20 PM
Solderability Assessment of Lead-free Alloys: Mehran Maalekian1; 1Mat-Tech

3:40 PM
Finite Element Analysis Modeling of Stress Evolution and Whisker Growth Under Applied Pressure: Nupur Jain1; Piyush Jagtap1; Allan Bower1; Eric Chason1; 1Brown University

4:00 PM
Corrosion Behavior of Co-based Surface Finishes in Sulfur-containing Gas: Si-Wei Lin1; Albert T. Wu1; 1National Central University
**CORROSION**

Environmentally Assisted Cracking: Theory and Practice — Stress Corrosion Cracking I

**Sponsored by:** TMS Structural Materials Division, TMS: Corrosion and Environmental Effects Committee

**Program Organizers:** Bai Cui, University of Nebraska-Lincoln; Raul Rebak, GE Global Research; Srujan Rokkam, Advanced Cooling Technologies Inc; Jenifer Locke, Ohio State University

**Tuesday PM**

**March 16, 2021**

**Session Chairs:** Karl Sieradzki, Arizona State University; Yong Yang, University of Florida

- **3:20 PM**
  - Florida<br>  - Golumbfskie<br>  - Corrosion Cracking Performance of Thin Plate 5xxx Alloys: Understanding the Effects of ß-phase Precipitation on the Stress
  - Authors: Xiang Li; Nima Shamsaei 1; 1Auburn University; 2Anna Wildeis 1; 1University of Tennessee; 3Sriram Srinivasan 1; 1Oak Ridge National Laboratory; 2University of Tennessee; 3NASA Langley Research Center

- **4:20 PM**
  - All times listed are in EDT time zone (UTC-4:00).
  - www.tms.org/TMS2021

**MATERIALS DESIGN**


**Program Organizers:** Garrett Pataky, Clemson University; Ashley Spear, University of Utah; Antonios Kontsos, Drexel University; Brian Wisner, Ohio University; Jean-Charles Stinville, University of California-Santa Barbara

**Tuesday PM**

**March 16, 2021**

**Session Chair:** Garrett Pataky, Clemson University

- **2:00 PM**
  - Invited<br>  - Microstructure and Fatigue Damage Evolution in Additively-manufactured Metals Using Enhanced Measurement Techniques and Modeling Approaches: Mustafa Awd; Frank Walther; Ali Fatemi; 1TU Dortmund University; 2University of Memphis

- **2:20 PM**
  - Low Cycle Fatigue Behavior of an Optimally Produced Additive Manufactured Aluminum Alloy: Emine Tetereli; Vignesh Perumal; Darren Beckett; Scott Halliday; Antonios Kontsos; 1Drexel University; 2Sigma Labs; 3Navajo Technical University

- **2:40 PM**
  - Investigation of the Fatigue Crack Behavior of 304 Stainless Steels Using Synchrotron X-ray Tomography: Ryan Schoell; Li Xi; Harvey West; Zeev Shayer; Djamel Koaumli; 1North Carolina State University; 2Colorado School of Mines

- **3:00 PM**
  - Long Range Internal Stress Assessment Using Convergent Beam Electron Diffraction and Dislocation Dipole Height in Cyclically Deformed Copper Single Crystals: Roya Ermagan; Maxime Sauzay; Michael Kassner; 1University of Southern California; 2CEA Paris-Saclay

- **3:20 PM**
  - Correlation between Cyclic Plastic Deformations and Strength Mismatches in Ni-Steel Dissimilar Joints under Isothermal Low-cycle Fatigue Tests: Shutong Zhang; Sebastian Romo; Rafael Arthur Giorjao; Antonio Ramirez; 1Ohio State University

- **3:40 PM**
  - High and Very High Cycle Fatigue Behavior of Additively Manufactured 17-4 PH Stainless Steel: The Effect of Shielding Gas: PD. Nezhadfar; Jade Welsh; Jutima Simsiriwong; Shuai Shao; Nima Shamsaei; 1Auburn University; 2University of North Florida

- **4:00 PM**
  - An In-situ Analysis on the Fatigue Damage in Martensitic Spring Steel: Anna Wildeis; Matthias Thimm; Robert Brandl; Hans-Jürgen Christ; Claus-Peter Fritzen; 1University of Siegen

- **4:20 PM**
  - Post-fatigue Study of SLM Ti64 Medical Implant by 3D Correlative Microscopy: Bartomiej Winarski; Matteo Benedetti; Philip Withers; 1Thermo Fisher Scientific; 2University of Trento; 3The University of Manchester
MATERIALS PROCESSING

Friction Stir Welding and Processing XI — Control & Non-Destructive Examination

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Shaping and Forming Committee

Program Organizers: Yuri Hovanski, Brigham Young University; Piyush Upadhyay, Pacific Northwest National Laboratory; Yutaka Sato, Tohoku University; Nilesh Kumar, University of Alabama, Tuscaloosa; Anton Naumov, Peter the Great St. Petersburg Polytechnic University

Tuesday PM March 16, 2021

2:00 PM Real-time Measurement of Friction Stir Tool Motion during Defect Interaction in Aluminum Alloy 6061-T6: Daniel Franke; Frank Pfefferkorn; Shiva Rudraraju; Michael Zinn; University of Wisconsin Madison

2:20 PM Development of Automatic Quality Control Techniques for Friction Stir Welding Processes: Egoitz Aldanondo; LORTEK

2:40 PM Preliminary Investigation of the Effect of Temperature Control in Friction Stir Welding: Johnathan Hunt; David Pearl; Carter Hamilton; Yuri Hovanski; Brigham Young University; Miami University

3:00 PM Transitioning FSW to a Controlled Production Process: Arnold Wright; Devry Smith; Brandon Taysom; Yuri Hovanski; Brigham Young University; Pacific Northwest National Laboratory

3:20 PM Removing Rotational Variations from Shoulder Thermocouples in Friction Stir Welding: Brandon Taysom; Kenneth Ross; Woonjoo Choi; Pacific Northwest National Laboratory

PHYSICAL METALLURGY

Frontiers in Solidification Science VIII — Faceted Growth / Solid-Liquid Interfaces

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Chemistry and Physics of Materials Committee, TMS: Phase Transformations Committee, TMS: Solidification Committee, TMS: Computational Materials Science and Engineering Committee

Program Organizers: Damien Tourret, IMDEA Materials; Amy Clarke, Colorado School of Mines; Ulrike Hecht, Access e.V.; Nana Ofori-Opoku, Canadian Nuclear Laboratories; Melis Serefoglu, Koc University; Tiberiu Stan, Northwestern University

Tuesday PM March 16, 2021

Session Chairs: Mohsen Asle Zaeem, Colorado School of Mines; Damien Tourret, IMDEA Materials; Alain Karma, Northeastern University; Nana Ofori-Opoku, Canadian Nuclear Laboratories

2:00 PM Invited 3D Phase-field Simulations of Pattern Formation during Freeze Casting: Kaiyang Yin; Louisa Strutzenberg; Rohit Trivedi; Ulrike Wegrts; Alain Karma; Northeastern University; NASA Marshall Space Flight Center; Iowa State University

2:30 PM Experimental Observations of Mechanisms of Pattern Formation during Freeze Casting: Kailiang Jia; Kailhua Ji; Louise Strutzenberg; Rohit Trivedi; Alain Karma; Ulrike G.K. Wegrts; Northeastern University; NASA Marshall Space Flight Center; Iowa State University

SPECIAL TOPICS

Frontiers of Materials Award Symposium: 2021 Functional Nanomaterials: Translating Innovation into Pioneering Technologies — Session IV

Program Organizer: Huanyu Cheng, Pennsylvania State University

Tuesday PM March 16, 2021

2:00 PM Invited Intelligent Materials at the AI-robotics-medicine Nexus: Xuanhe Zhao; Massachusetts Institute of Technology

2:40 PM Invited Expansile Kirigami Wrapping Designs for Breast Reconstruction: Young-Joo Lee; Hyuesung Cho; Jason Christopher Jolly; Eric Jablonka; Michael Tanis; Randall Kamien; Suhail Kanchwala; Shu Yang; University of Pennsylvania

3:20 PM Invited Liquid Metals and Hydrogels: Inherently Stretchable Materials for Wearables: Michael Dickey; North Carolina State University

4:00 PM Invited Semiconductor Nanomaterials for Neural Interfaces: John Rogers; Northwestern University

All times listed are in EDT timezone (UTC-4:00).
Skin-inspired Organic Electronics: Zhenan Bao¹; Stanford University

NANOSTRUCTURED MATERIALS

Heterostructured and Gradient Materials (HGM IV): Tailoring Heterogeneity for Superior Properties — Gradient Materials

**Sponsored by:** TMS Structural Materials Division, TMS: Mechanical Behavior of Materials Committee

**Program Organizers:** Yuntian Zhu, City University of Hong Kong; Kei Ameyama, Ritsumeikan University; Irene Beyerlein, University of California—Santa Barbara; Yves Brechet, Grenoble Institute of Technology; Huajian Gao, Nanyang Technological University; Hyoong Seop Kim, Pohang University of Science and Technology; Ke Lu, Institute of Metal Research; Xiaolei Wu, Chinese Academy of Sciences

Tuesday PM  March 16, 2021

**Session Chairs:** Brad Boyce, Sandia National Lab; Hyoung Seop Kim, Postech; Suveen Mathaudhu, University of California, Riverside

2:00 PM Invited
Chemical Gradients to Control Stability and Mechanical Behavior in Nanostructured Pt-Au: Brad Boyce¹; David Adams¹; Khalid Hattar²; Remi Dingerville³; Riley Parrish⁴; Fadi Abdeljawad⁵; Sandia National Laboratories; ²Clemson University

2:25 PM
Multi-layered Gradient Structure by Single-roll Angular-rolling and Ultrasonic Nanocrystalline Surface Modification: Hyoong Seop Kim¹; Hak Hyeon Lee¹; Hyung Keun Park¹; Jaimyun Jung¹; Auezhan Amanov¹; Pohang University of Science and Technology; ²KIMS; ³Sun Moon University

2:45 PM
Mechanical Enhancement of Graded Nanoporous Structure: Lijie He¹; Niaz Abdolrahimi¹; University of Rochester

3:05 PM
Tuning the Strongest Size by Tailoring Grain Size Gradient in Metals: Penghui Cao¹; University of California Irvine

3:25 PM Invited
Exploring the Grain Size Stability of Heterogeneous Copper in Thermal, Mechanical and Radiation Environments: Heather Salvador¹; Evander Ramos¹; Sina Shahrezaei¹; Trevor Clark¹; Khalid Hattar¹; Suveen Mathaudhu¹; University of California, Riverside; ²Pacific Northwest National Laboratory; ³Sandia National Laboratories

3:50 PM
Site-specific Texture Control for Functionally Graded Structures of Stainless Steel 316L Manufactured by Selective Laser Melting: Karl Sofinowski¹; Raman Sudharshan¹; Adarsh Nair¹; Matteo Seita¹; Nanyang Technological University

ADVANCED MATERIALS

High Entropy Alloys IX: Alloy Development and Properties — Alloy Development and Application III

**Sponsored by:** TMS Functional Materials Division, TMS Structural Materials Division, TMS: Alloy Phases Committee, TMS: Mechanical Behavior of Materials Committee

**Program Organizers:** Peter Liaw, University of Tennessee; Michael Gao, National Energy Technology Laboratory; E-Wen Huang, National Chiao Tung University; Sivatsan Tirumalai, The University of Akron; Xie Xie, FCA US LLC; Gongyao Wang, Alcoa Technical Center

Tuesday PM  March 16, 2021

**Session Chairs:** Wen Chen, University of Massachusetts Amherst; Duck Kim, Tennessee Technological University

2:00 PM Invited
High-Entropy Alloys Containing Cu: Effects on Microstructure and Liquid Phase: Reza Abbaschian¹; Nicholas Derimow²; Raquel Jaime³; Bryan Le⁴; University of California, Riverside; ²National Institute of Standards and Technology

2:25 PM Invited
Accelerated Design of High-entropy Alloys for Gas-Turbine Blade Components: Baldur Steingrimsson¹; Joseph Poon²; Michael Widom³; Anand Kulkarni³; Xuesong Fan⁴; Chanco Lee⁵; Chuan Zhang⁶; Michael Kirka⁶; Jaafar El-Awady⁷; Peter Law⁸; Imagars LLC; Portland State University; ²University of Virginia; ³Carnegie Mellon University; ⁴Siemens Corporation; ⁵University of Tennessee; ⁶CompuTherm LLC; ⁷Oak Ridge National Laboratory; ⁸John Hopkins University

2:50 PM Invited
Effect of Process Parameters on the Microstructure and Mechanical Properties of Wire+Arc Additively Manufactured AlCoCrFeNi High Entropy Alloy: Rumman Ahsan¹; Xuesong Fan¹; Gi-Jeong Seo¹; Peter Liaw²; Duck Bong Kim³; Tennessee Technological University; ²The University of Tennessee, Knoxville

3:15 PM Invited
Welding Metallurgy and Weld Properties of High Entropy Alloys: Carolin Fink¹; Alexander C. Martin¹; Ohio State University

3:40 PM Invited
Fabrication of Medium- and High-entropy Alloys Using Electroplating and Radio Frequency Plasma: Yu Zou¹; University of Toronto

4:05 PM
Friction Stir Gradient Alloying: A Novel High-throughput Screening Technique to Explore HCP to FCC Transformation in a γ-FCC Dominated High Entropy Alloy by V Addition: Priyanka Agrawal¹; Shivakant Shukla¹; Sanya Gupta¹; Priyanshi Agrawal¹; Rajiv Mishra¹; University of North Texas

4:25 PM
Exploring the Structure-property Relationships of (Ti, TiAl6V4) xCoCrFeMnNi Graded High Entropy Alloy: Michael Melia¹; Jonathan Pegues¹; Mark Rodriguez¹; Raymond Puckett¹; Shaun Whetten¹; Nicolas Argibay¹; Andrew Kustas¹; Sandia National Laboratories
**ADVANCED MATERIALS**

**High Entropy Alloys IX: Structures and Modeling — Structures and Characterization I**

*Sponsored by:* TMS Functional Materials Division, TMS Structural Materials Division, TMS: Alloy Phases Committee, TMS: Mechanical Behavior of Materials Committee

*Program Organizers:* Peter Liaw, University of Tennessee; Michael Gao, National Energy Technology Laboratory; E-Wen Huang, National Chiao Tung University; Srivatsan Tirumalai, The University of Akron; Xie Xie, FCA US LLC; Gongyao Wang, Alcoa Technical Center

**Tuesday PM**

**Session Chairs:** Robert Ritchie, University of California, Berkeley; Michael Widom, Carnegie Mellon University

2:00 PM Invited

Electronic Effects on the Mechanical Properties of HEA: Takeshi Egami; 1University of Tennessee

2:25 PM Invited

An Averaged Cluster Approach to Include Chemical Short Range Order in First Principles Calculations with Application to High Entropy Alloys: Vishnu Raghuraman; 1Yang Wang; 2Michael Widom; 1Carnegie Mellon University

2:50 PM Invited

Faulting-mediated Plasticity in a CoCrNiW Complex Concentrated Alloy: Shaoliu Wei; 1Cem Tasan; 1Massachusetts Institute of Technology

3:10 PM Invited

Unique Deformation Behavior in the NbTaTiV Refractory High-entropy Alloy: Chanho Lee; 1George Kim; 1Yi Chou; 1Brianna Musico; 1Michael Gao; 1Ke An; 1Yang Song; 1Yi-Chia Chou; 1Veerle Keppens; 1Wei Chen; 1Peter Liaw; 1University of Tennessee; 2Illinois Institute of Technology; 3National Chiao Tung University; 4National Energy Technology Laboratory/Leidos Research Support Team; 5Oak Ridge National Laboratory; 6Kongju National University

3:35 PM Invited

Unprecedented Supercritical Elasticity in NiCoFeGa Multi-principal-element Alloys: Haiyang Chen; 1Yan-Dong Wang; 1Yang An; 1University of Science and Technology Beijing; 2Argonne National Laboratory

4:00 PM Invited

Influence of Ductile Multicomponent Intermetallic Phase on Mechanical Behavior in High-entropy Alloys: Rui Feng; 1You Rao; 1Huamiao Wang; 1Yan Chen; 1Chuan Zhang; 1Maryam Ghaizaei; 1Ke An; 1Peter Liaw; 1Oak Ridge National Laboratory; 2The Ohio State University; 3Shanghai Jiao Tong University; 4Computherm, LLC; 5The University of Tennessee, Knoxville

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**MATERIALS PROCESSING**

**High Temperature Electrochemistry IV — Session III**

*Sponsored by:* TMS Extraction and Processing Division, TMS: Nuclear Materials Committee, TMS: Hydrometallurgy and Electrometallurgy Committee

*Program Organizers:* Prabhat Tripathy, Batelle Energy Alliance (Idaho National Laboratory); Guy Fredrickson, Idaho National Laboratory

**Tuesday PM**

**Session Chair:** Michael Simpson, University of Utah

2:00 PM Validated Modeling of Quartzite Reduction to Solar Silicon by Molten Salt Electrolysis: Aditya Moudgal; 1Mohammad Asadi-Kia; 1 Jacob Hazerjian; 1Vicky Luu; 1Ariana Ly; 1Adam Powell; 1Uday Pal; 1Yu Zhong; 1Worcester Polytechnic Institute; 2Boston University

2:30 PM A Comparative Study of Working Electrode Materials for Voltammetry Measurements in LiCl–Li2O Salts: Guoping Cao; 1Ammon Williams; 2Michael Shaltry; 3Idaho National Laboratory

3:00 PM Liquid Bipolar Electrode for Extraction of Aluminium and PGM Concentrate from Spent Catalysts: Andrey Yasinskiy; 1Peter Polyakov; 2Dmitry Varyukhin; 3Sai Krishna Padamata; 4Siberian Federal University

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**MATERIALS DESIGN**

**Hume–Rothery Symposium: Accelerated Measurements and Predictions of Thermodynamics and Kinetics for Materials Design and Discovery — Session IV**

*Sponsored by:* TMS Structural Materials Division, TMS: Alloy Phases Committee

*Program Organizers:* Wei Xiong, University of Pittsburgh; Shuanglin Chen, CompuTherm LLC; Wei Chen, Illinois Institute of Technology; James Saal, Citrine Informatics; Greta Lindwall, KTH Royal Institute of Technology

**Tuesday PM**

**Session Chair:** Dana Frankel, QuesTek Innovations LLC

2:00 PM Invited

High-throughput Synthesis, Characterization and Prediction of Metallic Glass Formation: John Perepezko; 1Janine Erickson; 1Dan Thoma; 1Carter Francis; 1Paul Voyles; 2Benjamin Afflerbach; 1Dane Morgan; 1University of Wisconsin-Madison

2:40 PM Invited

A Thermodynamic and Molar Volume Database for Co-base Superalloys: Ursula Kattner; 1Peisheng Wang; 1National Institute of Standards and Technology; 2Central South University

3:20 PM Invited

Phase Stability and Kinetic Considerations in Materials Processing and Performance: Steven Zinkle; 1Yajie Zhao; 1Ty Austin; 1Ying Yang; 1University of Tennessee
4:00 PM Invited Machine Learning-assisted ICME Approaches to Explore the Alloy and Process Space in Metals Additive Manufacturing: Raymundo Arroyave; Texas A&M University

4:40 PM Invited Printability and Properties of Metallic Alloys for Laser Powder Bed Fusion Additive Manufacturing: Yongho Sohn; Le Zhou; Holden Hyer; Abhishek Mehta; University of Central Florida

LIGHT METALS

Magnesium Technology 2021 — Fundamentals of Plastic Deformation

Sponsored by: TMS Light Metals Division, TMS: Magnesium Committee

Program Organizers: Victoria Miller, University of Florida; Petra Maier, University of Applied Sciences Stralsund; J. Brian Jordan, University of Alabama; Neale Neelameggham, IND LLC

Tuesday PM March 16, 2021

Session Chairs: Tracy Berman, University of Michigan; Sean Agnew, University of Virginia

2:00 PM Invited Accounting for the Effects of Dislocation Climb Mediated Flow in Mg alloy ZK10 Sheet: Michael Ritzo; Sean Agnew; University of Virginia

2:30 PM Three Dimensional Interaction of {101 ¯2} Twins with Tilt Boundaries in Mg: Twin and Dislocation Transmission: Khanh Dang; John Graham; Carlos Tomé; Vincent Taupin; Laurent Capolungo; Los Alamos National Laboratory; LEM3

2:50 PM Invited Revisiting c+a Pyramidal Slip in Magnesium: Jaafar El-Awady; Johns Hopkins University

3:20 PM Thermally Activated Nature of Basal and Prismatic Slip in Mg and Its Alloys: Mohammed Shabana; Jishnu Bhattacharyya; Marek Niewczas; Sean Agnew; University of Virginia; McMaster University

3:40 PM Mechanisms and Machine Learning for Magnesium Alloys Design: Zongrui Pei; National Energy Technology Laboratory

4:00 PM Three Dimensional Atomistic Simulations of {101 ¯2} Non-cozone Twin -- Twin Interaction in Mg -- Role of Twin Stability and Mobility: Khanh Dang; Carlos Tomé; Laurent Capolungo; Los Alamos National Laboratory

NUCLEAR MATERIALS

Materials and Chemistry for Molten Salt Systems — Electrochemistry

Sponsored by: TMS Structural Materials Division, TMS: Corrosion and Environmental Effects Committee

Program Organizers: Stephen Raiman, Texas A&M University; Kumar Sridharan, University of Wisconsin-Madison; Nathaniel Hoyt, Argonne National Laboratory; Jinsuo Zhang, Virginia Polytechnic Institute and State University; Michael Short, Massachusetts Institute of Technology; Raluca Scarlat, University of California-Berkeley

Tuesday PM March 16, 2021

Session Chair: Nathaniel Hoyt, Argonne National Laboratory

2:00 PM Research Paths on Spectroelectrochemistry for Molten Salt Chemistry in the U.S with Respect to Other Nations: Supathorn Phongkharoon; Virginia Commonwealth University

2:30 PM Materials Compatibility and Potential Stability of Reference Electrodes for Molten FLiBe: Francesco Carotti; Raluca Scarlat; University of Wisconsin, Madison; University of California, Berkeley

2:50 PM Redox Measurement and Control in Molten Chloride Fast Reactor Fuel Salt: Matthew Newton; D. Hamilton; Michael Simpson; University of Utah

3:10 PM Oxidation Potential of Molten Halide Salts: A First Principles Study: Jianguo Yu; Guoping Cao; Idaho National Lab

3:30 PM High-throughput Electrochemical Characterization and Screening of CSP-relevant Alloys: Nathaniel Hoyt; Jicheng Guo; Mark Williamson; Argonne National Laboratory

3:50 PM Corrosion of Zircalloy-2 in Molten LiCl-xLi2O at 650 °C: Vineeth Kumar Gattu; Evan Wu; William Ebert; Argonne National Laboratory

4:10 PM Development of an Electrochemical Phase Field Model for the Corrosion of Ni-Cr Alloys by Molten Fluoride Salts: Chaitanya Bhave; Michael Tonks; David Andersson; Jake McMurray; University of Florida; Los Alamos National Laboratory; Oak Ridge National Lab
MATERIALS PROCESSING

Materials Engineering -- From Ideas to Practice: An EPD Symposium in Honor of Jiann-Yang Hwang — Metallurgy

Sponsored by: TMS Extraction and Processing Division, TMS: Materials Characterization Committee, TMS: Pyrometallurgy Committee

Program Organizers: Bowen Li, Michigan Technological University; Baojun Zhao, University of Queensland; Jian Li, CanmetMATERIALS; Sergio Monteiro, Instituto Militar de Engenharia; Zhiwei Peng, Central South University; Dean Gregurek, RHI Magnesita; Tao Jiang, Central South University; Yong Shi, Futianbao Environment Technologies; Cuiping Huang, FuTianBao Environment Protection Technology Company Ltd.; Shadia Ikhmayies

Tuesday PM March 16, 2021

Session Chairs: Ailiang Chen, Central South University; Xiaodi Huang, Michigan Technological University

2:00 PM Invited
Effect of Boron Iron Concentrate on the Strength of Preheated Iron Ore Pellets: Li Ma1; Gele Qing; Zhixing Zhao2; Baojun Zhao2; 1Shougang Research Institute of Technology; 2University of Queensland

2:20 PM
Metallographic Feature of a Nickel-based Superalloy in Fluoride Electrolyte Melt: Bowen Li1; Xiaodi Huang1; Jiann-Yang Hwang; 1Michigan Technological University

2:40 PM Invited
Phase Diagram and Thermodynamic Properties of Cu-O Binary System: Shadia Ikhmayies

3:00 PM
Characterization of Mixing Conditions of Different Nozzle and Porous Plugs Setups in Non-ferrous Refining Furnaces: Anton Ishmurzin1; Daniel Kreuzer1; Goran Vukovic1; 1RHI Magnesita

3:20 PM Invited
The Formation Mechanism of the Third Phase in Nickel Electrolyte: Ailiang Chen1; Jiale Mao1; Guanwen Luo1; Sujun Lu1; Peng Zhang; Yutian Ma1; Shengli Chen; Zuojuan Du2; Jinxin Qiao1; Bowen Li1; 1Central South University; 2State Key Laboratory of Nickel and Cobalt Resources Comprehensive Utilization, Jinchang; 1State Key Laboratory of Nickel and Cobalt Resources Comprehensive Utilization, Jinchang; 2Michigan Technological University

ADVANCED MATERIALS

Materials for High Temperature Applications: Next Generation Superalloys and Beyond — Refractory Alloys: Design and Mechanical Properties

Sponsored by: TMS Structural Materials Division, TMS: Refractory Metals Committee

Program Organizers: Govindarajan Muralidharan, Oak Ridge National Laboratory; Martin Heilmair, KIT Karlsruhe; Benjamin Adam, Portland State University; Mario Bochichio, Pratt & Whitney; Katerina Christofidou, University of Sheffield; Eric Lass, University of Tennessee-Knoxville; Jeremy Rame, Safran Aircraft Engines; Pierre Sallof, Safran; Akane Suzuki, GE Research; Michael Titus, Purdue University

Tuesday PM March 16, 2021

2:00 PM Invited
Rapid Screening, Machine Learning, and Multi-objective Optimization for Refractory Alloy Development: Andrew Detor1; Meinolf Sellmann1; Scott Oppenheimer1; Emily Cheng1; James Ruud1; 1GE Research

2:30 PM
Rapid Design of Refractory Multi-principal Element Alloys for High-T Structural Applications: Theory-guided Combinatorial Synthesis and Characterization Approach: Gaoyuan Ouyang1; Prashant Singh1; Ranran Su2; Shalabh Gupta1; John Perepezko2; Jun Cui1; Matthew Kramer2; Duane Johnson1; 1Ames Laboratory (US DOE); 2University of Wisconsin – Madison

2:50 PM
New Tools for Analysis of Microplasticity in BCC Refractory Metals: Leah Mills1; Jean-Charles Stinvil1; Marie-Agathe Charpagn1; Joseph Wendel2; McLean Echlin; Valery Valle2; Paul Dawson2; Daniel Gianola2; Tresa Pollock2; 1University of California Santa Barbara; 2Pprime Institut; 3Cornell University

3:10 PM
The Creep Performance of Pesting-Resistant Mo-Si-Ti Alloys: Susanne Obert1; Alexander Kaufmann1; Martin Heilmair1; 1Karlsruhe Institute for Technology

3:30 PM
Effect of Processing Parameters on Molybdenum Weld Microstructures: Noah Kohlhorst1; Govindarajan Muralidharan; Roger Miller1; Kevin Faraone1; Ji-Cheng Zhao3; 1Ohio State University; 2Oak Ridge National Laboratory (ORNL); 3University of Maryland, Department of Materials Science and Engineering

3:50 PM
Creep Testing of Molybdenum: Brandon Kenny1; Jacqueline Foradora2; Alex Xie3; Gary Rozak2; 1Miami University; 2H.C. Starck Solutions Euclid; 3H.C. Starck Solutions Taicang
Materials Processing Fundamentals — Steel Casting

Sponsored by: TMS Extraction and Processing Division, TMS Materials Processing and Manufacturing Division, TMS: Process Technology and Modeling Committee

Program Organizers: Jonghyun Lee, Iowa State University; Samuel Wagstaff, Oculatus Consulting; Alexandre Anderson, Gopher Resource; Fiseha Tesfaye, Abo Akademi University; Guillaume Lambotte, Boston Metal; Antoine Allanore, Massachusetts Institute of Technology

Tuesday PM March 16, 2021

Session Chair: Samuel Wagstaff, Oculatus Consulting; Antoine Allanore, MIT

2:00 PM The CuCl₂-CuSO₄-ZnSO₄ System at Elevated Temperatures: Fiseha Tesfaye1; Daniel Lindberg1; Mykola Moroz2; Leena Hupa1; 1Abo Akademi University; 2Aalto University

2:20 PM Stress Development Simulation in Continuously Cast Steel Slabs during Cooling Process: Duo Huang1; 1Purdue University

Nuclear Materials

Mechanical Behavior of Nuclear Reactor Components — Microstructure Effects

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS Structural Materials Division, TMS: Nanomechanical Materials Behavior Committee, TMS: Nuclear Materials Committee

Program Organizers: Clarissa Yablinsky, Los Alamos National Laboratory; Assel Aitkaliyeva, University of Florida; Eda Aydogan, Middle East Technical University; Laurent Capolungo, Los Alamos National Laboratory; Khalid Hattar, Sandia National Laboratories; Kayla Yano, Pacific Northwest National Laboratory; Caleb Massey, Oak Ridge National Laboratory

Tuesday PM March 16, 2021

2:00 PM He ION Irradiation Response of a Gradient T91 Steel: Zhongxia Shang1; Jie Ding1; Cuncai Fan2; Di Chen3; Jin Li4; Yifan Zhang1; Yongqiang Wang4; Haiyan Wang5; Xinghang Zhang6; 1Purdue University; 2Oak Ridge National Laboratory; 3University of Houston; 4Los Alamos National Laboratory

2:20 PM High Temperature Strength of Additively Manufactured Gr91 Steel: Benjamin Effin1; Daniel Vega1; Osman El Atwani1; David Sprouster1; Carl Cady1; Mohammad Al-Sheikhly1; Thomas Lienert1; Stuart Maloy1; 1Los Alamos National Laboratory; 2DOE; 3Stony Brook University; 4University of Maryland; 5T.J. Lienert Consulting, LLC

2:40 PM Invited Wear Behavior of Incoloy™ 800HT and Inconel™ 617 for High-Temperature Gas-cooled Reactor (HTGR) Applications: Valentin Pauly1; Joseph Kern2; Malcolm Clark1; David Grierson2; Kumar Sridharan1; 1University of Wisconsin-Madison

3:00 PM Modeling the Effect of Helium Bubbles, Rigid Inclusions, and Grain Boundaries on Crack Initiation in Nickel: Tung Yan Liu1; Michael Demkowicz2; 1Texas A&M University

3:30 PM Quantifying Zirconium Embrittlement due to Hydride Microstructure Using Image Analysis: Pierre-Clement Simon1; Calion Frank1; Long-Qing Chen1; Mark Daymond2; Michael Tonks3; Arthur Motta1; 1The Pennsylvania State University; 2Queen’s University; 3University of Florida

3:50 PM In-situ Observations of the Failure Mechanisms of Hydrided Zircaloy-4 under Different Stress-States: Brian Cocheron1; Kwai Chan1; 1Naval Nuclear Laboratory-Bettis Laboratory; 2Southwest Research Institute

Characterization

Mechanical Response of Materials Investigated through Novel In-situ Experiments and Modeling — Session IV

Sponsored by: TMS Structural Materials Division, TMS: Thin Films and Interfaces Committee, TMS: Advanced Characterization, Testing, and Simulation Committee

Program Organizers: Saurabh Puri, Microstructure Engineering; Amit Pandey, Lockheed Martin Space; Dhirit Bhattacharyya, Australian Nuclear Science and Technology Organization; Dongchan Jang, KAIST; Jagannathan Rajagopal, Arizona State University; Josh Kacher, Georgia Institute of Technology; Minh-Son Pham, Imperial College London; Robert Wheeler, Microtesting Solutions LLC; Shailendra Joshi, University of Houston

Tuesday PM March 16, 2021

Session Chair: Amit Pandey, Lockheed Martin Space

2:00 PM Quantifying the Long-range Stress ahead of the Tip of a Dislocation Pileup at a Grain Boundary and Its Contribution to the Subsequent Structure Changes in Ti- alloys from the Atomistic to the Mesoscale: Liming Xiong1; 1Iowa State University

2:20 PM Dislocation Pileup Induced Transmission across Grain Boundaries in Aluminum via Molecular Dynamics Simulations: Roeye Reyes1; Douglas Speare1; 1University of Florida

2:40 PM Decoupling the Effect of Nanoscale Geometry and Internal Microstructure on the Mechanics of Nanoporous Pt: Ankit Gupta1; Timothy Ibru1; Antonia Antoniou1; Garrett Tucker1; 1Colorado School Of Mines; 2Georgia Institute of Technology

3:00 PM Constitutive Model Materials Parameter Determination Using Cyclic Tension-compression Test Data: Dilip Banerjee1; William Luecke1; Mark Iadicola1; Evan Rust1; 1National Institute of Standards and Technology

3:20 PM Multiphysics Modeling of Coupled Chemical-Thermal-mechanical Phenomena in Chemically Blown Polyurethane Foams during Manufacturing: Kevin Long1; Judith Brown1; Rekha Rao1; Christine Roberts1; 1Sandia National Laboratories

All times listed are in EDT time zone (UTC-4:00).

www.tms.org/TMS2021
3:40 PM
Effects of Phase Purity and Pore-reinforcement on the Mechanical Behavior of Metal–organic Frameworks: Kevin Schmalbach1; Zhao Wang1; Rebecca Combs1; Youxung Chen1; R. Lee Penn1; Andreas Stein1; Nathan Mara1; 1University of Minnesota; 2University of North Carolina at Charlotte

MATERIALS PROCESSING

Ni-Co 2021: The 5th International Symposium on Nickel and Cobalt — Hydrometallurgy II

Sponsored by: The Metallurgy & Materials Society of the Canadian Institute of Mining, Metallurgy and Petroleum, TMS: Extraction and Processing Division, TMS: Hydrometallurgy and Electrometallurgy Committee. TMS: Pyrometallurgy Committee

Program Organizers: Corby Anderson, Colorado School of Mines; Dean Gregurek, RHI Magnesita; Mari Lundström, Aalto University; Christina Musker; Prabhhat Tripathy, Batelle Energy Alliance (Idaho National Laboratory); Fiseha Tesfaye, Abo Akademi University; Graeme Goodall, XPS- Glencore; Shijie Wang, Rio Tinto Kennecott Utah Copper Corp (Retired)

Tuesday PM  March 16, 2021

2:00 PM
Effective Treatment of Domestic US Cobalt Ores and Concentrates: Andy Tomaka1; Corby Anderson2; 1Colorado School of Mines

2:20 PM
Separating and Recovering Cobalt and Iron from Co, Fe-bearing Metallurgical Slag via Acid Leaching Process: Yuanbo Zhang1; Yikang Tu1; Zijian Su2; Tao Jiang1; 1Central South University

2:40 PM
Starved Acid Leaching Technology for Nickel and Cobalt Recovery from Lean Resources: David Dreisinger1; 1University of British Columbia

PHYSICAL METALLURGY

Phase Transformations and Microstructural Evolution — Ferrous Alloys

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Phase Transformations Committee

Program Organizers: Rongpei Shi, Lawrence Livermore National Laboratory; Yipeng Gao, Idaho National Laboratory; Fadi Abdeljawad, Clemson University; Bharat Gwalani, Pacific Northwest National Laboratory; Qi An, University of Nevada-Reno; Eric Lass, University of Tennessee-Knoxville; Huajing (Wilson) Song, Los Alamos National Laboratory

Tuesday PM  March 16, 2021

Session Chair: Huajing Song. Los Alamos National Lab

2:00 PM
Solute Partitioning during the Double Soaking Heat Treatment of Medium Manganese Steels: Alexandra Glover1; Emmanuel De Moor2; John Speer1; 1Los Alamos National Laboratory; 2Colorado School of Mines

2:20 PM
Cementite Formation in Ferritic Steels: First-principles Based AtomisticSimulations: Océane Buggenhout1; Chu-Chun Fu1; Thomas Schuler1; Jean-Luc Béchade2; 1CEA, Université Paris Saclay

2:40 PM
Effect of Cold Rolling on Phase Transformations in 2202 Lean Duplex Stainless Steel: Frederic Danon1; Sophie Cazottes2; Raphaèle Danon1; Dimitri Rolland; Sarata Cissé; Véronique Massardier2; 1CNRS; 2INSA Lyon; 3CNRS - Univ Rouen Normandie; 4INDUSTEEL

3:00 PM
Phase Instability and Formation of Radiation-induced BCC-phases in Austenitic Stainless Steel after Long Term Neutron Exposure: Diana Merezhko1; Mikhail Merezhko2; Maxim Gussev3; Thomas Rosseel1; Oleg Maksimkin1; Francis Garner3; 1Institute of Nuclear Physics; 2Oak Ridge National Laboratory; 3Radiation Effects Consulting

3:20 PM
Applicability of Deep Cryogenic Treatment in Emerging Industries: Patricia Jovicic-Klug1; Matic Jovicic-Klug2; Bojan Podgornik2; 1Institute of Metals and Technology; 2The Timken Company

3:40 PM
Austempered Microstructures for Bearing Applications: Scott Hyde1; 1The Timken Company

MATERIALS PROCESSING

Rare Metal Extraction & Processing — REEs, Sc

Sponsored by: TMS Extraction and Processing Division, TMS: Hydrometallurgy and Electrometallurgy Committee

Program Organizers: Gisele Azimi, University of Toronto; Takanari Ouchi, The University of Tokyo; Kerstin Forsberg, KTH Royal Institute of Technology; Hojong Kim, Pennsylvania State University; Shafiq Alam, University of Saskatchewan; Alafara Baba, University of Ilorin; Neale Neelameggham, IND LLC

Tuesday PM  March 16, 2021

2:00 PM Keynote
Understanding the Feasibility for Secondary and by Product Sources to Supply Rare Earth Metals: Gabrielle Gaustad1; Eric Williams1; Alexandra Leader2; Ajay Gupta1; Saptarshi Das3; 1Alfred University; 2Rochester Institute of Technology

2:20 PM
Uranium and Thorium Removal from Rare Earth Sulfate Solutions by Ion Exchange and Solvent Extraction: David Dreisinger1; Mike Johnson1; Niels Verbaan3; Greg Andrews3; 1University of British Columbia; 2SGS Minerals

2:40 PM
Rare Earth Elements Extraction from Coal Waste Using Biooxidation Approach: Prashant Saraswat1; Michael Free1; 1University of Utah

3:00 PM Invited
Supercritical Extraction of Neodymium from NdFeB Magnet Using Organophosphorus Ligands: Nattanai Kunanusont1; Jiakai Zhang1; Kimberly Watada2; Yusuke Shimoyama1; Gisele Azimi1; 1Tokyo Institute of Technology; 2University of Toronto

3:20 PM Invited
Scandium Extraction from Bauxite Residue Using Sulfuric Acid and a Composite Extractant-enhanced Ion-exchange Polymer Resin: Efthymios Balomenos1; Ghazaleh Nazari2; Panagiotis Davris1; Gomer Abrenica1; Anastasia Pilichou2; Eleni Mikeli3; Dimitrios Panias1; Shailesh Patkar1; Wen-Qing Xu1; 1Mytilineos Metallurgy Buisness Unit; 2II-VI; 3NTUA

3:40 PM Invited
Scandium: Leaching and Extraction Chemistry: Dag Ericksen1; 1Primus.Intern.Pares As
4:00 PM Invited
Environmentally Friendly Solid Phase Extraction of Critical Materials and REE from Unconventional Sources: Athanasios Karamalidis1; Jonathan Callura2; Madhav Patel1; 1Pennsylvania State University; 2Carnegie Mellon University

ENERGY & ENVIRONMENT

Recycling and Sustainability for Emerging Technologies and Strategic Materials — E-Waste & Value Recovery

Sponsored by: TMS Extraction and Processing Division, TMS Light Metals Division, TMS: Recycling and Environmental Technologies Committee

Program Organizers: John Howarter, Purdue University; Mingming Zhang, ArcelorMittal Global R&D; Elsa Olivetti, Massachusetts Institute of Technology; Hong Peng. University of Queensland

Tuesday PM March 16, 2021

Session Chair: John Howarter, Purdue University

2:00 PM Invited
Characterisation and Techno-economics of a Process to Recover Value from E-waste Materials: Khairul Islam1; Michael Somerville2; Nawshad Haque3; 1MIT University; 2CSIRO

2:30 PM
Recycling of Spent SCR Catalyst to Recover Vanadium and Tungsten by Hydrometallurgical Routes: Ana Belen Cueva-Sola1; Jin-Young Lee2; Rajesh Kumar Jyothi3; 1Korea University of Science and Technology (UST); Daejeon 34113, South Korea; 2Korea Inst of Geoscience & Mineral Resources

2:50 PM
The Separation of Nickel and Cobalt from Lithium-ion Battery Leachate: Mark Strauss1; Josh McNally2; Luis Aldana3; John Klaehn1; Tedd Lister1; 1Idaho National Laboratory

3:10 PM
Rare Earth Magnet or Ferroalloy? What Steel Processing Can Teach Us about Magnet Sludge Recycling: Mary Elizabeth Wagner1; Antoine Allanore2; 1Massachusetts Institute of Technology

NANOSTRUCTURED MATERIALS

100 Years and Still Cracking: A Griffith Fracture Symposium — Fracture and Cracks

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Nanomechanical Materials Behavior Committee

Program Organizers: Megan Cordill, Erich Schmid Institute of Materials Science: William Gerberich, University of Minnesota; David Bahr, Purdue University; Christopher Schuh, Massachusetts Institute of Technology; Daniel Kienzer, Montanuniversität Leoben; Neville Moody; Nathan Mara, University of Minnesota; Erica Lilleodden, Helmholtz-Zentrum Geesthacht

Wednesday AM March 17, 2021

Session Chair: Nathan Mara, University of Minnesota

8:30 AM Invited
Modeling Mechanics of Nanoparticles: Everything but Size: Jonathan Amodeo1; Laurent Pizzagalli2; 1MATEIS lab, INSA-Lyon Univ. Lyon CNRS; 2P’ institute, Univ. Poitiers CNRS

9:10 AM
The Curious Phenomenon of Prince Rupert’s Drops: Koushik Viswanathan1; Hilla Aben2; Munawar Chaudhri3; Arvindan Chandrasekar4; 1Indian Institute of Science; 2Tallinn University of Technology; 3University of Cambridge; 4Purdue University

9:30 AM
Effect of Aspect Ratio on Stress Intensity Factor Solutions for Single Edge Notch Wire Fracture Test Specimen under Tensile and Clamped Bend Loading Conditions: Hrushikesh Sahasrabuddhe1; Ashwini Mishra2; Nagamani Jaya Balila1; 1India Institute of Technology Bombay

ADVANCED MATERIALS

2D Materials – Preparation, Properties & Applications — Case Studies & Applications

Sponsored by: TMS Functional Materials Division, TMS: Thin Films and Interfaces Committee

Program Organizers: Nuggehalli Ravindra, New Jersey Institute of Technology; Ramana Chintalapalle, University of Texas at El Paso; Gerald Ferblanter, Icube Laboratory - Strasbourg University; Sufian Abedrabbo, Khalifa University; Amber Shrivastava, Indian Institute of Technology Bombay

Wednesday AM March 17, 2021

Session Chairs: Amber Shrivastava, Indian Institute of Technology; Ramana Chintalapalle, University of Texas - El Paso

8:30 AM Invited
Formation of h-BN Ultrathin Films and Heterojunction MIS Diodes by Pulsed Laser Annealing: Siddharth Gupta1; Jagdish Narayan2; 1North Carolina State University; 2Oklahoma State University

8:55 AM Invited
Graphene and Carbon Nanotubes: Key Materials for Electrochemical Energy Materials and Nano Biosensors: Eon Soo Lee1; 1New Jersey Institute of Technology

9:20 AM Invited
hBN for Quantum Information Sciences: Ritesh Sachan1; 1Oklahoma State University

9:45 AM
The Growth of NbSe2 by Molecular Beam Epitaxy for Thermomagnetic Energy Conversion: Peter Litwin1; Sabbir Akhanda1; Mona Zebrajad1; Stephen McDonnell1; 1University of Virginia
NUCLEAR MATERIALS

Accelerated Discovery and Qualification of Nuclear Materials for Energy Applications — Data Analytics and Machine Learning in Nuclear Energy Applications

Sponsored by: TMS Structural Materials Division, TMS Materials Processing and Manufacturing Division, TMS: Integrated Computational Materials Engineering Committee, TMS: Nuclear Materials Committee, TMS: Additive Manufacturing Committee

Program Organizers: Yongfeng Zhang, University of Wisconsin-Madison; Adrien Coué, University of Wisconsin-Madison; Michael Tonks, University of Florida; Jeffery Aguilar, Idaho National Laboratory; Andrea Jokisaari, Idaho National Laboratory; Karim Ahmed, Texas A&M University

Wednesday AM March 17, 2021

Session Chairs: Dane Morgan, University of Wisconsin; Karim Ahmed, Texas A&M U

8:30 AM Invited
Machine Learning and Atomistic Modeling of Defect Diffusion in Concentrated Ni-Fe Alloys: Wenjiang Huang1; Xian-Ming Bai2; 1Virginia Polytechnic Institute and State University

9:00 AM
Characterization of As-Fabricated Additively Manufactured Alloy 718 Enhanced by Modern Tools and Machine Learning: Stephen Taller1; Luke Scime1; Kurt Terrani1; 1UT-Battelle

9:20 AM Invited
Machine Learning for Accelerating Property Prediction and Materials Characterization in Irradiated Materials: Dane Morgan1; Mingren Shen1; Ryan Jacobs1; G. Robert Odette2; Kevin Field2; 1University of Wisconsin-Madison; 2University of California, Santa Barbara; 3University of Michigan

9:50 AM
Point Defect Energies in Concentrated Alloys Using Ab Initio Calculations and Machine Learning: Anus Manzoor1; Gaurav Arora1; Dilpuneet Aidhy1; 1University of Wyoming

10:10 AM Invited
Machine Learning Perovskites in the Quest for Improved Scintillators: Anjana Talapatra1; Christopher Stanek1; Blais Uberuaga1; Ghanshyam Pilonio1; 1Los Alamos National Laboratory

10:40 AM
An Integrated Approach for Coupling Experimental Data, Physics-based Models, and Machine Learning Algorithms for Predicting the Effective Thermal Conductivity of U-based Fuels: Karim Ahmed1; Fergany Badry1; 1Texas A&M University

11:00 AM
Deep Learning for Automated Analysis of Cavities in Transmission Electron Microscopy Images: Chun Yin Wong1; Xing Wang2; Zhe Fan2; Karren More2; Sergei Kalinin3; Maxim Zlatidinov4; 1University of Tennessee; 2The Pennsylvania State University, Oak Ridge National Laboratory; 3University of California, Santa Barbara; 4Oak Ridge National Laboratory

ADDITIVE TECHNOLOGIES

Additive Manufacturing Fatigue and Fracture V: Processing-Structure-Property Investigations and Application to Qualification — Fatigue Modeling and Prediction

Sponsored by: TMS Structural Materials Division, TMS: Additive Manufacturing Committee, TMS: Mechanical Behavior of Materials Committee

Program Organizers: Nik Hrabe, National Institute of Standards and Technology; John Lewandowski, Case Western Reserve University; Nima Shamsaei, Auburn University; Mohsen Seifi, ASTM International/Case Western Reserve University; Steve Daniewicz, University of Alabama

Wednesday AM March 17, 2021

Session Chair: Nik Hrabe, National Institute of Standards and Technology (NIST)

8:30 AM Invited
Damage Tolerant Approach in Additively Manufactured Metallic Materials: Mauro Madia1; Uwe Zerbst2; Tiago Werner3; 1Bundesanstalt fuer Materialforschung und -pruefung (BAM)

9:00 AM
Defect-based Fatigue Model for AlSi10Mg Produced by Laser Powder Bed Fusion Process: Avinesh Ojha1; Wei-Jen Lai2; Ziang Li1; Carlos Engler-Pinto Jr1; Xuming Su1; 1Ford Motor Company

9:20 AM
State-of-the-Art in Predicting Fatigue Life for Applications in Metal-based Additive Manufacturing: Newell Moser1; Orion Kafka1; Jake Benzing1; Nicholas Derimow1; Nik Hrabe1; Edward Garboczi1; 1National Institute of Standards and Technology

9:40 AM Invited
Synergistic Effects of Defects and Microstructure on Fatigue Behavior of LB-PBF Metallic Materials: Shuai Shao1; Nima Shamsaei1; 1Auburn University

10:10 AM
Microstructure-based Model Validation and Predictions of Single-build-plate Fatigue Strength Sensitivity for Additively Manufactured Ti-6Al-4V: Orion Kafka1; Newell Moser1; Jake Benzing1; Nicholas Derimow1; Nikolas Hrabe1; Edward Garboczi1; 1NIST

10:30 AM
3-D Convolutional Neural Networks for Pore Analysis in Metal Additive Manufacturing Builds: Andrew Kitahara1; Zhiheng Wu1; Sujana Yarasi1; Nihal Sivakumar1; Anthony Rollett1; Elizabeth Holm1; 1Carnegie Mellon University

10:50 AM
Bayesian Inference of Elastic Constants and Texture Coefficients in Additively Manufactured Alloys Using Resonant Ultrasound Spectroscopy: Jeffrey Rossin1; Patrick Leser2; Chris Torbet2; Stephen Smith2; Samantha Daly1; Tresa Pollock1; 1University of California, Santa Barbara; 2NASA Langley Research Center
**ADDITIVE TECHNOLOGIES**

**Additive Manufacturing: Beyond the Beam II — Binder Jetting**

*Sponsored by:* TMS Materials Processing and Manufacturing Division, TMS: Powder Materials Committee, TMS: Additive Manufacturing Committee

**Program Organizers:** Paul Prichard, Kennametal Inc.; James Paramore, US Army Research Laboratory; Peeyush Nandwana, Oak Ridge National Laboratory; Nihan Tuncer, Desktop Metal

**Wednesday AM** March 17, 2021

**Session Chair:** Paul Prichard, Kennametal

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**8:30 AM**

Introductory Comments: Additive Manufacturing: Beyond the Beam II

*Paul Prichard* 1;  1Kennametal Inc.

**8:35 AM**

A Look into Solid-state Metal AM Techniques from Metallurgical Bonding Perspective

*Nihan Tuncer* 1;  1Animesh Bose 1;  1Desktop Metal

**8:55 AM**

Development, Characterization, and Modeling of a 3D Binder-jet Printed N95 Metal Filter for COVID-19

*Aaron Acierno* 1; Katerina Kimes 1; Erica Stevens 1; Pierangeli Rodriguez 1; Steve Pilz 2; Kyle Myers 3; Patrick Dougherty 3; Kurt Svikla 3; Thomas Spikra 3; Markus Chmielus 1;  1University of Pittsburgh; 2ANSYS; 3ExOne; 4Synopsys

**9:15 AM**

Effect of Processing Defects on Properties of Binderjet WC-Co

*Paul Prichard* 1; Hadi Miyanaji 1; Zhuqing Wang 1;  1Kennametal Inc.

**9:35 AM**

Droplet Powder Interactions in Binder Jet Additive Manufacturing

*Trenton Colton* 1;  1Brigham Young University

**9:55 AM**

Fluid and Particle Dynamics Simulation in Binder Jetting Process

*Fangzhou Li* 1;  1Wenda Tan 1;  1University of Utah

**10:15 AM**

Gravity Influence on Sintering of Binder jetted Components

*Elisa Torresani* 1; Eugene Oleksyv 1; Randall German 1;  1San Diego State University

**10:35 AM**

Distortion Modeling of Sintering Process in Binder Jet Printed Parts

*Basil Paudel* 1; Dave Conover 2; Albert To 1;  1University of Pittsburgh; 2ANSYS Inc.

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**ADDITIVE TECHNOLOGIES**

**Additive Manufacturing: Materials Design and Alloy Development III -- Super Materials and Extreme Environments — Other Materials and Aspects**

*Sponsored by:* TMS Materials Processing and Manufacturing Division, TMS: Additive Manufacturing Committee

**Program Organizers:** Behrang Poorganji, University of Waterloo; Hunter Martin, HRL Laboratories LLC; James Saal, Citrine Informatics; Orlando Rios, Oak Ridge National Laboratory; Atieh Moridi, Cornell University; Jiadong Gong, Questek Innovations LLC

**Wednesday AM** March 17, 2021

**Session Chair:** Jiadong Gong, QuesTek

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**8:30 AM Invited**

Design of Novel Fe-based Bulk Metallic Glasses Enabled by Additive Manufacturing

*Martin Walbrühl* 1; Jiayi Yan 1; Ida Berglund 1; Zaynab Mahbooba 2; Abhinav Saboo 2;  1QuesTek Europe AB; 2QuesTek Innovations

**9:00 AM**

Understanding the Corrosion Mechanism of an Equimolar AlCoCrFeNi High-entropy Alloy Additively Manufactured by Electron Beam Melting

*Kenta Yamanaka* 1; Hiroshi Shiratori 2; Manami Mori 1; Kazuyo Omura 3; Tadashi Fujieda 2; Kosuke Kuwabara 2; Akihiko Chiba 1;  1Tohoku University; 2Hitachi, Ltd.; 3National Institute of Technology, Sendai College

**9:20 AM**

Design and Additive Manufacturing of Hastelloy C22 for Corrosive Environment

*Somayeh Paseban* 1; Dongqing Yan 1; Alirea Torbati-Sarrafi 1; Behrang Poorganji 2; Osman Ertorer 3; O Isgor 4;  1Oregon State University; 2University of Waterloo; 3University of Southern California; 4Oryx Advanced Materials, Inc

**9:40 AM**

Catalytic Inhibition of Metal Dusting by Cu — The Difference of Cast and AM Alloys

*Anke Ulrich* 1; Clara Schlereth 1; Katrin Jahns 1; Ulrich Krupp 1; Mathias Galetz 1;  1DECHEMA-Forschungsinstitut; 2University of Applied Sciences Osnabrück; 3RWTH Aachen University

**9:40 AM**

Correlating Data from Digital and Virtual Twins of Component Manufacturing via DED

*Monica Salgueiro* 1; Carlos Gonzalez 1; Camilo Prieto 2; Bernardo Freire 3; Mihail Babicinschi 2; Joerg Willem 3;  1AIMEN; 2University of Coimbra; 3ESI Group

**10:00 AM**

Material Development Using RF Plasma

*Nicolas Gobelli* 1;  1Tekna
**ADDITIVE TECHNOLOGIES**

**Additive Manufacturing: Solid-State Phase Transformations and Microstructural Evolution — Steels**

*Sponsored by:* TMS Materials Processing and Manufacturing Division, TMS: Additive Manufacturing Committee, TMS: Phase Transformations Committee, TMS: Shaping and Forming Committee

**Program Organizers:** Bji–Na Kim, Carpenter Additive; Andrew Weissman, University of Arizona; Chantal Sudbrack, National Energy Technology Laboratory; Eric Lass, University of Tennessee–Knoxville; Katerina Christofidou, University of Sheffield; Peeyush Nandwana, Oak Ridge National Laboratory; Rajarshi Banerjee, University of North Texas; Whitney Poling, General Motors Corporation; Yousub Lee, Oak Ridge National Laboratory

**Wednesday AM**
**March 17, 2021**

**Session Chairs:** Eric Lass, The University of Tennessee Knoxville; Peeyush Nandwana, Oak Ridge National Laboratory

**8:30 AM**
The Crystallography and Orientation of Cellular Features in Additively Manufactured 316L. *Richard Fonda*; Joseph Aroh; Jerry Feng; David Rowenhorst; Naval Research Laboratory; Carnegie Mellon University

**8:50 AM**
The Dislocation and Composition Microstructure Evolution and Mechanical Properties of Selective Laser Melted Stainless Steels: *Markus Sudmanns*; Yejun Gu; Jaafar El-Awady; Johns Hopkins University

**9:10 AM**
Microstructural Characterization of Maraging 300 Steel Fabricated by Select Laser Melting: *Johnathan Rodriguez*; Elizabeth Hoyos; Fabio Conde; André Jardini Munhoz; Julian Avila; EIA University; University of Sao Paolo; BIOFABRIS - National Institute of Science and Technology in Biomanufacturing; UNESP - São Paulo State University

**9:30 AM**
Recrystallization-based Grain Boundary Engineering of 316L Stainless Steel Produced via Selective Laser Melting: *Shubo Gao*; Zhiheng Hu; Sraya Tekumalla; Matteo Seita; Nanyang Technological University; Singapore Institute of Manufacturing Technology

**9:50 AM**

**10:20 AM**
Phase Transformation Modeling of Functionally Graded Materials Made by Direct Energy Deposition: *Noah Sargent*; Wei Xiong; Richard Otis; University of Pittsburgh; Jet Propulsion Laboratory

**10:40 AM**
Effect of Low-temperature Plasma Nitriding on the Wear and Corrosion Resistance of Additive-manufactured Stainless and Maraging Steels: *Matija Godec*; Crtomir Donik; Aleksandra Kocijan; Bojan Podgornik; Danijela Anica Skobir Balantic; Institute of Metals and Technology

**11:00 AM**
Section Thickness Dependent Behavior in Additively Manufactured Stainless Steel: *Thomas Slagel*; Alexandra Vyatsikhi; Sen Jiang; Salma El-Azab; Umberto Scipioni Bertoli; Lorenzo Valdevit; Enrique Lavernia; Julie Schoenung; University of California Irvine

**CHARACTERIZATION**

**Advanced Characterization Techniques for Quantifying and Modeling Deformation — Session V**

*Sponsored by:* TMS Extraction and Processing Division, TMS Materials Processing and Manufacturing Division, TMS Structural Materials Division, TMS: Advanced Characterization, Testing, and Simulation Committee, TMS: Materials Characterization Committee

**Program Organizers:** Rodney McCabe, Los Alamos National Laboratory; Marko Knezovic, University of New Hampshire; Irene Beyerlein, University of California–Santa Barbara; Wolfgang Pantleon, Technical University of Denmark; C. Tasan, Massachusetts Institute of Technology; Arul Kumar Maryappan, Los Alamos National Laboratory; Olivia Underwood, Sandia National Laboratories

**Wednesday AM**
**March 17, 2021**

**8:30 AM Invited**
Combining Advanced Characterization Techniques to Rationalize the Multiple Mechanical Behaviors Observed in TRIP/TWIP Alloys: *Lola Liliensten*; Yolaine Danard; Inés Danard; Raphaëlle Guillou; Nathalie Bozozo; Dominique Thiaudière; Frédéric Prima; CNRS - IRCP; ICMPME; CEA; Mines ParisTech - CEMEF; Synchrotron Soleil

**9:00 AM**
A Study on Migrating Boundary Induced Plasticity Using Atomistic Simulation: *Simoon Sung*; Jaehoon Jang; Hyerim Hwang; Yanghoo Kim; Heung Nam Han; Seoul National University; Korea Institute of Materials Science; Harvard University; Korea Institute of Industrial Technology

**9:20 AM**
Deformation Behavior and Phase Transformation of Nanotwinned Al/Ti Multilayers: *Yifan Zhang*; Qi Li; Mingyu Gong; Sichuang Xue; Jie Ding; Jaehun Cho; Tongjun Niu; Ruizhe Su; Nicholas Richter; Haiyan Wang; Jian Wang; Xinghang Zhang; Purdue University; University of Nebraska-Lincoln

**9:40 AM**
Fingerprinting Shock-induced Deformations via Virtual Diffraction: *Avanish Mishra*; Cody Kunka; Marco Echeverria; Rémi Dingreville; Avinash Dongare; University of Connecticut; Sandia National Laboratories

**10:00 AM Invited**
Deformation Behaviour of High-alloy Twinning-induced Plasticity Steels Unravelled by Complementary Local and Integral Methods: *Stefan Martin*; Christiane Ullrich; Christian Schimpf; Mykhaylo Motylenko; Anja Weidner; Horst Biermann; David Rafaja; Alexey Vinogradov; Yuri Estrin; Tu Bergakademie Freiberg; NTNU; Monash University

**10:40 AM**
Ultrasonic Effects on Plastic Deformation Behavior of TRIP 780 Steel: *Jiarui Kang*; Xun Liu; The Ohio State University

**11:00 AM**
In-situ Shock Stress Field Detection Using Laser Array Raman Spectroscopy: *Abhijeet Dhiman*; Ayotomi Olokun; Nolan Lewis; Vikas Tomar; Purdue University

**11:10 AM**
Experimental Characterization and FFT-based Modeling of Heterogeneous Deformation in HCP Materials: *Behnam Ahmadinia*; Leyun Wang; Irene Beyerlein; University of California, Santa Barbara; Shanghai Jiao Tong University
ADVANCED MATERIALS


Sponsored by: TMS Functional Materials Division, TMS: Thin Films and Interfaces Committee

Program Organizers: Adele Carrado, IPCMS - CNRS; Ramana Chintalapalli, University of Texas at El Paso; Gerald Fertlantier, Icube Laboratory - Strasbourg University; Nancy Michael, University of Texas at Arlington; Karine Mougin, Is2m Cnrs; Heinz Palkowski, Clausthal University of Technology; Nuggehalli Ravindra, New Jersey Institute of Technology; Vikas Tomar, Purdue University

Wednesday AM March 17, 2021

Session Chair: Adele Carrado, Université de Strasbourg IPCMS

8:30 AM Keynote
Bio-inspired Nano- and Microstructured Surfaces: Hendrik Hoelscher1; 1Karlsruhe Institute of Technology

9:10 AM Invited
TiN and DLC Coated Medical Grade Polyurethane (PUR) for Controlled Surface Degradation and Improved Mechanical Properties: Maren Fossum1; Mohammad Ibrahim2; Javier Sanchez3; Christoph Burgstaller4; Emma Strömberg5; Gunilla Björling5; Ragnhild Aune1; 1Norwegian University of Science and Technology; 2Danderyd Hospital at Karolinska Institute; 3TCKT - Transfertcenter für Kunststofftechnik GmbH; 4KTH Royal Institute of Technology; 5The Swedish Red Cross University College

9:40 AM Invited
Multimodal Flexible Optoelectronic Devices for Colocalized Electrophysiology and Optophysiology: Luyao Lu1; 1George Washington University

10:10 AM Invited
Structural and Biological Properties of Silicon-incorporated Diamond-like Carbon Coatings: Roger Narayan1; 1University of North Carolina

10:40 AM
Silicone Breast Implants: Grafting of a Bioactive Polymer to Improve the Bio-integration: Mylan Lam1; Vivien Moris2; Vincent Humbiot2; Véronique Mignonney2; Céline Falentin-Daudré3; 1Université Sorbonne Paris Nord; 2Université Bourgogne Franche-Comté

11:00 AM Keynote
Determining the Interaction between Porous Titanium and Adhesion of a Bioactive Coating: Holly Martin1; Patrick McWhorter1; Arthur Kasson1; Snejza Balaz2; 1Youngstown State University

ENERGY & ENVIRONMENT

Advanced Magnetic Materials for Energy and Power Conversion Applications — Structures and Modelling of Soft Magnetic Materials

Sponsored by: TMS Functional Materials Division, TMS: Magnetic Materials Committee

Program Organizers: Richard Beddingfield, North Carolina State University; Daniel Salazar, BCMaterials; Alex Leary, NASA Glenn Research Center; Huseyin Ucar, California Polytechnic University; Yongmei Jin, Michigan Technological University; Arcady Zhukov, University of the Basque Country

Wednesday AM March 17, 2021

Session Chair: Richard Beddingfield, North Carolina State University

8:30 AM Invited
Advanced Magnetics for Power and Energy Development (AMPED): A New Consortium Model for US Power Magnetics Research and Workforce Development: Paul Ohodnicki1; Brandon Grainger1; Michael McHenry1; Maarten DeBoer2; Subhashish Bhattacharya3; Richard Beddingfield4; 1University of Pittsburgh; 2Carnegie Mellon University; 3North Carolina State University

9:00 AM
Radio Frequency Rapid Thermal Processing of Nanocrystalline Soft Magnetic Alloys: Ahmed Talaat1; David Greve2; Paul Ohodnicki3; 1University of Pittsburgh; 2DWGreve Consulting

9:20 AM
Soft Magnetic Fe-Co-Cu Supersaturated Solid Solutions by Severe Plastic Deformation: Martin Stückler1; Heinz Krenn1; Lukas Weissitsch1; Stefan Wurster1; Andrea Bachmaier1; 1Erich Schmid Institute of Materials Science, Austrian Academy of Sciences; 2Institute of Physics, University of Graz

9:40 AM
Accurate Modelling of Soft Magnetic Materials for Power Applications Using Finite Element Methods: Alex Leary1; Byron Beddingfield2; Randy Bowman1; 1NASA Glenn Research Center; 2North Carolina State University

10:00 AM
Regression Modelling of the High-frequency Inductors Used for Power Electronic Applications: Sanket Parashar1; Richard Beddingfield1; Subhashish Bhattacharya2; 1North Carolina State University
ENERGY & ENVIRONMENT

Advanced Materials for Energy Conversion and Storage VII — Functional Materials for Energy II

Sponsored by: TMS Functional Materials Division, TMS: Energy Conversion and Storage Committee

Program Organizers: Jung Pyung Choi, Pacific Northwest National Laboratory; Soumendra Basu, Boston University; Amit Pandey, Lockheed Martin Space; Paul Ohodnicki, University of Pittsburgh; Kyle Brinkman, Clemson University; Partha Mukherjee, Purdue University; Surojit Gupta, University of North Dakota

Wednesday AM March 17, 2021

Session Chairs: Paul Ohodnicki, University of Pittsburgh; Christian Faria, Worcester Polytechnic Institute

8:30 AM
Integrated Mo$_x$Co$_y$/Carbon Nanotubes for Water Splitting Applications: 
Lee Kendall; Amir Chamaani; Stephen McDonnell; Giovanni Zangari; University of Virginia

8:50 AM
Heterogeneous Metal/Oxide Nanostructure Integration for Catalytic Chemical Transformation: from HCs Oxidation, CO2 Conversion, to H2 Production: 
Pu-Xian Gao; University of Connecticut

9:10 AM
High-efficiency High Power Density Direct Carbon Fuel Cell: 
Christian Faria; Jun Lu; Adam Powell; Boyd Davis; Yu Zhong; Uday Pal; Worcester Polytechnic Institute; Kingston Process Metallurgy; Boston University

9:40 AM
Magnesium as a Zero- or Negative-Emissions Fuel for Shipping and Aerospace: 
Hongyi Sun; Yi Jie Wu; Jake Scarponi; Adam Powell; Jagannath Jayachandran; Worcester Polytechnic Institute

10:00 AM
Metal Dichalcogenide Based Planner Thermoelectric Generator for Efficient Waste Heat Harvesting: 
Sangram Pradhan; Gilbert Kogo; Messaoud Bahoura; Norfolk State University

MATERIALS PROCESSING

Advances in Surface Engineering III — Session I

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Surface Engineering Committee

Program Organizers: Tushar Borkar, Cleveland State University; Anil Mubarok, PPG; Rajeev Gupta, North Carolina State University; Sandip Harimkar, Oklahoma State University; Bharat Jasthi, South Dakota School of Mines & Tech

Wednesday AM March 17, 2021

Session Chairs: Bharat Jasthi, South Dakota School of Mines & Tech; Tushar Borkar, Cleveland State University

8:30 AM
Surface Modification by In-situ Grown VC Reinforced Composite Layer on Steel Substrate Using TIG Arcing Process: 
Nilesh Kumar; Prakriti Ghosh; Sourav Das; Indian Institute of Technology Roorkee

8:50 AM
Effect of Potassium Hydroxide (KOH) Additives on Corrosion Behavior of Coatings Formed by Plasma Electrolytic Oxidation (PEO) Method on the Titanium Substrate: 
Navid Attarzadeh; Maryam Molaei; Kazem Babaei; Arash Fatollah-ahosseini; University of Texas at El Paso; Bu-Ali Sina University

9:10 AM
Electroplated Powder to Improve Particle Adhesion in Cold Spray Applications: 
Gwendolyn Bracher; Elizabeth Hodges; Madeline Scott; V. Champagne; Robert Hyers; University of Massachusetts; Cold Spray Innovations International

MATERIALS DESIGN

Advances in Titanium Technology — Invited Presentations

Sponsored by: TMS Structural Materials Division, TMS: Titanium Committee

Program Organizers: Don Li, Howmet Engineered Products; Yufeng Zheng, University of Nevada-Reno; Peeyush Nandwana, Oak Ridge National Laboratory; Matthew Dunstan, US Army Research Laboratory

Wednesday AM March 17, 2021

Session Chair: Don Li, Howmet Engineered Products

8:30 AM Invited
Titanium Mill Product Yield Enhancement via Electrochemical Conditioning: 
Kurt Faller; MetCon

8:50 AM Invited
Optimizing Microstructure and Properties of Additively Manufactured Titanium Alloys Using Alloying and Post-AM Heat-treatment: 
Brian Welk; Nevin Taylor; Gopal Viswanathan; Hamish Fraser; Ohio State University

9:10 AM Invited
Multiscale Characterization of Titanium Alloy Microstructures and Links to Processing and Properties: 
Amy Clarke; Benjamin Ellyson; Alec Saville; Jonah Kliem-Toole; Behnam Aminahmadi; Jake Benzing; Adam Creuziger; Sven Vogel; Kamel Fezzaa; Wayne Chen; Adam Plichak; Colorado School of Mines; National Institute of Standards and Technology; Los Alamos National Laboratory; Advanced Photon Source, Argonne National Laboratory; Purdue University; Air Force Research Laboratory

9:30 AM
Atom Probe Tomographic Study of Precursor Metastable Phases and Their Influence on a Precipitation in the Metastable β-titanium Alloy, Ti-5Al-5Mo-5V-3Cr: 
Stoichko Antonov; Yufeng Zheng; Hamish Fraser; Baptiste Gault; Max Planck Institut fur Eisenforschung GmbH; University of Nevada, Reno; The Ohio State University

9:50 AM
An In-situ Deformation Micro-mechanisms Study of a Ti-Al-V-Fe (α+β) Alloy: 
Shaolou Wei; Gaoming Zhu; Cem Tasan; Massachusetts Institute of Technology

10:10 AM
Enhanced Work-hardening from Oxygen-stabilized Omega Precipitation in Aged Metastable Beta Ti Alloys: 
Kathleen Chou; Emmanuelle Marquis; University of Michigan
MATERIALS DESIGN

AI/Data informatics: Design of Structural Materials — AI/ML for Integrating Experiments and Simulations; Steels


Program Organizers: Jennifer Carter, Case Western Reserve University; Amit Verma, Carnegie Mellon University; Natasha Vermaak, Lehigh University; Jonathan Zimmerman, Sandia National Laboratories; Darren Pagan, Pennsylvania State University; Chris Haines, Ccdc Army Research Laboratory; Judith Brown, Sandia National Laboratories

Wednesday AM March 17, 2021

8:30 AM Invited  A Physics-informed Bayesian Experimental Autonomous Researcher for Structural Design: Keith Brown1; 1Boston University

8:50 AM  Solving Inverse Problems for Process-structure Linkages Using Asynchronous Parallel Bayesian Optimization: Anh Tran1; Tim Wildey2; 2Sandia National Laboratories

9:10 AM  Model Reification with Batch Bayesian Optimization: Richard Couperthwaite1; Danial Khatamsaz2; Abhilash Molkeri2; Douglas Allaire1; Ankit Srivastava1; Raymundo Arroyave1; 1Texas A&M University

9:30 AM Invited  Structural Response Statistics of Deformed Polycrystals Leading to Rare Events: Curt Bronkhorst1; Peter Marcy2; Hansohl Cho2; Scott Vander Wiel1; Satyapriya Gupta1; Veronica Anghe1; George Gray1; 1University of Wisconsin-Madison; 2Los Alamos National Laboratory; 3Korea Advanced Institute of Science and Technology

10:00 AM Invited  Data-driven Approaches for Automated Analysis of Non-metallic Inclusions that Form during Steel Processing: Mohammad Abdulsalam1; Nan Gao1; Elizabeth Holm1; Bryan Webler1; 1Carnegie Mellon University

10:30 AM Inviting  Incorporating Historical Data & Past Analyses for Improved Tensile Property Prediction of 9% Cr Steel: Madison Wenzlick1; Ram Devanathan1; Osman Mamun1; Kelly Rose1; Jeffrey Hawk1; 1Leidos Research Support Team for the National Energy Technology Laboratory; 2Pacific Northwest National Laboratory; 3National Energy Technology Laboratory

MATERIALS DESIGN

AI/Data informatics: Tools for Accelerated Design of High-temperature Alloys — Uncertainty Quantification, AI Tools, and Environmental Degradation

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Integrated Computational Materials Engineering Committee, TMS: Computational Materials Science and Engineering Committee

Program Organizers: Michael Titus, Purdue University; Pinar Acar, Virginia Tech; Andrew Detor, GE Research; James Saal, Citrine Informatics; Dongwon Shin, Oak Ridge National Laboratory

Wednesday AM March 17, 2021

8:30 AM Invited  Domain and Uncertainty Quantification in Machine Learning Models of Alloy Properties: Dane Morgan1; Ryan Jacobs1; Benjamin Blaiszik1; 1University of Wisconsin-Madison; 2University of Chicago

9:00 AM  Domain Knowledge-informed, Process-mapping AI Graph for Designing Fe-based Alloys: Vyacheslav Romanov1; 1National Energy Technology Laboratory

9:20 AM Invited  Toward High Throughput Design and Development of Multi-principal Element Alloys for Corrosion and Oxidation Resistance (MPEAs): Mitra Taheri1; Todd Hufnagel1; Chris Wolverton2; James Rondinelli2; Jason Hattrick-Simpers3; Brian DeCost4; Elizabeth Opila1; John Sully1; Jean-Philippe Couzinie5; Nick Birbilis6; 1Johns Hopkins University; 2Northwestern University; 3NIST; 4University of Virginia; 5University Paris-Est Créteil (UPECD); 6Australian National University

9:50 AM  Advanced Data SCIENce Toolkit for Non-data Scientists (ASCENDS) - A Case Study of the Oxidation Kinetics of NiCr-based Alloys: Jian Peng1; Rishi Pillai1; Marie Romedenne1; Sangkeun Lee1; Govindarajan Muralidharan2; Bruce Pint3; J. Allen Haynes1; Dongwon Shin4; 1Oak Ridge National Laboratory

10:10 AM  Expanding Materials Selection via Transfer Learning for High-temperature Oxide Selection: Zachary McCleure1; 1Purdue University

10:30 AM Invited  Optimal Design of High-temperature, Oxidation-resistant Complex Concentrated Alloys: Alejandro Strachan1; 1Purdue University
MATERIALS DESIGN

Algorithm Development in Materials Science and Engineering — Models and Algorithms for Study Microstructures and Mechanical Properties of Materials


Program Organizers: Mohsen Asle Zaeem, Colorado School of Mines; Mikhail Mendelev, KBR; Bryan Wong, University of California, Riverside; Ebrahim Asadi, University of Memphis; Garritt Tucker, Colorado School of Mines; Charudatta Phatak, Argonne National Laboratory; Bryce Meredig, Citrine Informatics

Wednesday AM  March 17, 2021

Session Chair: Garritt Tucker, Colorado School of Mines

8:30 AM  Mechanistic Modeling of Point Diffusion in Polycrystals to Capture Different Diffusion-deformation Mechanisms: Anirtra Chakraborty1; Veerappan Prithivirajan1; Nathan Beets1; Arul Kumar Mariyappan1; Ricardo Lebensohn1; Laurent Capolungo1; 1Los Alamos National Laboratory

8:50 AM  Quantitative Phase-field Model for Void Nucleation and Growth Under Ion Irradiation: Rayaprolu Sneekar Annadanam1; Anter El-Azab1; 1Purdue University

9:10 AM  Low Dimensional Polynomial Chaos Expansion Performance at Assessing Uncertainty in Creep Life Prediction of Grade 91 Steel: Timothy Truster1; Amirfarzad Behnam1; Varun Gupta2; Ramakrishna Tipireddy1; 1University of Tennessee; 2Pacific Northwest National Laboratory

9:30 AM  Full-field Stress Computation from Measured Deformation Fields: A Hyperbolic Formulation: Benjamin Cameron1; Cem Tasan1; 1Massachusetts Institute of Technology

9:50 AM  A Simulation Survey of Recrystallization Behavior in Al-xSi Microstructures Under Stress Loading Conditions: William Frazier1; Bharat Gwalani1; Lei Li1; Ayoub Soulami1; Arun Devaraj1; Petr Sushko1; 1Pacific Northwest National Laboratory

10:10 AM  Predicting Mechanical Property Parameters from Load-displacement Curve of Nanoindentation Test by Using Machine Learning Model: Jinmyoung Jeon1; Jungwook Cho1; Kyojun Hwang1; 1Gift, POSTECH

LIGHT METALS

Aluminum Alloys, Processing and Characterization — Microstructure Evolution and Characterization

Sponsored by: TMS Light Metals Division, TMS: Aluminum Committee

Program Organizer: Dimitry Sediako, University of British Columbia

Wednesday AM  March 17, 2021

Session Chair: Izabela Szlufarska, University of Wisconsin–Madison

8:30 AM Invited  MechanicMicrostructure Evolution of an Al-Fe-Ni Alloy with Zr and Sc Additions Upon Different Cooling Rates during Solidification for Improving the Mechanical and Electrical Conductivity Properties: Suwaree Chankitmunkong1; Dmitry Eskin2; Chaowalit Limmaneevichitr3; 1King Mongkut’s University of Technology Thonburi; 2Brunel University London

8:50 AM  Microstructure and Mechanical Properties of a Precipitation-hardened Al-Mn-Zr-Er Alloy: Amir Farkoosh1; David Seidman1; David Dunand1; 1Northwestern University

9:10 AM  Characterization of the Microstructure of Al-Mg Alloy Matrix Syntactic Foam by Three-dimensional Analysis: Jeki Jung1; Su-Hyeon Kim1; Won-Kyoung Kim1; Cha-Yong Lim1; Yong Ho Park2; 1Korea Institute of Materials Science; 2Pusan National University/Department of Materials Science and Engineering

9:30 AM  Thermal Analysis of the Solidification Behavior of AA7075 Containing Nanoparticles: Maximilian Sokoluk1; Igor De Rosa1; Xiaochun Li1; 1University of California Los Angeles

9:50 AM  Microstructural Evolution of Ultra-fine Grained (UFGs) Aluminum in Tribological Contacts: Shuguang Wei1; Chayaapat Tangpatjaroen1; Hongliang Zhang1; Izabela Szlufarska1; 1University of Wisconsin Madison

10:10 AM  Question and Answer Period Dr. Dimitry Sediako
BIOMATERIALS

Biological Materials Science — Biological Materials Science I

Sponsored by: TMS Functional Materials Division, TMS Structural Materials Division, TMS: Biomaterials Committee

Program Organizers: David Restrepo, University of Texas at San Antonio; Steven Naleway, University of Utah; Jing Du, Pennsylvania State University; Ning Zhang, University of Alabama

Wednesday AM  March 17, 2021

Session Chairs: Steven Naleway, The University of Utah; David Restrepo, The University of Texas at San Antonio

8:30 AM Invited
Understanding the Role of Ridged Geometries in the Telson of the Mantis Shrimp: Adwait Trikanad1; Wei Huang2; Jesus Rivera3; David Kisailus1; Pablo Zavattieri1; 1Purdue University; 2University of California, Irvine; 3University of California, Riverside

9:00 AM Invited
Bioinspired Design of Fracture Resistant Layer-by-Layer Composite Structure: Xirnrui Niu1; 1City University of Hong Kong

9:30 AM
Assessing the Role of Loading Direction on the Compressive Response and Deformation Mechanism in Bioinspired Multilayered Composites: Sashanka Akurati1; Justine Marin2; Bharath Gundrathi; Dipankar Ghosh1; 1Old Dominion University

9:50 AM Invited
Bamboo Fibre-reinforced Mycelium Composites for Sustainable Structures: Hortense Le Ferrand1; 1Nanyang Technological University

ADVANCED MATERIALS

Bulk Metallic Glasses XVIII — Structures and Characterization

Sponsored by: TMS Structural Materials Division, TMS: Mechanical Behavior of Materials Committee

Program Organizers: Peter Liaw, University of Tennessee; Yanfei Gao, University of Tennessee-Knoxville; Hahn Choo, University of Tennessee; Yunfeng Shi, Rensselaer Polytechnic Institute; Robert Maass, Federal Institute for Materials Research and Testing (BAM); Bharath Gundrathi, Dipankar Ghosh; 1Old Dominion University

Wednesday AM  March 17, 2021

Session Chairs: Robert Maass, Federal Institute of Materials Testing and Research; Joerg Loeffler, ETH Zurich

8:30 AM Invited
Ultrafast-calorimetry Experiments to Study Multistep Crystallization and Melting Pathways in Metals: Joerg Loeffler1; 1ETH Zurich

8:55 AM Invited
Tracing Structural Dynamics in Metallic Glasses during Cryogenic Cycling: Amlan Das1; Eric Dufresne2; Robert Maass1; 1University of Illinois at Urbana-Champaign; 2Argonne National Laboratory; 3Federal Institute for Materials Research and Testing (BAM)

LIT METALS

Cast Shop Technology — Metal Cleanliness

Sponsored by: TMS Light Metals Division, TMS: Aluminum Committee

Program Organizer: Samuel Wagstaff, Oculatus

Wednesday AM  March 17, 2021

Session Chairs: Gerd-Ulrich Gruen, Hydro; Kumar Sundaram, Novelis

8:30 AM
Automated Metal Cleanliness Analyzer (AMCA) – An Alternative Assessment of Metal Cleanliness in Aluminium Melts: Hannes Zedel1; Robert Fritzsche; Ragnhild Aune1; Shahid Akhtar2; 1NTNU; 2Norsk Hydro

8:50 AM
Overview of the Possibilities and Limitations of the Characterization of Ceramic Foam Filters for Metal Melt Filtration: Claudia Voigt1; Jana Hubálková1; Are Bergin2; Robert Fritzsche; Ragnhild Aune1; Christos G. Aneziris3; 1Institute of Ceramic, Glass and Construction Materials; 2Norwegian University of Science and Technology

9:10 AM
Compression Testing of Ceramic Foam Filters (CFFs) Submerged in Aluminium at Operating Temperature: Are Bergin1; Robert Fritzsche; Shahid Akhtar2; Lars Arnborg2; Ragnhild E. Aune3; 1Norwegian University of Science and Technology & Hydro Aluminium AS; 2Norwegian University of Science and Technology; 3Hydro Aluminium AS

9:30 AM
The Effect of Grain Refiner on Aluminium Filtration: Sarina Bao1; Jiawei Yang2; Shahid Akhtar1; Stig Tjelta2; Ulf Tundal3; Tanja Pettersen2; Yanjun Li3; 1SINTEF Materials & Chemistry; 2SINTEF Technology; 3SINTEF Manufacturing

9:50 AM
Next-generation Electrical Preheating System for Filter Boxes: Jochen Schnelle1; Markus Byczek1; 1Dräche Umwelttechnik GmbH

10:10 AM
Reduction of Impurity Elements by Applying Electromagnetic Stirring in Fractional Crystallization: Yuichiro Murakami1; Naoki Omura1; 1National Institute of Advanced Industrial Science and Technology
10:30 AM
NatureAlu: Manufacturing High Purity Aluminum from the Concept Idea to the Production Plant
Jean Francois Desmeules1; Denis Mazeroller2; 1Dynamic Concept; 2NatureAlu
10:50 AM Question and Answer Period

NUCLEAR MATERIALS

Ceramic Materials for Nuclear Energy Research and Applications — High Burnup Oxide Fuels

Sponsored by: TMS Extraction and Processing Division, TMS Structural Materials Division, TMS Light Metals Division, TMS: Advanced Characterization, Testing, and Simulation Committee, TMS: Energy Committee, TMS: Nuclear Materials Committee

Program Organizers: Xian-Ming Bai, Virginia Polytechnic Institute and State University; Yongfeng Zhang, University of Wisconsin-Madison; Larry Aagesen, Idaho National Laboratory; Vincenzo Rondinella, Jrc-Ec

Wednesday AM March 17, 2021
Session Chairs: Miaomiao Jin, Idaho National Laboratory; Karim Ahmed, Texas A&M University

8:30 AM Invited
Modeling of Pressure-driven Inter-granular Fracture in High Burnup Structure UO2 during LOCA Using A Phase-field Approach: Wen Jiang1; Larry Aagesen2; Kyle Gamble3; 1Idaho National Laboratory

9:00 AM Multiscale Modeling of High Burn-up Structure (HBS) Formation and Evolution in UO2: Karim Ahmed1; Mohammed Abdoelatef2; Sudipta Biswas3; Larry Aagesen4; David Andersson5; 1Texas A&M University; 2INL; 3LANL

9:20 AM A Thermo-mechanical Coupled Phase Field Dynamic Fracture Model and Its Application in UO2: Shaufang Zhang1; Wen Jiang2; Michael Tonks1; 1University of Florida; 2Idaho National Laboratory

9:40 AM Invited
Phase-field Modeling of Bubble Growth During High Burn-up Structure Formation in UO2: Sudipta Biswas1; Andrea Jokisaari2; Larry Aagesen3; 1Idaho National Laboratory

10:10 AM Invited
Electron Microscopy Characterization of the Fuel-cladding Interaction in Annular Fast Reactor MOX: Fabiola Cappia1; Alex Winston1; Brandon Miller2; Jeffery Aguiar2; Boopathi Kombaiah1; Fei Teng1; Daniel Murray2; Jason Harp3; 1Idaho National Laboratory

10:40 AM Microstructural and Fission Products Analysis from Irradiated UO2 Fuel Using Atom Probe Tomography: Mukesh Babhav1; Lingfeng He1; Brandon Miller2; Xiang Liu3; Fabiola Cappia1; Jian Gan4; 1Idaho National Laboratory

CHARACTERIZATION

Characterization of Materials through High Resolution Imaging — High Resolution Characterization of Materials with Coherent Diffraction Imaging

Sponsored by: TMS Structural Materials Division, TMS: Advanced Characterization, Testing, and Simulation Committee

Program Organizers: Richard Sandberg, Brigham Young University; Ross Harder, Argonne National Laboratory; Xanghui Xiao, Brookhaven National Laboratory; Brian Abbey, La Trobe University; Saryu Fensin, Los Alamos National Laboratory; Ana Diaz, Paul Scherrer Institut; Mathew Cherukara, Argonne National Laboratory

Wednesday AM March 17, 2021
Session Chair: Ana Diaz, Paul Scherrer Institute

8:30 AM Invited
Investigating the Early Life on Earth with Nanoscale X-ray Coherent Imaging: Lara Maldacén1; Douglas Galante2; 1Université Grenoble Alpes; 2Brazilian Synchrotron Light Laboratory

9:00 AM Confocal Bragg Ptychography for 3D Mapping of Bulk Specimens: Henning Fris Poulsen1; 1DTU

9:20 AM Improve Phase Retrieval Performance in Bragg CDI by Simultaneous Reconstruction of Multiple Diffraction Peaks: Yuan Gao1; Garth Williams2; 1Brookhaven National Laboratory

9:40 AM Near-surface Optical Characterisation of Ion Implantation in Titanium Oxide Thin Films: Eugeniul Balaur1; Brian Abbey2; 1La Trobe University

10:00 AM Invited
ID01 in Light of the ESRF-EBS: Steven Leake1; Peter Boesecke2; 1ESRF - The European Synchrotron

10:30 AM Retrieving the Full 3D Strain Tensor for Nanoscale Materials ScienceApplications at 34-ID-C: Anastasios Pataras1; Ross Harder2; Wonsuk Cha3; Jonathan Gigak4; Jon Baldwin5; Jon Tischler6; Ruxing Xu7; Wengjun Liu8; Mark Erdmann9; Robert Kalt10; Richard Sandberg11; Saryu Fensin12; Reiju Pokhare13; 1Los Alamos National Laboratory; 2Argonne National Laboratory; 3Bringham Young University

10:50 AM Multi-peak Phase Retrieval for Coherent X-ray Diffraction Imaging at High Energies: Matthew Wilkin1; Anthony Rollett2; 1Carnegie Mellon University

11:10 AM Invited
X-ray Imaging of Three-dimensional Magnetic Systems and Their Dynamics: Claire Donnelly1; 1University of Cambridge
**CHARACTERIZATION**

Characterization of Minerals, Metals and Materials 2021 — Characterization of Mechanical Properties

**Sponsored by:** TMS Extraction and Processing Division, TMS: Materials Characterization Committee

**Program Organizers:** Jian Li, CanmetMATERIALS; Mingming Zhang, ArcelorMittal Global R&D; Bowen Li, Michigan Technological University; Sergio Monteiro, Instituto Militar de Engenharia; Shadia Ikhamyies; Yunus Kalay, Middle East Technical University; Jiann-Yang Hwang, Michigan Technological University; Juan Escobedo-Diaz, University of New South Wales; John Carpenter, Los Alamos National Laboratory; Andrew Brown, Army Research Laboratory; Rajiv Soman, Eurofins EAG Materials Science LLC; Alex Moser, US Naval Research Laboratory

**Wednesday AM  March 17, 2021**

**Session Chairs:** Bowen Li, Michigan Technological University; Shadia Ikhamyies, Al Isra University

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**8:30 AM**

Effect of Specimen Dimension on Plasticity Behaviour Below Submillimetre Scale: *Anjali Lodh*; Gustavo Castelluccio; *Cranfield University*

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**8:50 AM**

Significant Disparity of Non-basal Dislocation Activities in Hot-rolled Mg and AZ31 Alloy Under Tension: *Dexin Zhao*; Xiaolong Ma; Abhinav Srivastava; Griffin Turner; Ibrahim Karaman; Kelvin Xie; *Texas A&M University*

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**9:10 AM**

Analysis of Wear Issues in the Rotary Shear Biomass Comminution System: *Kyungjun Lee*; Lianshan Lin; Dave Lanning; Erkan Cakmak; James R. Keiser; Jun Qu; *11612 Lanesborough Way; ORNL; Forest concepts*

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**9:30 AM**

Characterization of Solidification Structure Morphology in High-carbon Steel Billet by Fractal Dimension: *Jianghai Cao*; Zibing Hou; Zhiqiang Peng; Dongwei Guo; Ping Tang; *Chongqing University*

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**9:50 AM**

Dislocation Creep at Low Stresses and High Temperature: Harper-Dorn Creep Revisited: *Shobhit Singh*; Michael Kassner; Praveen Kumar; *Indian Institute of Science, Bangalore; University of Southern California*

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**10:10 AM**

The Study of Structure-mechanical Properties Relationship in Different Cross-linked SU-8 Thermoset Polymers: *Prakash Sarthar*; Prita Pant; Hemant Nanavati; *Indian Institute of Technology Bombay*

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**NUCLEAR MATERIALS**

Composite Materials for Nuclear Applications — Tungsten

**Sponsored by:** TMS Structural Materials Division, TMS: Composite Materials Committee, TMS: Nuclear Materials Committee

**Program Organizers:** Anne Campbell, Oak Ridge National Laboratory; Dong Liu, University of Bristol; Rick Ubic, Boise State University; Lauren Garrison, Oak Ridge National Laboratory; Peng Xu, Idaho National Laboratory; Johann (Hans) Riesch, Max Planck Institute for Plasma Physics

**Wednesday AM  March 17, 2021**

**Session Chairs:** Lauren Garrison, Oak Ridge National Laboratory; Johann Riesch, Max Planck Institute for Plasma Physics

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**8:30 AM Invited**

Tungsten-based High and Medium Entropy Alloys and Composites for Nuclear Applications: *Owais Waseem*; *Ho Jin Ryu*; *MIT PSFC; KAIST, Korea*

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**9:00 AM Invited**

Tungsten Fibre-reinforced Copper – A High-Conductivity, High-Strength Composite Material for Plasma-facing Component Applications: *Alexander von Müller*; Bernd Böswirth; Henri Greuener; Rudolf Neu; Udo Siekken; Eliseo Visca; Jeong-Ha Youl; *Max-Planck-Institut für Plasmaphysik; Louis Renner GmbH; ENEA Frascati*

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**9:30 AM Invited**

W, C-reinforced Tungsten: A Promising Candidate for DEMO Divertor Material: *Petra Jenus*; *Aljaz Iakovlevic*; Matej Kocen; Anze Abram; Andreja Sestan; Andrei Galatanu; Magdalena Galatanu; Sandra Tarancón; Elena Tejado; Jose Ygnacio Pastor; Marius Wirtz; Gerald Pintsuk; Sasa Novak; Jožef Stefan Institute; *National Institute of Materials Physics; Universidad Politécnica de Madrid; Institute for Energy and Climate Research, Forschungszentrum Juelich GmbH; Institute for Energy and Climate Research, Forschungszentrum Jülich GmbH*

**10:00 AM**

Solving the Brittleness Problem of Tungsten - Tungsten Fibre-reinforced Tungsten Composites: *Johann Riesch*; Jan Coenen; Bailey Curzadd; Maximilian Fuhr; Lauren Garisson; Hanns Gietl; Henri Greuener; Till Höschel; Yiran Mao; Wolfgang Pantleon; Leonard Raumann; Daniel Schwalenberg; Thomas Schwarz-Selinger; Dmitry Terentyev; Rudolf Neu; Max Planck Institute for Plasma Physics; Forschungszentrum Jülich GmbH, Institut für Energie- und Klimaforschung – Plasmaphysik, Partner of the Triilateral Euregio Cluster (TEC); *Oak Ridge National Laboratory; Technical University of Denmark; Belgian Nuclear Research*

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**10:20 AM**

Opportunities for Nanostructured Tungsten Alloys in Composite Fusion Materials: *Jason Trelewicz*; Nicholas Olynik; Wenbo Wang; David Sprouster; Chad Parish; Stony Brook University; *Oak Ridge National Laboratory*

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**10:40 AM**

Conformal Tungsten Coatings for Cermet Nuclear Fuel Elements: *Jonathan Johnson*; Ryan Wilkerson; Stephen DiPietro; Scott O’Dell; Gregory Thompson; University of Alabama; NASA Marshall Space Flight Center; Exothermics Inc; Plasma Processes LLC
11:00 AM
Coupled Primary and Secondary Recrystallization in Single Tungsten Fiber-reinforced Tungsten Composites: Umberto Ciucani1; Lea Haus1; Maximilian Fuhr2; Hanns Gietl3; Johann Riesch2; Wolfgang Panteleon1; 1Technical University of Denmark; 2Max-Planck-Institute for Plasma Physics; 3Oak Ridge National Laboratory

ADDITIVE TECHNOLOGIES

Computational Techniques for Multi-Scale Modeling in Advanced Manufacturing — Multiscale Computational Techniques

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Extraction and Processing Division, TMS: Computational Materials Science and Engineering Committee, TMS: Process Technology and Modeling Committee

Program Organizers: Adrian Sabau, Oak Ridge National Laboratory; Anthony Rollett, Carnegie Mellon University; Laurentiu Nastac, University of Alabama; Mei Li, Ford Motor Company; Alexandra Anderson, Gopher Resource; Srujan Rokkam, Advanced Cooling Technologies Inc

Wednesday AM March 17, 2021
Session Chair: Adrian Sabau, Oak Ridge National Laboratory

8:30 AM
Machine-learning Informed Design of High-strength Gradient Metals for Additive Manufacturing: S. Mohadeseh Taheri-Mousavi1; A. John Hart1; 1MIT

8:55 AM
A Hybrid Approach to Connecting a Low Fidelity Model to a High Fidelity Model for Efficient and Accurate Prediction of Thermal History of Large Domains in Additive Manufacturing: Christopher Katinas1; Corbin Grohol1; Yung Shin1; 1Purdue University

9:20 AM Invited
Predicting Mechanical Performance in Additive Manufacturing Components Using Deep Learning: Kyle Johnson1; John Emery2; Demitri Maestas3; Matthew Smith1; Carianne Martinez2; Mircea Grigoriu2; 1Sandia National Laboratories; 2Cornell University

10:00 AM
Smoothed Particle Hydrodynamics based approach for 3D Modeling of Linear Friction Welding Process: Srujan Rokkam1; Quang Truong2; 1Advanced Cooling Technologies Inc

10:25 AM
Synchrotron Calibrated Lagrangian Particle Tracking of Melt-pool Ejections during Laser Powder Bed Fusion: Samuel Clark1; Gongyuan Zeng1; Juergen Jakumeit1; Chu Lun Alex Leung1; Yunhui Chen1; Sebastian Marussi2; Lorna Sinclair1; Margie Olbinado3; Alexander Rack3; Peter Lee4; 1University College London; 2Access e.V.; 4Paul Scherrer Institute; 3European Synchrotron Radiation Facility

PHYSICAL METALLURGY

Computational Thermodynamics and Kinetics — Solidification, Additive Manufacturing / Ordering, Coarsening and Patterning

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Chemistry and Physics of Materials Committee, TMS: Computational Materials Science and Engineering Committee

Program Organizers: Nana Ofori-Opoku, Canadian Nuclear Laboratories; Eva Zarkadoula, Oak Ridge National Laboratory; Enrique Martinez Saez, Clemson University; Vahid Attari, Texas A&M University; Jorge Munoz, University of Texas at El Paso

Wednesday AM March 17, 2021
Session Chairs: Nana Ofori-Opoku, Canadian Nuclear Laboratories; Vahid Attari, Texas A&M University; Eva Zarkadoula, Oak Ridge National Laboratory; Laurent Béland, Queen’s University

8:30 AM Invited
Influence of Interphase Boundary Anisotropy on the Formation of Lamellar Eutectic Solidification Patterns: Mathis Plapp1; Supriyo Ghosh2; Sabine Bottin-Rousseau3; Silvère Akamatsu3; 1Ecole Polytechnique, CNRS; 2Los Alamos National Laboratory; 3Sorbonne Université, CNRS

9:00 AM
Thermokinetics and Associated Microstructural Evolution of Laser Powder Bed Fused Additively Manufactured Ti6Al4V: Mangesh Pantawane1; Narendra Dahotre1; 1University of North Texas

9:20 AM Invited
Inhomogeneous Free Energies Beyond the Cahn-Hilliard Model: Interface Anisotropy and Equilibrium Patterning: Pascal Bellon1; Qun Li1; Robert Averback1; 1University of Illinois at Urbana-Champaign

9:50 AM
Topological Transitions during Coarsening in Nanoporous Metals: Kate Elder1; W. Beck Andrews2; Markus Ziehmer3; Alexander Chadwick1; Erica Lilleodden1; Katsuyo Thornton2; Peter Voorhees1; 1Northwestern University; 2University of Michigan; 3Helmholtz-Zentrum Geesthacht
PHYSICAL METALLURGY

Defect and Phase Transformation Pathway Engineering for Desired Microstructures — Experiment and Characterization

**Sponsored by:** TMS Materials Processing and Manufacturing Division, TMS: Phase Transitions Committee

**Program Organizers:** Yufeng Zheng, University of Nevada-Reno; Rongpei Shi, Lawrence Livermore National Laboratory; Yipeng Gao, Idaho National Laboratory; Timofey Frolov, Lawrence Livermore National Laboratory; Stoichko Antonov, Max-Planck-Institut für Eisenforschung GmbH; Jessica Krogstad, University of Illinois at Urbana-Champaign; Bin Li, University of Nevada, Reno

**Wednesday AM**  
**March 17, 2021**

**Session Chair:** Stoichko Antonov, Max Planck Institut für Eisenforschung GmbH

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8:30 AM
**Grain Boundary Segregation for Thermal Stability in Ternary Nanocrystalline Alloys:**  
Sebastian Kube1; Wenting Xing2; Arvind Kailidindi2; Sungwoo Sohn3; Amit Datye4; Dor Amram5; Christopher Schuh1; Jan Schroers2; 1Yale University; 2Massachusetts Institute of Technology

8:50 AM
**Tuning Fine-scale Alpha Microstructures via Nano-scale Structural and Compositional Non-uniformities in Beta Titanium Alloys:**  
Dian Li1; Rongpei Shi2; Rajarshi Banerjee3; Yunzhi Wang1; Hamish Fraser4; Yufeng Zheng1; 1University of Nevada, Reno; 2Lawrence Livermore National Laboratory; 3University of North Texas; 4Ohio State University

9:10 AM
**Exploring the Microstructure of Sputtered Nanotwinned Alloys and Its Role in the Study of Dislocation-Twin Interactions:**  
Francisco Andrade Chavez1; Orcun Koray Calebii; Ahmed Sameer Khan Mohammed1; Huseyin Sehitoglu1; Jessica Krogstad1; 1University of Illinois at Urbana-Champaign

9:30 AM
**Pseudo-in situ Characterization of Phase Transformation in an Al-Cu-Mn-Zr Alloy Using Atom Probe Tomography:**  
Bharat Gwalani1; Jia Liu1; Jonathan Poplawsky2; Amit Shyam2; Arun Devaraj1; 1Pacific Northwest National Laboratory; 2Oak Ridge National Lab

9:50 AM
**High-temperature Bulk Dislocation Dynamics in Aluminum:**  
Leora Dresselhaus-Marais1; 1Lawrence Livermore National Laboratory

10:10 AM
**Interaction between Martensite Transformation and Ion-induced Damage in Shape Memory Alloys:**  
Alejandra Hinojos1; Daniel Hong1; Nan Li2; Khalid Hattar1; Peter Anderson1; Michael Mills1; 1The Ohio State University; 2Los Alamos National Labs; 3Sandia National Labs

10:30 AM
**Microstructural Evolution of Nanotwinned Al-Zr Alloy with Significant 9R Phase Stabilization:**  
Nick Richter1; Yifan Zhang1; Ruizhe Su1; Tongjun Niu1; Qiang Li1; Sichuang Xue1; Hailan Wang1; Xinghang Zhang1; 1Purdue University

MATERIALS PROCESSING

Deformation Induced Microstructural Modification — Session V: Deformation of Alloys II and Composites

**Sponsored by:** TMS Materials Processing and Manufacturing Division, TMS: Shaping and Forming Committee

**Program Organizers:** Arun Devaraj, Pacific Northwest National Laboratory; Suveen Mathaudhu, University of California-Riverside; Kester Clarke, Colorado School of Mines; Bharat Gwalani, Pacific Northwest National Laboratory; Daniel Coughlin, Los Alamos National Laboratory

**Wednesday AM**  
**March 17, 2021**

**Session Chair:** Kester Clarke, Colorado School of Mines

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8:30 AM
**Grain Refinement and Bimodal Distribution of Precipitates in Al 6xxx and 7xxx Alloys during SHAPE (Shear Assisted Processing and Extrusion):**  
Xiaolong Ma1; Rajib Kalsari2; Jens Darseili; Miao Song1; Nicole Overman1; Keerti Kappagantula1; Vineet Joshi1; 1Pacific Northwest National Laboratory

8:50 AM
**Influence of Shear Rolling on Microstructure and Properties of Low-density Steels:**  
Dean Pierce1; Tomas Scuseria1; Kelcey Garza1; Amrinder Gill1; Jerry Arnold1; Amy Clarke1; Kester Clarke1; Erkan Cakmak1; Artem Trofimov1; Hsin Wang1; Govindarajan Muralidharan1; Tom Muth1; 1Oak Ridge National Laboratory

9:10 AM
**Investigation of Path Dependent Microstructural Evolution in Cu-Nb System Processed via Friction Consolidation:**  
Mageshwaran Komarasamy1; Xiao Li1; Scott Whalen1; Xiaolong Ma1; Nathan Canfield1; Matthew Olsztajn1; Tamas Varga1; Glenn Grant1; Suveen Mathaudhu1; 1Pacific Northwest National Laboratory; 2University of California, Riverside and Pacific Northwest National Laboratory

9:30 AM
**Low Temperature Superplasticity in Al 5083 Produced by Accumulative Roll Bonding:**  
Brady McBride1; Kester Clarke1; Amy Clarke1; 1Colorado School of Mines

9:50 AM
**Tailoring the Mechanical Performance in Novel Zn-Ag-Mg Alloy Processed by Cold Plastic Deformation Processes:**  
Maria Watroba1; Wiktor Bednarczyk1; Jakub Kawalko1; Terence G. Langdon2; Piotr Bal1; 1AGH University of Science and Technology; 2University of Southampton

10:10 AM
**The Unusual Effect of HPT Processing on Microstructure and Mechanical Properties in Zn-alloys:**  
Wiktor Bednarczyk1; Maria Watroba1; Jakub Kawalko1; Piotr Bal1; Terence G. Langdon2; 1AGH University of Science and Technology in Krakow; 2University of Southampton

10:30 AM
**Mg-Fe Bonded Interface Using FaST:**  
Hrishikesh Das1; Tianhao Wang1; Piyush Upadhyay1; Bharat Gwalani1; Xiaolong Ma1; Dalong Zhang1; 1Pacific Northwest National Laboratory

10:50 AM
**Harnessing Thermomechanical Processing to Influence Texture in ARB Cu/Nb Composites:**  
Justin Cheng1; Sven Vogel1; Cody Miller2; Ryan Mier2; Carl Osborn2; John Carpenter2; Madhavan Radhakrishnan1; Osman Anderoglu1; Nathan Maral1; 1University of Minnesota Twin Cities; 2Los Alamos National Laboratory; 3University of New Mexico
11:10 AM
Evolution of Mechanical Properties and Microstructure in Accumulative Roll Bonded FCC/BCC Metallic Composites: Thomas Nizolek; Daniel Coughlin; Cody Miller; Nan Li; Rodney McCabe; John Carpenter; Los Alamos National Laboratory

11:30 AM
Analysis of Al 6061 and Mild Steel Joints from Rotary Friction Welding: Nikhil Gotavala; Amber Shrivastava; Indian Institute of Technology Bombay

LIGHT METALS
Electrode Technology for Aluminum Production — Anode Production - Green & Baked Anode Production/Modelling and Performance

Sponsored by: TMS Light Metals Division, TMS: Aluminum Committee

Program Organizer: Derek Santangelo, Hatch

Wednesday AM March 17, 2021
Session Chair: Julien Lauzon-Gauthier, Alcoa Corporation

8:30 AM
Start-up of a New “Smart & Green” Anode Plant: Christophe Bouche; Xavier Genin; Vincent Philippaux; Jérôme Morfoise; Fives

8:50 AM
The Steps to Optimize and Implement an Anode Stub Hole Cleaning Machine Modification: Valerie Langelier; Derek Santangelo; Hatch

9:10 AM
Biocarbon in the Aluminium Industry: A Review: Samuel Senanu; Asbjorn Solheim; SINTEF

9:30 AM
Anode to Cathode Electrical Current Modelling for Cell Retrofit Application of Conductive Nails Technology: William Berends; Alucelltech Inc.

9:50 AM
Managing Anode Performance with a Versatile Reactivity Analysis Method: Lorentz Petter Lossius; Juraj Chmelar; Viktorija Tomkute; Hydro Aluminium AS

10:10 AM Question and Answer Period

ELECTRONIC MATERIALS
Electronic Packaging and Interconnections 2021 — Advanced Microelectronic Packaging Materials

Sponsored by: TMS Functional Materials Division, TMS: Electronic Packaging and Interconnection Materials Committee

Program Organizers: Mehran Maalekian, Mat-Tech; Christopher Gourlay, Imperial College London; Babak Arfaei, Ford Motor Company; Praveen Kumar, Indian Institute of Science; Sai Vadlamani, Intel Corporation; Kazuhiro Nogita, University of Queensland; David Yan, San Jose State University

Wednesday AM March 17, 2021
Session Chairs: Sai Vadlamani, Intel Corp.; Prithwish Chatterjee, Intel Corp.

8:30 AM Invited
Advances in Low Temperature/Low Pressure Ag Sinter Joining and Its Thermal Performance: Katsuaki Suganuma; Chuantong Chen; Zheng Zhang; Aiji Suetsake; Aya Iwaki; Ming Hsieh; Naoki Sato; Osaka University

8:50 AM
Electric-enhanced Sintering of Copper Interconnects: Tzu-Hao Shen; Albert T. Wu; National Central University

9:10 AM
Modeling and Simulation of Stress Gradient Driven Migration: Zachary Morgan; Yongmei Jin; Vahid Attari; Raymundo Arroyave; Michigan Technological University; Texas A&M University

9:30 AM
Plasticity and Contact Resistance Behavior in Wirebond Packaging: Allison Osmanson; Mohsen Tajedini; Hossein Madanipour; Yi Ram Kim; Choong-Un Kim; University of Texas at Arlington

9:50 AM
The Effects of DC, Pulsed DC, and AC Load Conditions on Electromigration Failure Mechanism in Solder Interconnects: Yi Ram Kim; Hossein Madanipour; Allison Osmanson; Mohsen Tajedini; Choong-Un Kim; Patrick Thompson; Qiao Chen; University of Texas at Arlington; Texas Instruments, Inc.

10:10 AM
Sintered Micro-silver Joints with the Addition of Indium Applied to Power IC Packaging: Chin-Hao Tsai; Wei-Chen Huang; Ly May Chew; Wolfgang Schmitt; Hiroshi Nishikawa; C. Robert Kao; National Taiwan University; Heraeus Deutschland GmbH & Co. KG; Joining and Welding Research Institute, Osaka University

10:30 AM
Low-Temperature and Pressureless Cu-to-Cu Bonding by Electroless Pd Plating Using Microfluidic System: Po Shao Shih; Zhen De Ma; Han Tang Hung; Jeng Hau Huang; C. Robert Kao; National Taiwan University
**CORROSION**

**Environmental Degradation of Additively Manufactured Alloys — High Temperature Oxidation and Corrosion, High Temperature Alloys**

*Sponsored by:* TMS Structural Materials Division, TMS: Corrosion and Environmental Effects Committee, TMS: Additive Manufacturing Committee

*Program Organizers:* Kinga Unocic, Oak Ridge National Laboratory; Jenifer Locke, Ohio State University; Sebastien Dryepondt, Oak Ridge National Laboratory; Michael Kirka, Oak Ridge National Laboratory; Xiaoyuan Lou, Auburn University; Brendy Rincon Troconis, University of Texas at San Antonio; Luke Brewer, University of Alabama

**Wednesday AM**  
March 17, 2021

**Session Chairs:** Kinga Unocic, Oak Ridge National Laboratory; Sebastien Dryepondt, Oak Ridge National Laboratory; Michael Kirka, Oak Ridge National Laboratory

8:30 AM  
Invited  
High Temperature Air Oxidation Behavior of Ni-based Superalloys Processed by Electron Beam Melting (EBM) and Selective Laser Melting (SLM): Marie Romedenne; Rishi Pillai; Sebastien Dryepondt; ORNL

9:00 AM  
Invited  
Effect of High-temperature Oxidation on the Fatigue Properties of Inconel 625 Fabricated by Laser Additive Manufacturing: Grace De Leon Nope; Juan Alvarado-Orozco; Guofeng Wang; Brian Gleeson; University of Pittsburgh; CIDESI

9:30 AM  
Invited  
High Temperature Oxidation of Additively Manufactured FeCrAl and Ni-based Alloys: Mohammad Sattari; Irina Fedorova; Alberto Visibile; Kerem Gündüz; Jan Froitzheim; Jan Froitzheim; Krystyna Stiller; Mats Halvarsson; Chalmers University of Technology

10:00 AM  
Microstructural Evolution and Oxidation Behavior of Fe-25Cr-20Ni-1.4Nb-0.2C Steel Fabricated by Laser Powder-bed Fusion: Kinga Unocic; Marie Romedenne; Peeyush Nandwana; Sebastien Dryepondt; Oak Ridge National Laboratory

10:20 AM  
Invited  
High Temperature Oxidation and Corrosion of LBM and EBM Ni-base Superalloys and Ti Alloys: Daniel Monceau; Tom Sanvimmongsak; Antoine Casadebaigt; Annabelle Vernouillet; Bruno Macquaire; Jonathan Hugues; Sebastien Doublet; Aurélie Vande Put; CIRIMAT Laboratory; CIRIMAT Laboratory; Safran Tech; CIRIMAT Laboratory; IRT Saint Exupery; CIRIMAT Laboratory; Air Liquide; Safran Tech; IRT Saint Exupery; Air Liquide

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**CORROSION**

**Environmentally Assisted Cracking: Theory and Practice — Innovative Techniques in Corrosion Research**

*Sponsored by:* TMS Structural Materials Division, TMS: Corrosion and Environmental Effects Committee

*Program Organizers:* Bai Cui, University of Nebraska-Lincoln; Raul Rebak, GE Global Research; Srujan Rokkam, Advanced Cooling Technologies Inc; Jenifer Locke, Ohio State University

**Wednesday AM**  
March 17, 2021

**Session Chairs:** Khalid Hattar, Sandia National Lab; Michele Manuel, University of Florida

8:30 AM  
Invited  
Deconvoluting Mechanism in Complex Environments via In-situ Electron Microscopy: Khalid Hattar; Sandia National Laboratories

9:10 AM  
Invited  
Elucidation of Corrosion Mechanisms in Light Alloys by In situ X-ray Micro and Nanotomography: Nikhilesh Chawla; Purdue University

9:50 AM  
Invited  
Controlling the Corrosion Behavior of Bioreorbable Magnesium Implants: Michele Manuel; University of Florida

10:30 AM  
Invited  
Understanding General Grain Boundaries: The Weak Link for Mechanical and Chemical Degradation: Jian Luo; University of California, San Diego

11:10 AM  
Invited  
Classifying Liquid-solid Metal Interactions: Separation of the Multiple Mechanisms of Liquid Metal Embrittlement: Justin Norkett; Cameron Frampton; Victoria Miller; University of Florida
MATERIALS DESIGN

Fatigue in Materials: Fundamentals, Multiscale Characterizations and Computational Modeling — From Cyclic Plastic Localization and Accumulation to Crack Nucleation and Propagation


Program Organizers: Garrett Pataky, Clemson University; Ashley Spear, University of Utah; Antonios Kontsos, Drexel University; Brian Wisner, Ohio University; Jean-Charles Stinville, University of California-Santa Barbara

Wednesday AM  March 17, 2021

8:30 AM  Invited
Fatigue and Dwell-fatigue Crack Initiation at (0001) Twist Boundaries in Ti Alloys: Cyril Lavogiez1; Jean-Charles Stinville2; Tresa Pollock2; Paraskevas Kontis1; Valéry Valle3; Patrick Villechais3; Samuel Hemery4; 1IAE-ENSMA; 2University of California Santa Barbara; 3MPIE; 4Université de Poitiers; 5Institute Prime - Ensma

8:50 AM
Multi-scale Analysis of Fatigue Damage in Welded Lean Duplex Stainless Steel Components: Ayoub Elmotououakkil1; Anna Fraczkiewicz1; Alexandre Gay3; Jacques Stolarz2; 1Emse; 2e.l.m. Leblanc

9:10 AM  Invited
Tracking Crystal-scale Cyclic Plasticity in Inconel 718 Using High Energy X-rays: Dalton Shadle1; Kelly Nygren2; Matthew Miller3; 1Cornell University; 2Cornell High Energy Synchrotron Source

9:30 AM
Plastic Localization in Solid Solution and Precipitation Strengthened Inconel 718 and Its Effect on VHCF Properties: Alice Cervellon1; Damien Texier1; Marie Agathe Charpagné1; Chris Torbet1; Valéry Valle2; Jean Charles Stinville2; Tresa Pollock2; 1University of California Santa Barbara; 2MPIE

9:50 AM
Microstructural and Mechanical Evolution of Aluminum 7075-T6 during Non-reversible Fatigue Loading: Joseph Indeck1; Gabriel Demeneghi2; Jason Mayeur2; Cyril Williams3; Kavan Hazeli4; 1The University of Alabama in Huntsville; 2U.S. Army Research Laboratory

10:10 AM
Effect of Microtexture on Minimum Dwell Fatigue Life of Ti-6Al-4V: Sushant Jha1; Daniel Sparkman2; James Larsen3; Reji John4; Adam Pilchak5; 1University of Dayton Research Institute; 2US Air Force Research Laboratory

10:30 AM
On the Role of Annealing Twin Boundaries in the Cyclic Plastic Strain Localization and the Fatigue Crack Initiation in Equiatomic CrCoNi Medium-entropy Alloy: Veronika Mazánová1; Milan Heckzo1; Connor Stone1; Ivo Kubena2; Easo George3; Maryam Ghaiziaseldi4; Tomas Kruml5; Jaroslav Polak6; Michael Mills7; 1The Ohio State University; 2Institute of Physics of Materials CAS; 3Oak Ridge National Laboratory

10:50 AM Reminder    ...  A joint session, “Microstructure-based Fatigue Studies on Additive-Manufactured Materials,” will be held on Wednesday at 2 p.m. EDT in conjunction with the Additive Manufacturing Fatigue and Fracture V: Processing-Structure-Property Investigations and Application to Qualification Symposium.

MATERIALS PROCESSING

Friction Stir Welding and Processing XI — Dissimilar

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Shaping and Forming Committee

Program Organizers: Yuri Hovanski, Brigham Young University; Piyush Upadhyay, Pacific Northwest National Laboratory; Yutaka Sato, Tohoku University; Niles Kumar, University of Alabama, Tuscaloosa; Anton Naumov, Peter the Great St. Petersburg Polytechnic University

Wednesday AM  March 17, 2021

8:30 AM  Invited
Friction Stir Welding of Metal and Carbon Fiber Reinforced Plastic: Hidetoshi Fujii1; Jeong-Won Choi2; Yoshiaki Morisada3; Kimiaki Nagatsu4; Kazuhiro Nakata5; 1Osaka University

8:50 AM
Friction Stir Welding of Metal Matrix Composites to Dissimilar Aluminum Alloys: Optimization of Weld Quality and Tool Life: Michael Eff1; Scott Rose2; Kyung Chung3; Don Hashiguchi4; Drew Shipley; Elizabeth Burns5; 1EWI; 2Boeing; 3Materion

9:10 AM
Dissimilar Joining of ZEK100 and AA6022 for Automotive Application: Hrishikesh Das1; Piyush Upadhyay1; Woongjo Choi2; Shank Kulkarni2; 1Pacific Northwest National Laboratory

9:30 AM
Fracture Mechanics Approach to Improve Fatigue Strength of a Dissimilar Metal T-Lap Joint by Friction Stir Welding: Masakazu Okazaki1; Hao Duong2; Satoshi Hirano3; 1Nagaoka University of Technology; 2Hitachi Research Laboratory

9:50 AM
Effect of Diffusion on Intermetallics at Interface during Friction Stir Welding of Stainless Steel and Pure Titanium: Nikhil Gotawala2; Amber Shrivastava1; 1Indian Institute of Technology Bombay

10:10 AM
Microstructural and Mechanical Characterization of Titanium/Steel Joints Produced by Ultrasonic Enhanced Friction Stir Welding: Andreas Gester1; Marco Thomaes; Guntram Wagner2; 1Chernitz University of Technology
Frontiers in Solidification Science VIII — Melting, Nucleation & Laser Processing

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Chemistry and Physics of Materials Committee, TMS: Phase Transformations Committee, TMS: Solidification Committee, TMS: Computational Materials Science and Engineering Committee

Program Organizers: Damien Tournet, IMDEA Materials; Amy Clarke, Colorado School of Mines; Ulrike Hecht, Access e.V.; Nana Ofori-Opong, Canadian Nuclear Laboratories; Melis Serefoğlu, Koc University; Tiberiu Stan, Northwestern University

Wednesday AM March 17, 2021

Session Chairs: Julien Zollinger, Institut Jean Lamour; Amy Clarke, Colorado School of Mines; Guillaume Boussinot, Access e.V.; Tiberiu Stan, Northwestern University

8:30 AM Invited
Melting of Metastable Solid-states in Au-Si Eutectic Alloy: Güven Kurtuluğ; 1ETH Zürich

9:00 AM Invited
Microstructure Evolution during Melting: Guillaume Boussinot; 1Mahdi Torabi Rad; 1Markus Apel; 1Alexandre Viardin; 1Access e.V.

9:30 AM Invited
ISRO-mediated Nucleation in Fcc Alloys during Rapid Melting and Solidification Processes: Julien Zollinger; 2Ivan Cazic; 2Michel Rappaz; 2Benoît Appolaire; 2Institut Jean Lamour; 2Institut Jean Lamour / Institut de Soudure; 2EPFL

10:00 AM
Orientation Relationships between Al3Ti and TiB2 due to Nucleation and Pushing/Engulfment: Yi Cui; 2Andrew Horsfield; 2Christopher Gourlay; 2Imperial College London

10:20 AM
Model the Initiation of Hot Cracking in Aluminum 6061 during the Processes of Laser Welding: Guannan Tang; 1Anthony Rollett; 1Carnegie Mellon University

10:40 AM
Using Composition and Patterning to Induce Solidification Instabilities in Al-Cu Eutectic Thin Films: Eli Sullivan; 1John Tomko; 1Jonathan Skelton; 1James Fitz-Gerald; 1Patrick Hopkins; 1Jerrold Florio; 1University of Virginia

SPECIAL TOPICS

Frontiers of Materials Award Symposium: Low-Dimensional Materials and Interfaces for Next Generation Computing — Session II

Program Organizer: Deep Jariwala, University of Pennsylvania

Wednesday AM March 17, 2021

8:30 AM Invited
Designing Solid-state Materials from Quantum Dots for Next-generation Electronic Devices: Cherie Kagan; 1University of Pennsylvania

9:10 AM Invited
vdW Contacts on 2D Semiconductors: Manish Chhowalla; 1Cambridge University

9:50 AM Panel Discussion Moderator: Deep Jariwala; Panelists: Mark C. Hersam, Suman Datta, Cherie Kagan, and Manish Chhowalla

NANOSTRUCTURED MATERIALS


Sponsored by: TMS Functional Materials Division, TMS: Nanomaterials Committee

Program Organizers: Jiyoun Chang, University of Utah; Michael Cai Wang, University of South Florida; Sarah Zhong, University of South Florida; Sun Choi, Korea Institute of Science and Technology; Pei Dong, George Mason University

Wednesday AM March 17, 2021

Session Chairs: Jiyoun Chang, University of Utah; Sun Choi, Korea Institute of Science and Technology

8:30 AM Invited
In-situ Production of Metal Nanoparticles on Polymer Derived Ceramic Fibers for Catalysis and Sensing: Sajia Afrin; 1Jean Calderon; 1Lei Zhai; 1University of Central Florida

8:55 AM
Suspended Graphene H2 Sensors With Enhanced Sensitivity Fabricated Using Direct-write Functional Fibers: Abiral Regmi; 1Dongwoon Shin; 1Noori Na; 1Jiyoun Chang; 1University of Utah

9:15 AM Invited
Laser Digital Patterning for Nickel-based Flexible Electrodes and Its Applications for Electronics and Sensors: Daeho Lee; 1Gachon University

9:40 AM Invited
Redesigning Batteries via Additive Manufacturing: Corie Cobb; 1University of Washington

10:20 AM Invited
Ultra-fast Nanomaterial Assembly and R2R Printing for High-performance Skin Sensors: Ying Zhong; 1Long Wang; 1Rui Kou; 1University of South Florida; 1University of California at San Diego

10:45 AM
Transparent and Flexible Nanoelectrodes for Wearable Electronics by Direct-writing of PEDOT:PSS-nanofiber& Nanoink: Dongwoon Shin; 1Abiral Regmi; 1Jiyoun Chang; 1University of Utah

11:05 AM
Wireless Strain Field Mapping of Metallic Surfaces through THz Time Domain Spectroscopy of Electrostrictive Coating Acting as Passive Sensor: Luis Reig Buades; 1Abhijeet Dhiman; 1Vikas Tomar; 1Purdue University
**ADVANCED MATERIALS**

High Entropy Alloys IX: Alloy Development and Properties — Joint Session with Materials for High Temperature Applications: Next Generation Superalloys and Beyond

*Sponsored by*: TMS Functional Materials Division, TMS Structural Materials Division, TMS; Alloy Phases Committee, TMS; Mechanical Behavior of Materials Committee

**Program Organizers**: Peter Liaw, University of Tennessee; Michael Gao, National Energy Technology Laboratory; E-Wen Huang, National Chiao Tung University; Srivatsan Tirumalai, The University of Akron; Xie Xie, FCA US LLC; Gongyao Wang, Alcoa Technical Center

**Wednesday AM**  March 17, 2021

**Session Chairs**: Oleg Senkov, Air Force Research Laboratory; Ridwan Sakidja, Missouri State University

8:30 AM Invited
Temperature Dependence of Mass Transport in Complex Alloys Using a High-throughput Platform for Applications in Extreme Environments: Adrien Couet1; Michael Moorehead1; Michael Niezgoda2; Phaigun Nelaturu1; Bonita Goh1; Yafei Wang2; Medha Karatas1; Chuan Zhang1; Fan Zhang2; Thien Duong2; Santanu Chaudhuri1; Dan Thomas1

1; National Institute for Materials Science / Waseda University; 2; University of Wisconsin-Madison; 3; Algorame National Laboratory

10:30 AM Invited
Design of Corrosion and Irradiation Resistant Compositionally Complex Alloys Using a High-throughput Platform for Applications in Extreme Environments: Toshua Saito1; Michael Niezgoda1; Phaigun Nelaturu1; Bonita Goh1; Akira Ishida2; Michinari Yuyama2; Yuji Takata2; Kyoko Kawagishi1; Hideyuki Murakami1; 1; National Institute for Materials Science / Waseda University; 2; National Institute for Materials Science

10:55 AM Microstructure and Mechanical Properties of High-entropy Superalloy HESA-3 at Intermediate Temperature: Tolhuma Saito1; Michael Niezgoda1; Phaigun Nelaturu1; Bonita Goh1; Akira Ishida2; Michinari Yuyama2; Yuji Takata2; Kyoko Kawagishi1; Hideyuki Murakami1; 1; National Institute for Materials Science / Waseda University; 2; National Institute for Materials Science

**NANOSTRUCTURED MATERIALS**

Heterostructured and Gradient Materials (HGM IV): Tailoring Heterogeneity for Superior Properties — Harmonic Structure, Composites and Films

*Sponsored by*: TMS Structural Materials Division, TMS; Mechanical Behavior of Materials Committee

**Program Organizers**: Yuntian Zhu, City University of Hong Kong; Kei Ameyama, Ritsumeikan University; Irene Beyerlein, University of California-Santa Barbara; Yves Brechet, Grenoble Institute of Technology; Huanjian Gao, Nanyang Technological University; Hyo-Yong Seo, Kim, Pohang University of Science and Technology; Ke Lu, Institute of Metal Research; Xiaolei Wu, Chinese Academy of Sciences

**Wednesday AM**  March 17, 2021

**Session Chairs**: Kei Ameyama, Ritsumeikan University; Dmytro Orlov, Lund University; Benjamin Guennec, Toyama Prefectural University

8:30 AM
Unique Hall-petch Relation in Harmonic Structure Materials: Kei Ameyama; Ritsumeikan University

8:50 AM Invited
Size Effect Issue on the Fatigue Properties of Ti-6Al-4V Designed in Heterogeneous Structure: Jagannathan Rajagopalan; Takayuki Ishiguri; Mie Ota Kawabata; Shoichi Kikuchi; Akira Ueno; Kei Ameyama; Tomoaki Niyama; Kanazawa University

9:15 AM
Yielding in a Metallic Nanocomposite at the Nanoscale: Nobuhiro Tsuji; Kanazawa University

9:35 AM Invited
Lattice Defect Development in Harmonic Metals through Atomic Simulations: Tomotada Shimokawa; Tatsumi Hasegawa; Tomoaki Niyama; Kanazawa University

10:00 AM Invited
Backstress Development and Strain Partitioning in Harmonic-structure Materials: Dmytro Orlov; Roman Kulagin; Yan Beygelzimer; Lund University; Karlsruhe Institute of Technology; Donetsk Institute for Physics and Engineering

10:25 AM Invited
Outstanding Mechanical Properties in a Harmonic Structure Designed Titanium Due to Preferential Recrystallization: Bhupendra Sharma; Motoki Miyakoshi; Mie Kawabata; Kei Ameyama; Ritsumeikan University

10:50 AM
High Strength and Tensile Ductility in Bicrystalline Nickel Thin Films with Incoherent Twin Boundaries: Rohit Berlia; Jagannathan Rajagopalan; Arizona State University

11:10 AM
Effect of Rolling on Fatigue Crack Propagation in Harmonic Structured Commercially Pure Titanium: Yoshikazu Nakao; Shoichi Kikuchi; Kohei Osaki; Mie Kawabata; Kei Ameyama; Kobe Univ; Shizuka University; Ritsumeikan University

11:30 AM
Synthesis and Mechanical Characterization of Metallic Films with Precisely Defined Heterogeneous Microstructures: Rohit Berlia; Jagannathan Rajagopalan; Arizona State University
ADVANCED MATERIALS

High Entropy Alloys IX: Structures and Modeling — Structures and Characterization II

**Sponsored by:** TMS Functional Materials Division, TMS Structural Materials Division, TMS: Alloy Phases Committee, TMS: Mechanical Behavior of Materials Committee

**Program Organizers:** Peter Liaw, University of Tennessee; Michael Gao, National Energy Technology Laboratory; E-Wen Huang, National Chiao Tung University; Srivatsan Tirumalai, The University of Akron; Xie Xie, FCA US LLC; Gongyao Wang, Alcoa Technical Center

**Wednesday AM**

**March 17, 2021**

**Session Chairs:** James Morris, Ames Laboratory; Yang Ren, Argonne National Laboratory

8:30 AM Invited

**Predicting High Entropy Alloy Behavior: What We Can Learn from Non-empirical Approaches:** James Morris1; 1Ames Laboratory

8:50 AM Invited

**Role of Local Chemical Order in Orientation Relationship Determination in an Alloy:** Anber Elaf-Anber6; Daniel Foley6; Diana Farkas6; Peter Liaw6; Mitra Taheri1; 1Johns Hopkins University; 2Virginia Tech; 3The University of Tennessee

9:10 AM

**Microstructure and Mechanical Properties of a Dual Phase Transformation Induced Plasticity Fe-Mn-Co-Cr High Entropy Alloy:** AFM Monowar Hossain1; Rajiv Mishra2; Niles Kumar2; 1University of Alabama Tuscaloosa; 2University of North Texas

MATERIALS DESIGN

Hume-Rothery Symposium: Accelerated Measurements and Predictions of Thermodynamics and Kinetics for Materials Design and Discovery — Session V

**Sponsored by:** TMS Structural Materials Division, TMS: Alloy Phases Committee

**Program Organizers:** Wei Xiong, University of Pittsburgh; Shuanglin Chen, CompuTherm LLC; Wei Chen, Illinois Institute of Technology; James Saal, Citrine Informatics; Greta Lindwall, KTH Royal Institute of Technology

**Wednesday AM**

**March 17, 2021**

**Session Chairs:** Greta Lindwall, KTH Royal Institute of Technology; Shuanglin Chen, CompuTherm LLC

8:30 AM Invited

**Some Properties of the Multicomponent Diffusivity Matrix:** John Agran1; 1Royal Institute of Technology

9:10 AM Invited

**A Tale of Two Approaches: From Phase Equilibria to Materials Properties:** Qing Chen1; 1Thermo-Calc Software AB

9:50 AM Invited

**A Diffusion Mobility Database for γ/γ′ Co-Superalloys:** Carelyn Campbell1; Kil-won Moon1; Maureen Williams1; Greta Lindwall1; 1National Institute of Standards and Technology; 2Royal Institute of Technology (KTH)

10:30 AM Invited

**Modeling of Diffusion and Intermetallic Phase Formation in Al-Mg Bimetallic Structures:** Alan Luo1; 2Ohio State University

11:10 AM Invited

**An Integrated Computational Materials Engineering (ICME) Framework for Additive Manufacturing (AM) of Ni-based Superalloys:** Qiaofo Zhang1; Abhinav Saboo1; Jiadong Gong1; Greg Olson1; 1QuesTek Innovations LLC

LIGHT METALS

Magnesium Technology 2021 — Mechanical Behavior

**Sponsored by:** TMS Light Metals Division, TMS: Magnesium Committee

**Program Organizers:** Victoria Miller, University of Florida; Petra Maier, University of Applied Sciences Stralsund; J. Brian Jordon, University of Alabama; Neale Neelameggham, IND LLC

**Wednesday AM**

**March 17, 2021**

**Session Chairs:** Brian Jordon, University of Alabama; Kiran Solanki, Arizona State University

8:30 AM Invited

**Quasi-static and Dynamic Rate Mechanical Behavior and Microstructural Investigation of High-purity Mg and AZ31B Alloy:** Benjamin Morrow1; Ellen Cerreta1; Saryu Fensin1; Sara Perez-Bergquist1; Carl Trujillo1; Suveen Mathaudhu1; Veronica Anghel1; Rodney McCabe1; George Gray1; 1Los Alamos National Laboratory; 2University of California - Riverside

8:00 AM Invited

**Some Properties if the Multicomponent Diffusivity Matrix:** John Agran1; 1Royal Institute of Technology

9:10 AM Invited

**A Tale of Two Approaches: From Phase Equilibria to Materials Properties:** Qing Chen1; 1Thermo-Calc Software AB

9:50 AM Invited

**A Diffusion Mobility Database for γ/γ′ Co-Superalloys:** Carelyn Campbell1; Kil-won Moon1; Maureen Williams1; Greta Lindwall1; 1National Institute of Standards and Technology; 2Royal Institute of Technology (KTH)

10:30 AM Invited

**Modeling of Diffusion and Intermetallic Phase Formation in Al-Mg Bimetallic Structures:** Alan Luo1; 2Ohio State University

11:10 AM Invited

**An Integrated Computational Materials Engineering (ICME) Framework for Additive Manufacturing (AM) of Ni-based Superalloys:** Qiaofo Zhang1; Abhinav Saboo1; Jiadong Gong1; Greg Olson1; 1QuesTek Innovations LLC

MATERIALS PROCESSING

High Temperature Electrochemistry IV — Session IV

**Sponsored by:** TMS Extraction and Processing Division, TMS: Hydrometallurgy and Electrometallurgy Committee

**Program Organizers:** Prabhat Tripathy, Battelle Energy Alliance (Idaho National Laboratory); Guy Fredrickson, Idaho National Laboratory

**Wednesday AM**

**March 17, 2021**

**Session Chair:** Guy Fredrickson, Idaho National Laboratory

8:30 AM

**Interaction between Solute Species and Metallic Alloying Elements in Molten Chloride Systems:** William Phillips4; Ruchi Gakh4; 4Idaho National Laboratory

9:00 AM

**Effect of Hydroxide and Oxide Impurities in Electrochemical Processes Using Molten LiCl and CaCl2:** Mario Alberto Gonzalez4; Emma Faulkner4; Michael Simpson4; 4University of Utah
9:00 AM Invited
Understanding Twinning: Detwinning Behavior of Unalloyed Mg during Low-cycle Fatigue Using High Energy X-ray Diffraction: Aeri Murphy-Leonard1; John Allison2; 1Naval Research Laboratory; 2University of Michigan

9:30 AM
The Effects of Basal and Prismatic Precipitates on Deformation Twinning in AZ91 Magnesium Alloy: Brandon Leu1; M Arul Kumar2; Irene Beyerlein3; 1University of California Santa Barbara; 2Los Alamos National Laboratory; 3National University of Singapore

9:50 AM
On the Role of Crystallographic Anisotropy and Texture in Damage Tolerance of Magnesium and its Alloys: Sharmeen Baweja1; Padmeya Indurkar2; Shailendra Joshi2; 1University of Houston; 2National University of Singapore

10:10 AM Invited
Achieving Excellent Room Temperature Formability and High Strength in Wrought Magnesium Alloy Sheets: Taisuke Sasaki1; Zehao Li2; Kazuhiro Hono1; 1NIMS

10:40 AM Invited
Texture and Microstructure Evolution in Thermomechanically Processed Mg-Ca and Mg-Zn-Ca Alloys: Tracy Berman1; John Allison2; 1University of Michigan; 2University of California-Berkeley

11:10 AM
Eliminating Yield Anisotropy and Enhancing Ductility in Mg Alloys by Shear Assisted Processing and Extrusion: Dalong Zhang1; Jens Darsell1; Nicole Overman2; Darrell Herling2; Vineet Joshi3; 1Pacific Northwest National Laboratory; 2University of Michigan; 3University Of South Carolina

11:30 AM
Numerical Study of Multi-axial Loading Behavior of Mg Alloy AZ31 Extruded Bar: Huamiao Wang1; Xiaodan Zhang1; 1Shanghai Jiao Tong University

11:30 AM
NUCLEAR MATERIALS

Materials and Chemistry for Molten Salt Systems — Salt Structure and Properties

Sponsored by: TMS Structural Materials Division, TMS: Corrosion and Environmental Effects Committee

Program Organizers: Stephen Raiman, Texas A&M University; Kumar Sridharan, University of Wisconsin-Madison; Nathaniel Hoyt, Argonne National Laboratory; Jinsuo Zhang, Virginia Polytechnic Institute and State University; Michael Short, Massachusetts Institute of Technology; Raluca Scarlat, University of California Berkeley

Wednesday AM March 17, 2021

Session Chair: Raluca Scarlat, UC Berkeley

8:30 AM
Development of Higher Order Systems for the Molten Salt Thermodynamic Database and their Application: Theodore Besmann1; Kaitlin Johnson2; Johnathan Ard3; Jacob Yingling3; Matthew Christian4; Juliano Schorne-Pinto5; Mahmut Aslan1; Jake McMurray1; Max Poschmann1; Markus Piro1; 1University of South Carolina; 2Oak Ridge National Laboratory; 3University of California, Berkeley; 4Los Alamos National Laboratory; 5Ontario Tech

8:50 AM
Ab Initio Molecular Dynamics Simulations of Actinide Molten Chloride Salts: David Andersson1; 1Los Alamos National Laboratory

9:00 AM
Extracting Salt Properties from Visualization of Molten Salt Sessile Droplets: Sara Mastromarino1; Malachi Nelson1; Raluca Scarlat1; Ryan Hayes2; 1University of California Berkeley; 2University of California, Berkeley

9:30 AM
Liquid-vapor Equilibrium and Transport Phenomena in Molten Salt Systems: Jacob Mcmurray2; Joanna McFarlane2; Scott Greenwood2; Abbey McAlister2; Matt Kurley1; 1Oak Ridge National Laboratory

9:50 AM
Optimization of the Phase Equilibria and Thermodynamics for Rare-earth Fluoride Systems Relevant to Molten Salt Reactors: Kautil Johnson1; Juliano Schorne Pinto2; Theodore Besmann1; 1University of South Carolina

10:10 AM
Molten Salt Reactor: Fluoride/Chloride Salt Comparison: Sylvie Delpech1; Céline Cannes1; Davide Rodrigues1; 1UCLAB-CNRS

10:40 AM
X-ray Absorption Studies Investigating Solute-solvent Interactions in Molten Salt Environments: Elaine Dias1; Simeonjeet Gill2; Ruchi Gkahar1; Santanu Roy1; Mehmet Topsakal1; William Phillips2; Bobby Layne3; Shannon Maharun3; Phillip Halstenberg1; James Wishart1; Vyacheslav Bryantsev1; Anatoly Frenkel1; 1Brookhaven National Laboratory; 2Idaho National Laboratory; 3Oak Ridge National Laboratory

11:00 AM
Imaging Nanostructural Heterogeneities Induced by Molten Salt Corrosion in Ni-Cr Alloy: Yang Yang1; Weijue Zhou1; Sheng Yin1; Sarah Wang1; Qin Yu1; Robert Ritchie1; Mark Asta1; Ju L1; Michael Short1; Andrew Minor1; 1Lawrence Berkeley National Laboratory; 2Massachusetts Institute of Technology; 3University of California, Berkeley

11:30 AM
MATERIALS PROCESSING

Materials Engineering -- From Ideas to Practice: An EPD Symposium in Honor of Jiann-Yang Hwang — Material Processing and Recycling

Sponsored by: TMS Extraction and Processing Division, TMS: Materials Characterization Committee, TMS: Pyrometallurgy Committee

Program Organizers: Bowen Li, Michigan Technological University; Baojun Zhao, University of Queensland; Jian Li, CanmetMATERIALS; Sergio Monteiro, Instituto Militar de Engenharia; Zhiwei Peng, Central South University; Dean Gregurek, RHI Magnesita; Tao Jiang, Central South University; Yong Shi, Futianbao Environment Technologies; Cuiping Huang, Futianbao Environment Protection Technology Company Ltd.; Shadia Ikhmayies

Wednesday AM March 17, 2021

Session Chairs: Tom Xu, AGreatE Inc; Yongguang Luo, Chi Hong Zn & Ge .Co.Ltd

8:30 AM
Investigation of Nickel Laterite Smelting Slags: Ender Keshikhilic1; 1ATlim University

8:50 AM
Recycled Common Glass Bottle Used in Composite Repair for Industrial Piping: Felipe Lopes1; Noan Tonini Simonass3; Carlos Fontes Vieira1; Sergio Neves Monteiro1; 1Universidade Estadual do Norte Fluminense
MATERIALS PROCESSING

Materials Processing Fundamentals — Thermodynamics on Metals and Slags Processing

**Sponsored by:** TMS Extraction and Processing Division, TMS Materials Processing and Manufacturing Division, TMS: Process Technology and Modeling Committee

**Program Organizers:** Jonghyun Lee, Iowa State University; Samuel Wagstaff, Oculatus; Alexandra Anderson, Gopher Resource; Fiseha Tesfaye, Abo Akademi University; Guillaume Lambotte, Boston Metal; Antoine Allanore, Massachusetts Institute of Technology

**Wednesday AM**  
March 17, 2021

**Session Chairs:** Guillaume Lambotte, Boston Metal; Fiseha Tesfaye, Abo Akademi University

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8:30 AM
Effect of Slag Conductivity on Decarburisation Reaction Kinetics: Jayasree Biswas; Kenneth Coley; 2McMaster University; 3Western University

8:50 AM
Experimental Characterization of Liquid Metal Bubble-driven Flows Modeling the Situation in a Steel Ladle: Thomas Wondrak; Christian Bruch; Sven Eckert; Pascal Gardin; Gernot Hackl; Helmut Lachmund; Hans-Bodo Lüngen; Hans-Jürgen Odenthal; Klaus Timmel; Bernd Willers; 1Helmholtz-Zentrum Dresden-Rossendorf; 2Saarstahl AG; 3ArcelorMittal; 4RHIL-Magnesita; 5Dillinger Hüttenwerke; 6Steel Institute VDEh; 7SMS group GmbH

9:10 AM
Influence of Slab Transportation and Handling Practice on Crack Sensitivity of Micro-alloyed Steels: Hossam Shafy; Heinz Palkowski; 1Clausthal University of Technology

9:30 AM
Low Temperature Aluminothermic Reduction of Metal Oxides: Jawad Haider; 1Kinaltek Pty Ltd.

9:50 AM
Modelling of Metal Loss in Ferromanganese Furnace Tapping Operations: Quinn Reynolds; Jan Erik Olsen; 1Mintek; 2SINTEF Industry

10:10 AM
Carbothermal Reduction of Brazilian Linz Donawitz-LD Steel Sludges: Mery Gomez-Marroquin; Jose Carlos D’Abreu; Enrique Dionisio-Calderon; Nilton Cárdenas-Falcon; Abraham Terrones - Ramirez; Jhony Huarcaya-Nina; Kim Phatti - Satto; Fernando Huaman-Perez; 1APM/Universidad Nacional de Ingenieria; 2Pontificia Universidad Católica del Perú; 3Pontificia Universidad Católica de Chile; 4FIA Universidad Nacional de Ingeniería; 5FIQ; 6National University of engineering

10:30 AM
Liquid-liquid Extraction Thermodynamic Parameter Estimator (LLEPE) for Multicomponent Separation Systems: Titus Ouah; 1Chukwunwike Iloeje; 2Illinois Institute of Technology

10:50 AM
Thermodynamic Modeling of Iron-copper-sulfuric Acid Solutions during Solvent Extraction and Electrowinning for Copper Production: Jiahao Xu; Guikuan Yue; 1University of Texas El Paso
NUCLEAR MATERIALS

Mechanical Behavior of Nuclear Reactor Components — Early Career

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS Structural Materials Division, TMS: Nanomechanical Materials Behavior Committee, TMS: Nuclear Materials Committee

Program Organizers: Clarissa Yablinsky, Los Alamos National Laboratory; Assel Alkilayeva, University of Florida; Eda Aydogan, Middle East Technical University; Laurent Capolungo, Los Alamos National Laboratory; Khalid Hattar, Sandia National Laboratories; Kayla Yano, Pacific Northwest National Laboratory; Caleb Massey, Oak Ridge National Laboratory

Wednesday AM    March 17, 2021

8:30 AM Invited
On the Role of Material Pedigree to Predict Engineering Material Properties: Andrea Rovinelli1; Mark Messner2; T.-L. Sham4; 1Argonne National Laboratory

8:50 AM Invited
A Model for Dislocation Climb and Precipitate Interactions Applied to Creep in Ferritic Steel: Aaron Kohnert1; Laurent Capolungo1; 1Los Alamos National Laboratory

9:10 AM Invited
Atom-probe Study of Nano-hardening Features in Neutron Irradiated RAFM Steels: Arunodaya Bhattacharya2; Philip Edmondson1; Hiroyasu Tanigawa3; Takashi Nozawa3; Josina Geringer1; Yutai Katoh1; Michael Rieh7; 1Oak Ridge National Laboratory; 2National Institutes for Quantum and Radiological Science and Technology; 3Kartlsruhe Institute of Technology

9:30 AM Invited
Microstructural Effects on the Mechanical Behavior of FeCrAl Alloys: Andrew Hoffman1; Shenyang Huang2; Steve Buresh1; Michael Schuster1; Evan Dolley1; Raub Rebak2; 1GE Research

9:50 AM Invited
Novel Small Scale Mechanical Testing Techniques for Nuclear Materials: Jonathan Gigax1; Hyosim Kim1; Calvin Lear1; Matthew Chancey1; Peter Hosemann1; Yongqiang Wang1; Stuart Maloy1; Nan Li1; 1Los Alamos National Lab; 2University of California-Berkeley

10:10 AM Invited
Probing the Mechanical Behavior of Irradiated Materials through Micromechanical Testing: Sezer Ozerinc1; 1Middle East Technical University

10:30 AM Invited
Small Scale Mechanical Testing of Nuclear Fuel and Cladding: David Frazer1; Joshua White2; Tarik Saleh3; Fabiola Cappia4; Fei Deng5; Daniel Murray1; Cameron Howard1; Colin Judge1; Idaho National Lab; 1LANL

10:50 AM Invited
Atomistic Simulations and Theoretical Modelling of the Yield Behavior of Industrial Tantalum Alloys: Divya Singh1; Satish Rao1; Jaafar El-Awady1; 1Johns Hopkins University; 2UES Inc.

11:10 AM Invited
The Merit of In-situ Environmental TEM for the Study of Tungsten under Fusion-relevant Conditions: Maanas Togaru1; Rajat Sainju1; Yuan yuan Zhu1; 1University of Connecticut

CHARACTERIZATION

Mechanical Response of Materials Investigated through Novel In-situ Experiments and Modeling — Session V

Sponsored by: TMS Structural Materials Division, TMS: Thin Films and Interfaces Committee, TMS: Advanced Characterization, Testing, and Simulation Committee

Program Organizers: Saurabh Puri, Microstructure Engineering; Amit Pandey, Lockheed Martin Space; Dhriti Bhattacharyya, Australian Nuclear Science and Technology Organization; Dongchan Jang, KAIST; Jagannathan Rajagopalan, Arizona State University; Josh Kacher, Georgia Institute of Technology; Minh-Son Pham, Imperial College London; Robert Wheeler, Microtesting Solutions LLC; Shailendra Joshi, University of Houston

Wednesday AM    March 17, 2021

Session Chair: Shailendra Joshi, University of Houston

8:30 AM
Complementary In-situ Methods for Crack Evaluation within High-temperature Materials at Ambient Conditions: Michael Burtscher1; Markus Alfreider2; Michael Wurmshuber1; Klemens Schmuck1; Helmut Clemens2; Svea Mayer1; Daniel Kiener1; 1Montanuniversität Leoben; 2Montanuniversität Leoben

8:50 AM
In-situ Experimental Evaluation of Residual Stresses in Composites during Autoclave Manufacturing: Sandeep Chava1; Sirish Namilae1; Marwan Al-Haik1; 1Embry-Riddle Aeronautical University

9:10 AM
In-situ Investigation of Intergranular Crack Initiation in Hydrogen Embrittled Inconel 725: Mengying Liu1; Lai Jiang1; Emmeline Sheu1; Michael Demkowicz2; 1Texas A&M University

9:30 AM
Advanced In-situ Electrochemical Nanoindentation Testing for Understanding Hydrogen-materials Interactions: Verena Mayer-Kiener1; Anna Ebner1; Helmut Clemens1; Reinhard Pippann1; 1Montanuniversität Leoben; 2Austrian Academy of Sciences

9:50 AM
Size Effects in Barium Titanate: Nidhin Mathews1; Ashish Saxena2; Christoph Kirchlechner2; N Venkataramani1; Gerhard Dehm1; Bailla Nagamani Jaya1; 1Indian Institute of Technology Bombay; 2Max-Planck-Institut für Eisenforschung GmbH

10:10 AM
Size Effect, Friction and Adhesion in Small-scale Cutting of Metals: Gan Feng1; Parth Dave1; Dinakar Sagapuram1; 1Texas A&M University

10:30 AM
The Effect of Material Volume on Impact Energy Absorption for Protective Equipment Applications: Kendra Hartley1; Prasad Ternakoon1; John Nychka1; 1University of Alberta; 2Superior Glove Works, Ltd.
MATERIALS PROCESSING

Ni-Co 2021: The 5th International Symposium on Nickel and Cobalt — Pyrometallurgy I

Sponsored by: The Metallurgy & Materials Society of the Canadian Institute of Mining, Metallurgy and Petroleum, TMS Extraction and Processing Division, TMS: Hydrometallurgy and Electrometallurgy Committee; TMS: Pyrometallurgy Committee

Program Organizers: Corby Anderson, Colorado School of Mines; Dean Gregurek, RHI Magnesita; Mari Lundström, Aalto University; Christina Meskers; Prabhat Tripathy, Batelle Energy Alliance (Idaho National Laboratory); Fiseha Tesfaye, Abo Akademi University; Yuanbo Zhang, Central South University; Sari Muinonen, Glencore; Graeme Goodall, XPS- Glencore; Shijie Wang, Rio Tinto Kennecott Utah Copper Corp (Retired)

Wednesday AM March 17, 2021

8:30 AM
One-step Extraction of Nickel from Nickel Sulfide Concentrates by Iron Addition: Fannao Wang1; Sam Marcuson1; Leili Khajavi1; Mansoor Barati1; 1University of Toronto; 2University of British Columbia

8:50 AM
Continuous Improvement of Process Advisor Optimizing Furnace Model: Peter Björklund1; David Grimsey2; Mikko Korpi2; Milikka Marjakoski2; 1Outotec; 2BHP; 3Boliden

9:10 AM
Fluxing Optimisation and Control Improvements at the Kalgoorlie Nickel Smelter: David Grimsey1; Eric Grimsey2; Peter Björklund2; 1Curtin University; 2Outotec

9:30 AM
Preparation of Refractory Materials by Co-sintering of Ferronickel Slag and Ferrochromium Slag: Thermodynamic Analysis: Foquan Gu1; Yuanbo Zhang1; Zhiwei Peng2; Huimin Tang3; Zijian Su1; Tao Jiang1; 1Central South University

9:50 AM
PGM Furnace Design, Construction, Improvement and Performance Optimisation: Isobel McDougall1; Gerrit de Villiers2; Hugo Joubert1; Burger van Beek3; John Davis3; Trevor Goff3; 1Tenova Pyromet; 2Sibanye-Stillwater

ELECTRONIC MATERIALS

Phase Stability, Phase Transformations, and Reactive Phase Formation in Electronic Materials XX — Advanced Electronic Interconnection

Sponsored by: TMS Functional Materials Division, TMS Structural Materials Division, TMS: Alloy Phases Committee

Program Organizers: Hiroshi Nishikawa, Osaka University; Shih-kang Lin, National Cheng Kung University; Chao-Hong Wang, National Chung Cheng University; Chih-Ming Chen, National Chung Hsing University; Jaeho Lee, Hongik University; Zhi-Quan Liu, Shenzhen Institutes of Advanced Technology; Ming-Tzer Lin, National Chung Hsing University; Dajian Li, Karlshruhe Institute of Technology; Yu Zhong, Worcester Polytechnic Institute; Yee-wen Yen, National Taiwan University of Science and Technology; A.S.Md Abdul Haseeb, University of Malaya; Ligang Zhang, Central South University; Sehoon Yoo, KITECH; Vesa Vuorinen, Aalto University; Yu-chen Liu, National Cheng Kung University

Wednesday AM March 17, 2021

Session Chairs: Shih-kang Lin, National Cheng Kung University; Yee-Wen Yen, National Taiwan University of Science and Technology

8:30 AM
Introductory Comments: Phase Stability, Phase Transformations, and Reactive Phase Formation in Electronic Materials XX: Sinn-wen Chen1; 1National Tsinghua University

8:35 AM Keynote
Interfacial Reactions in the Bi2Te3 Thermoelectric Modules: Sinn-wen Chen1; Ya-Hsiang Hsu1; Chao-Hong Wang1; 1National Tsinghua University

9:15 AM Invited Review of X-ray Microbeam Study of Electromigration: Ping-Chuan Wang1; 1SUNY New Paltz

9:45 AM
Effects of Bromide and Adipic Acid on Electrochemical Migration of Tin: A.S.Md Abdul Haseeb1; Ee Lynn Lee1; Yi Sing Goh1; Y. H. Wong1; M. F. M. Sabri2; B. Y. Low2; 1University of Malaya; 2NXP Semiconductor Sdn Bhd

10:05 AM
The Microstructure and Properties Variations of Sn-coated Cu Wires Induced by Electromigration: Hsiao-Chun Liu1; Chien-Lung Liang1; Tsung-Chieh Chiu1; Kwang-Lung Lin1; 1National Cheng Kung University; 2Conquer Electronics

10:25 AM
Thermomigration Failure Induced by Surface Diffusion of Sn on Ni/Cu Metallization in Microbumps for 2.5-dimensional Integrated Circuits Packaging: Wei-Dung Tsai1; 1National Chung Hua University

10:45 AM
Synchrotron White Laue Nanodiffraction Characterization of Allotropic Phase Transformation of Hexagonal- into Monoclinic-Cu6Sn5, Cu3Sn5, Cu-Sn3: Wan-Zhen Hsieh1; Cheng-Yu Lee2; Yu-Hsuan Huang3; Ching-Yu Chiang2; Ching-Shun Ku2; C. Robert Kao3; Cheng-En Ho3; 1National Taiwan University; 2National Synchrotron Radiation Research Center; 3Yuan Ze University

11:05 AM
Electroplating of NiP for the Low Residual and High Strength MEMS Probe Tip: Na-Young Kang1; Jaeho Lee1; 1Hongik University

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All times listed are in EDT time zone (UTC-4:00).
PHYSICAL METALLURGY

**Phase Transformations and Microstructural Evolution — Non-Ferrous Alloys**

*Sponsored by:* TMS Materials Processing and Manufacturing Division, TMS: Phase Transformations Committee

**Program Organizers:** Rongpei Shi, Lawrence Livermore National Laboratory; Yipeng Gao, Idaho National Laboratory; Fadi Abdeljawad; Clemson University; Bharat Gwalani, Pacific Northwest National Laboratory; Qi An, University of Nevada-Reno; Eric Lass, University of Kentucky-Huntington; Huajing (Wilson) Song, Los Alamos National Laboratory

**Wednesday AM**  March 17, 2021

**Session Chair:** Deep Choudhuri, New Mexico Institute of Mining and Technology

8:30 AM  **Effect of Zirconium Addition to Wrought Al-Mg-Si Alloys on Microstructure**

*Florian Schmidt*1; Irmgard Weißenstein2; Mathews Tunes2; Thomas Kremmer2; Thomas Ebner2; Peter J. Uggowitzer2; Stefan Pogatscher2;  
1Christian Doppler Laboratory for Advanced Aluminum Alloys; 2Montanuniversitaet Leoben; 3AMAG rolling GmbH

8:50 AM  **Phase Transitions in Beta Ti and Beta Zr Alloys**

*Josef Strasky*1;  
1Charles University

9:10 AM  **Local Phase Transformation Strengthening in Ni-based Superalloys**

*Ashton Egan*1; Timothy Smith2; You Rao2; Longsheng Feng1; Emmanuelle Marquis1; Maryam Ghazisaeidi1; Yunzhi Wang1;  
1University of Michigan; 2NASA Glenn Research Center; 3University of California

9:30 AM  **On the Application Potential of Aluminum Crossover Alloys**

*Lukas Stemper*1; Mathews Tunes2; Ramona Tosone2; Peter Uggowitzer2; Stefan Pogatscher2;  
1Montanuniversitaet Leoben; 2AMAG rolling GmbH

9:50 AM  **Thermal Behavior and Decomposition of Quasicrystalline Dispersoids in Powder-processed Aluminum Alloys**

*Hannah Leonard*1; Sarshad Rommel1; Mingxuan Li1; Thomas Watson1; Tod Policandriti3; Mark Aindow1;  
1University of Connecticut; 2Ohio State University; 3University of Virginia

MATERIALS PROCESSING

**Rare Metal Extraction & Processing — Recycling, Co, REE**

*Sponsored by:* TMS Extraction and Processing Division, TMS: Hydrometallurgy and Electrometallurgy Committee

**Program Organizers:** Gisele Azimi, University of Toronto; Takanari Ouchi, The University of Tokyo; Kerstin Forsberg, KTH Royal Institute of Technology; Hojung Kim, Pennsylvania State University; Shafiq Alam, University of Saskatchewan; Alafara Baba, University of Ilorin; Neale Neelameggham, IND LLC

**Wednesday AM**  March 17, 2021

8:30 AM  **Copper Separation from Steel Scrap**

*Hyunsoo Jim*1; Brajendra Mishra1;  
1Worcester Polytechnic Institute

8:50 AM  **The Italian National Research Council Operations within the EIT Raw Materials Framework**

*Paolo Dambruoso*1; Salvatore Siano1; Armida Torreggiani1; Ornella Russo1; Vladimir Del Santo1; Stefania Marzocchi1;  
1ISOF-CN:R; 2IFAC-CN; 3Library of the Bologna CNR Research Area; 4SCITEC-CN; 5Library of the Bologna CNR Research Area

9:10 AM  **Experimental Determination of Liquidus Temperature and Phase Equilibria of the CaO-Al2O3-SiO2-Na2O Slag System Relevant to E-waste Smelting**

*Md Khairul Islam*2; Michael Somerville2; Mark Pownceby2; James Tardio2; Nawshad Haque2; Suresh Bhargava2;  
1RMIT University; 2CSIRO

9:30 AM  **How to Prepare Future Generations for the Challenges in the Raw Materials Sector**

*Armida Torreggiani*1; Alberto Zanelli1; Alessandra Degli Esposti1; Eleonora Polo2; Paolo Dambruoso2; Renata Lapiska-Viola2; Kerstin Forsberg2; Emilia Benvenuti2;  
1National Research Council of Italy-CNR; 2ISOF-CNR; 3KTH - Royal Institute of Technology; 4National Research Council of Italy (CNR)

9:50 AM  **Circular Economy for Rare Earths: What are the Different Strategies, Challenges, and Opportunities?**

*Komal Habib*1;  
1University of Waterloo

ENERGY & ENVIRONMENT

**Recycling and Sustainability for Emerging Technologies and Strategic Materials — Recycling and Process Optimization I**

*Sponsored by:* TMS Extraction and Processing Division, TMS Light Metals Division, TMS: Recycling and Environmental Technologies Committee

**Program Organizers:** John Howarter, Purdue University; Mingming Zhang, ArcelorMittal Global R&D; Elsa Olivetti, Massachusetts Institute of Technology; Hong Peng, University of Queensland

**Wednesday AM**  March 17, 2021

**Session Chair:** Hong Peng, University of Queensland

8:30 AM  **Copper Separation from Steel Scrap**

*Hyunsoo Jim*1; Brajendra Mishra1;  
1Worcester Polytechnic Institute
8:50 AM Invited
Improvement of Steel Scrap Recycling: Optical Recognition of Cu Impurities Using Machine Learning: Zhijiang Gao1; Colorado School of Mines

9:10 AM Copper Supply for Electric Vehicles and Impacts on the Recycling Sector: Ayomipo Arowosola1; Gabrielle Gaustad2; Rochester Institute of Technology; Alfred University

9:30 AM Development and Impact of High-performance Al Alloys Alloyed with Rare Earth Co-products: Hunter Henderson1; Zachary Sims2; David Weiss3; Tomer Fishman4; Ryan Ott5; Orlando Rios5; Scott McCall5; Lawrence Livermore National Laboratory; University of Tennessee-Knoxville; Eck Industries, Inc.; IDC Herzliya; Ames Laboratory

9:50 AM Electrochemical Separation of Aluminum from Mixed Scrap Using Ionic Liquids: Aninda Nafis Ahmed1; Ramana Reddy2; The University of Alabama

10:10 AM High-temperature Oxidation of Explosion Welded Tantalum-tungsten Alloy on Steel Substrate as a Potential Technique for Recycling: Akanksha Gupta1; Brajendra Mishra1; Worcester Polytechnic Institute

NUCLEAR MATERIALS
Thermal Property Characterization, Modeling, and Theory in Extreme Environments — Early Career Scholars in Thermal Properties

Sponsored by: TMS Structural Materials Division, TMS: Nuclear Materials Committee

Program Organizers: Janelle Wharry, Purdue University; Mukesh Bachhav, Idaho National Laboratory; Marat Khafizov, Ohio State University; Eric Lass, University of Tennessee-Knoxville; Vikas Tomar, Purdue University; Tiankai Yao, Idaho National Laboratory; Cody Dennett, Idaho National Laboratory; Karim Ahmed, Texas A&M University

Wednesday AM March 17, 2021

Session Chairs: Cody Dennett, Idaho National Laboratory; Fergany Badry, Texas A&M University

8:30 AM Invited
A Thermodynamically-consistent Model for Heat Transport in Heterogeneous Solids: Karim Ahmed1; Fergany Badry1; Texas A&M University

8:55 AM Invited
Defect Density and Annealing Kinetics Estimation Using Thermal Diffusivity Measurements from Transient Grating Spectroscopy: Mohamed Abdallah Reza1; Hongbing Yu1; Kenichiro Mizohata1; Felix Hofmann2; University Of Oxford; University of Helsinki

9:20 AM Invited
Thermal Behaviors of Correlated Insulators ThO2 and SmB6: Narayan Poudel1; Daniel Murray1; Matthew Mann1; Jason Jeffries1; Idaho National Laboratory; Air Force Research Laboratory; Lawrence Livermore National Laboratory

9:45 AM Invited
Thermal Conductivity Degradation from Irradiation-induced Microstructural Defects in Single Crystal Thorium Dioxide: Amey Khanolkar1; Zilong Hua2; Cody Dennett2; Marat Khafizov2; Tiankai Yao2; Kausthub Bawane2; Lingfeng He2; J. Matthew Mann2; Anter El-Azab2; Jian Gan2; David Hurley2; Idaho National Laboratory; Ohio State University; Air Force Research Laboratory; Purdue University

10:10 AM Invited
Phase-dictated Thermal Conductivity Response in Carbon Systems Exposed to Ion Irradiation: Ethan Scott1; Khalid Hattar2; Jeffrey Braun1; Sean King1; Mark Goorsky3; Patrick Hopkins1; University of Virginia; Sandia National Laboratories; Intel Corporation; University of California Los Angeles

10:35 AM Invited
Thermal Transport Behavior of U-50Zr at the Mesoscale: Before and After Irradiation: Zilong Hua1; Tiankai Yao1; Amey Khanolkar1; Cody Dennett1; Xiaxin Ding1; Krzysztof Goelryk1; Michael Benson1; Lingfeng He1; Jian Gan1; David Hurley1; Idaho National Laboratory

11:00 AM Invited
Non-magnetic Kondo Effect in Elsta-UZr2: Xiaxin Ding1; Kaya Wei1; Tiankai Yao1; Ryan Baumbach2; Krzysztof Goelryk1; Idaho National Laboratory; National High Magnetic Field Laboratory

LIGHT METALS
TMS-DGM Symposium: A Joint US-European Symposium on Linking Basic Science to Advances in Manufacturing of Lightweight Metals — Session I

Sponsored by: Deutsche Gesellschaft für Materialkunde e.V. (DGM): German Materials Society, TMS Materials Processing and Manufacturing Division, TMS: Shaping and Forming Committee

Program Organizers: William Joost; Norbert Hort, Helmholtz-Zentrum Geesthacht

Wednesday AM March 17, 2021

Session Chair: William Joost, Pratt & Whitney

8:30 AM Stacking-fault Mediated Plasticity and Strengthening in Lean, Rare-earth Free Magnesium Alloys: Indranil Basu1; Jörg Löffler1; ETH Zurich

8:50 AM High-throughput Evaluation of Hardening Potency and Solubility of Eight Alloying Elements in Magnesium: Chuangye Wang1; Wei Zhong1; Ji-Cheng Zhao1; University Of Maryland

9:10 AM High-throughput Experimental Techniques to Measure the CRSS for Slip and Twinning in Mg and Mg Alloys: Jingya Wang1; Reza Alizadeh2; Javier Llorca3; Shanghai Jiao Tong University and IMDEA Materials Institute; Sharif University of Technology and IMDEA Materials Institute; IMDEA Materials Institute & Technical University of Madrid

9:30 AM Study of the Solidification Pathways of Hypo/hyper-eutectic Al-Ge over a Wide Range of Thermal Histories: Akanksha Sahoo1; Abdoul Aziz Bogno1; Hani Henein1; University of Alberta

9:50 AM Solute-vacancy Clustering in Aluminum: Dongwon Shin1; Jian Peng1; Sumit Bahl1; Amit Shyam1; James Haynes1; Oak Ridge National Laboratory
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All times listed are in EDT time zone (UTC-4:00).

TMS2021 VIRTUAL FINAL TECHNICAL PROGRAM

NANOSTRUCTURED MATERIALS

100 Years and Still Cracking: A Griffith Fracture Symposium — Fracture and Modeling

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Nanomechanical Materials Behavior Committee

Program Organizers: Megan Cordill, Erich Schmid Institute of Materials Science; William Gerberich, University of Minnesota; David Bahr, Purdue University; Christopher Schuh, Massachusetts Institute of Technology; Daniel Kiener, Montanuniversität Leoben; Neville Moody; Nathan Mara, University of Minnesota; Erica Lilleoedden, Helmholtz-Zentrum Geesthacht

Wednesday PM  March 17, 2021

Session Chair: Megan Cordill, Erich Schmid Institute

2:00 PM
Characterization of a Novel Crack Growth Mechanism in Ti-6Al-4V Subjected to Dwell Fatigue at Elevated Temperature: Adam Pitchak; John Rotella; Nate Levkulich; Sushant Jha; Reji John; Jim Larsen; 

2:20 PM
The Maximum Limit of Compressive Strength and Hardness of Nanocrystalline MgAl2O4 Spinel: Jessica Maita; Jacob Davis; James Wollmershauser; Edward Gorzkowski; Boris Feigelson; Seok-Woo Lee; 

2:40 PM
Reversing Griffith after 100 Years: Mechanics of the Solid-state Bonding: Yanfei Gao; Zhili Feng; 

3:00 PM
High-strength and Thermal Stability of Nanotwinned Al Alloys: Qiang Li; Sichuang Xue; Yifan Zhang; Haiyan Wang; Jian Wang; Xinghang Zhang; 

3:20 PM
Nanomechanics of Amorphous Silica: From Mechanical to Fracture Properties: Pania Newell; Truong Vo; Bang He; Michael Blum; Angelo Damone; 

2021 TMS Special Sessions — All-conference Plenary

Wednesday PM  March 17, 2021

Session Chair: Thomas Battle

12:00 PM
Introductory Comments: Thomas Battle; 2020 TMS President

12:05 PM
New Methodologies: Producing High-Quality Metal from Low-Grade Ores: Anne Lauvergeon; Founder/CEO of ALP; Chair, Ecole des Mines de Nancy; former CEO of Areva S.A.

12:45 PM Question and Answer Period

SPECIAL TOPICS

2021 TMS Special Sessions — Young Professional Workshop on Preparing a Winning Application Package

Wednesday PM  March 17, 2021

Session Chair: Megan Cordill, Erich Schmid Institute

2:00 PM
Young Professional Workshop on Preparing a Winning Application Package

ADVANCED MATERIALS

2D Materials – Preparation, Properties & Applications — Synthesis, Properties & Applications

Sponsored by: TMS Functional Materials Division, TMS: Thin Films and Interfaces Committee

Program Organizers: Nuggehalli Ravindra, New Jersey Institute of Technology; Ramana Chintalapalai, University of Texas at El Paso; Gerald Ferblantier, Icube Laboratory - Strasbourg University; Sumit Bahl, Khalifa University; Amber Shrivastava, Indian Institute of Technology Bombay

Wednesday PM  March 17, 2021

Session Chairs: Sumit Bahl, Khalifa University; Nuggehalli Ravindra (Ravi), New Jersey Institute of Technology

2:00 PM Invited
Magnetic and Transport Properties of 2D Layered Chiral Magnets: Junjie Yang; New Jersey Institute of Technology

2:25 PM Invited
Elaboration and Characterization of Thin Films of SiP Lamellar Alloys: A First Step towards 2D-SiP: Mathieu Stoffel; Alix Valdenaire; Sébastien Geiskopf; Xavier Devaux; Erwan André; Cedric Carteret; Alexandre Bouché; Michel Vergnat; Hervé Rinnert; Université De Lorraine

2:50 PM Invited
Polymer Composites Reinforced with 3D Foam of 2D Materials: Tony Thomas; Kazue Lopez; Arvind Agarwal; Florida International University
NUCLEAR MATERIALS

Accelerated Discovery and Qualification of Nuclear Materials for Energy Applications — Multiscale, Physics Based Modeling of Nuclear Materials

Sponsored by: TMS Structural Materials Division, TMS Materials Processing and Manufacturing Division, TMS: Integrated Computational Materials Engineering Committee, TMS: Nuclear Materials Committee, TMS: Additive Manufacturing Committee

Program Organizers: Yongfeng Zhang, University of Wisconsin-Madison; Adrien Couet, University of Wisconsin-Madison; Michael Tonks, University of Florida; Jeffery Aguilar, Idaho National Laboratory; Andrea Jokisaari, Idaho National Laboratory; Karim Ahmed, Texas A&M University

Wednesday PM March 17, 2021

Session Chairs: Benjamin Beeler, North Carolina State University; Shijun Zhao, City University of Hong Kong

2:00 PM Invited Overview of Advanced Fuels and Materials R&D within the US DOE-NE NEAMS Program: Chris Stanek1; 1Los Alamos National Laboratory

2:30 PM Constructing Multi-component Diffusion under Irradiation in U-Mo Alloys. Benjamin Beeler1; Bei Ye2; Yipeng Gao3; Shenyang Hu4; 1North Carolina State University; 2Argonne National Laboratory; 3Idaho National Laboratory; 4Pacific Northwest National Laboratory

2:50 PM Effective Bias for Interstitial Clusters to Cavities in BCC Fe: Yuhao Wang1; Fei Gao1; Brian Wirth1; 1University of Michigan - Ann Arbor; University of Tennessee, Knoxville

3:10 PM Microscale Measurement of Elastic Constants in Ceramics Using Picosecond Ultrasonics for High Throughput Characterization and Atomic Model Validations: Yuzhou Wang1; David Hurley2; Zilong Hua3; Amey Khanolkar2; Cody Dennett2; Marat Khafizov1; 1Ohio State University; 2Idaho National Laboratory

3:30 PM Effect of Distributed Gas Bubbles on Elastic-plastic Deformation Behavior in Polycrystalline UMo: Shenyang Hu1; Benjamin Beeler1; Douglas Burkes1; 1Pacific Northwest National Laboratory; North Carolina State University

3:50 PM Molecular Dynamics Study of Cascade Overlap Effects in FCC Ni: Samuel Morris1; Brian Wirth1; 1University of Tennessee-Knoxville

ADDITIVE TECHNOLOGIES

Additive Manufacturing Fatigue and Fracture V: Processing-Structure-Property Investigations and Application to Qualification — Microstructure-based Fatigue Studies on Additive-Manufactured Materials (Jointly Organized with Fatigue in Materials Symposium)

Sponsored by: TMS Structural Materials Division, TMS: Additive Manufacturing Committee, TMS: Mechanical Behavior of Materials Committee

Program Organizers: Nik Hrabe, National Institute of Standards and Technology; John Lewandowski, Case Western Reserve University; Nima Shamsaei, Auburn University; Mohsen Seifi, ASTM International/Case Western Reserve University; Steve Daniewicz, University of Alabama

Wednesday PM March 17, 2021

Session Chair: Garrett Pataky, Clemson University

2:00 PM Invited Automotive-specific Requirements for Additive Manufacturing of Metal Materials: Tyson Brown1; Whitney Poling1; 1General Motors

2:30 PM Fatigue Crack Growth and Fracture Toughness Behavior of Laser Powder Bed Fusion Titanium Alloys: Jamie Kruzic1; Tarik Hasib1; Xiaopeng Li1; 1University of New South Wales

2:50 PM Fatigue Crack Growth Rate of Electron Beam Melted (EBM) Titanium Alloy (Ti-6Al-4V): Effect of Crystallographic Texture and Internal Porosity: Nik Hrabe1; Jake Benzing1; Nick Derimow1; Tim Quinn1; Jolene Splett1; Lucas Koepke1; 1National Institute of Standards and Technology

3:10 PM Laser Powder Bed Fusion of Hydride-dehydride Ti-6Al-4V Powders: Effect of Hot Isostatic Pressing on Microstructure and Mechanical Properties: Mohammadreza Asherloo1; Zheng Wu2; Srujana Rao Yarasi3; Muktesh Paliwal4; Mike Marucci5; Joe Capone6; Anthony Rollett1; Amir Mostafaei1; 1Illinois Institute of Technology; 2Carnegie Mellon University; 3Kymera International - Reading Alloys; 4Ametek Inc.

3:30 PM Towards Validation for Computed Tomography Processes for Additive Manufacturing: Griffin Jones1; Jayme Keist1; Rachel Reed2; Veeraraghavan Sundar2; 1The Pennsylvania State University; 2UES Inc.
ADDITIVE TECHNOLOGIES

Additive Manufacturing of Functional, Energy, and Magnetic Materials — Advanced Manufacturing of Magnetic Materials

Sponsored by: TMS Functional Materials Division, TMS: Additive Manufacturing Committee, TMS: Magnetic Materials Committee

Program Organizers: Markus Chmielus, University of Pittsburgh; Sneha Prabha Narra, Worcester Polytechnic Institute; Mohammad Elahinia, University of Toledo; Reginald Hamilton, Pennsylvania State University; Iver Anderson, Iowa State University Ames Laboratory

Wednesday PM  March 17, 2021

2:00 PM Invited
Development of High-temperature Permanent Magnet Alloys for Additive Manufacturing: Ryan Ott1; Emrah Simsek1; Rakesh Chaudhary1; Scott McCall2; Alex Baker1; 1Ames Laboratory/Cmi; 2Lawrence Livermore National Laboratory

2:20 PM
Advanced Design for Lightweighting Wind Power Generators Using Additively Manufactured Hard and Soft Magnets: Latha Sethuraman1; Ganesh Vijayakumar1; Shreyas Ananthan3; Jonathan Keller1; M.Parans Paranthaman1; 1National Renewable Energy Laboratory; 2Oak Ridge National Laboratory

2:40 PM
An Additive Manufacturing Design Approach to Achieving High Strength and Ductility in Traditionally Brittle Alloys via Laser Powder Bed Fusion: Andrew Kustas1; Tomas Babuska1; Kyle Johnson1; Trevor Verdonik1; Samuel Subia1; Brandon Krick1; Donald Susan1; 1Sandia National Laboratories; 2Lehigh University; 3Florida State University

3:00 PM
Cold Spray of Permanent Magnets: Alexander Baker1; Richard Thuss1; Nathan Woollett1; Elise Stavrou1; Scott McCall1; Harry Radousky1; 1Lawrence Livermore National Laboratory; 2TTEC LLC

3:20 PM
Establishing Fundamentals for Laser Metal Deposition of Functional Ni-Mn-Ga Alloys: Effect of Rapid Solidification on Microstructure and Phase Transformation Characteristics: Emily Filcraft1; Jakub Toman1; Markus Chmielus2; Carolin Fink1; 1Ohio State University; 2University of Pittsburgh

ADDITIVE TECHNOLOGIES

Additive Manufacturing: Beyond the Beam II — Material Deposition for Sinter Densification

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Powder Materials Committee, TMS: Additive Manufacturing Committee

Program Organizers: Paul Prichard, Kennametal Inc.; James Paramore, US Army Research Laboratory; Peeyush Nandwana, Oak Ridge National Laboratory; Nihan Tuncer, Desktop Metal

Wednesday PM  March 17, 2021

Session Chair: Nihan Tuncer, Desktop Metal

2:00 PM
Wall Thickness Effects on Dimensional Variation, Microstructure, and Mechanical Properties in Stainless Steel Samples Manufactured Using a Bound Metal Deposition (BMD) Sintering Process: Joy Forsmark1; Emily Wolbeck1; Ignacio Arretche1; Eric Poczatek1; Yun Bai1; Hiroko Ohtani1; Sushmit Chowdhury1; 1Ford Motor Company

2:20 PM
Bi-metal Composite Material for Plastic Injection Molding Tooling Applications via Fused Filament Fabrication Process: Maxim Seleznev1; Joe Roy-Mayhew1; 1Markforged Inc.

2:40 PM
Direct Ink Writing of Ceramic Architected Materials: Raphael Thiraux1; Lorenzo Valdevit1; 1University of California, Irvine

3:00 PM
Beyond the Beam Additive Manufacturing of Titanium Alloys: James Paramore1; Brady Butler1; Matthew Dunstan1; Daniel Lewis1; Michael Hurst1; Laura Moody1; 1U.S. Army Research Laboratory

3:20 PM
Spatial Architecture of Copper Fillers in Additively Manufactured PLA-matrix Composite: Nazmul Haque1; Hadi Noori1; 1Oklahoma State University
ADDITIVE TECHNOLOGIES

Additive Manufacturing: Solid-State Phase Transformations and Microstructural Evolution — Titanium Alloys

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Additive Manufacturing Committee, TMS: Phase Transformations Committee, TMS: Shaping and Forming Committee

Program Organizers: Biji-Na Kim, Carpenter Additive; Andrew Wasserman, University of Arizona; Chantal Sudbrack, National Energy Technology Laboratory; Eric Lass, University of Tennessee-Knoxville; Katerina Christofi-dou, University of Sheffield; Peeyush Nandwana, Oak Ridge National Laboratory; Rajarshi Banerjee, University of North Texas; Whitney Poling, General Motors Corporation; Yousub Lee, Oak Ridge National Laboratory

Wednesday PM March 17, 2021

Session Chairs: Raj Banerjee, University of North Texas; Biji-Na Kim

2:00 PM Invited Prediction of Large Regions of Microstructure and Phase Distributions for Additively Manufactured Alloys Prediction of the Microstructure, Resultant Phases and Hardness of Additively Manufactured Ti6Al4V: Shunyu Liu1; Kyung-min Hong2; Yung Shint3; 1Purdue University

2:50 PM Controlled Thermal Post-processing of Additively Manufactured Ti-6Al-4V Parts in Order to Enhance their Mechanical Performance: Frederico Rossi Kaschel1; Rajani Vijayaraghavan1; Patrick McNally1; Mert Celikin1; Denis Dowling1; 1-Form Advanced Manufacturing Centre

3:30 PM Microstructure Control in a Beta Titanium Alloy via Selective Laser Melting: Srawya Tekumalai1; Alex Tan Sui Wei2; Krishnan Manickavasagam1; Matteo Seta1; Nanyang Technological University; 1Advanced Remanufacturing Technology Centre

3:50 PM Second Phase Precipitation during AM Processing of Metastable Beta Ti Alloys: Mohan Sai Kiran Nartu1; Srinivas Aditya Mantri1; Abhishek Sharma1; Eugene Ivanov2; Kyu Cho3; Brandon McWilliams4; Narendra Dahotre5; Rajarshi Banerjee5; 1University of North Texas; 2Texas A&M University; 3University of Maryland; 4SMD; 5US Army Research Laboratory

4:10 PM Main Microstructural Characteristics of Ti-6Al-4V Components Produced via Electron Beam Additive Manufacturing (EBAM): Silvia Lopez-Castaño1; Philippe Emile2; Claude Archambeau2; Florence Pettinari-Sturmel3; Gérard Joulin4; 1CEMES-CNRS / Airbus Operations S.A.S.; 2Airbus Operations S.A.S.; 3CEMES-CNRS

CHARACTERIZATION

Advanced Characterization Techniques for Quantifying and Modeling Deformation — Session VI

Sponsored by: TMS Extraction and Processing Division, TMS Materials Processing and Manufacturing Division, TMS Structural Materials Division, TMS: Advanced Characterization, Testing, and Simulation Committee, TMS: Materials Characterization Committee

Program Organizers: Rodney McCabe, Los Alamos National Laboratory; Marko Knezevic, University of New Hampshire; Irene Beyerlein, University of California-Santa Barbara; Wolfgang Pantleon, Technical University of Denmark; C. Tasan, Massachusetts Institute of Technology; Anjul Kumar Mariyappan, Los Alamos National Laboratory; Olivia Underwood, Sandia National Laboratories

Wednesday PM March 17, 2021

2:00 PM Invited Dominant Microstructural Features for Structural Properties in Additively Manufactured AISI107Mg: Jay Carroll1; Christopher Laursen1; Philip Noell2; John Emery1; David Moore3; Garrett Pataky4; 1Sandia National Laboratories; 2Clemson University

2:30 PM Invited Investigation of Porosity, Texture, and Damage Evolution of Additively Manufactured 316L Stainless Steel during In-situ Tensile Loading Using High Energy X-rays: Aerial Murphy-Leonard1; David Rowenhorst1; 1Naval Research Laboratory

3:00 PM Temperature-dependent Intermittent Microplasticity: Quentin Rizzardi1; Cameron McElfresh2; Jaime Marian3; Douglas Stauffer4; Robert Mazz5; 1University of Illinois Urbana Champaign; 2University of California Los Angeles; 3Bruker Nano Surfaces; 4Federal Institute for Materials Research and Testing (BAM)

3:20 PM Characterization and Modeling of Fatigue-induced Grain Growth in Ultrafine Grained Ni: Alejandro Barrios1; Eblakpo Kakandar2; Xavier Maeder3; Gustavo Castelluccio4; Olivier Pierron5; 1Georgia Institute of Technology; 2Cranfield University; 3Empa, Swiss Federal Laboratories for Materials Science and Technology

3:40 PM Invited Microstructure Evolution of a Stainless Steel Produced via Laser Powder Bed Fusion Subjected to Post-Fabrication Treatments: Gwenelle Proust1; Wen Hao Kan2; Quentin Portella2; Mahdi Chemkh1; Magnus Garbrecht1; Delphine Retraint1; 1University of Sydney; 2Monash University; 3University of Technology of Troyes; 4EPF

4:10 PM Informing Mechanical Model Development Using Lower-dimensional Descriptions of Microstructural Evolution: Darren Pagan1; Gideon Schmidt2; Andy Borum2; Timothy Long3; Matthew Miller4; Armand Beaudoin5; 1Pennsylvania State University; 2Cornell University; 3Cornell High Energy Synchrotron Source

4:30 PM Effects of Room Temperature Interface Sliding in TIMETAL-407 (Ti-407): Zachary Kloenne1; Gopal Viswanathan2; Stoichko Antonov2; Stephen Fox3; Michael Loretto3; Hamish Fraser3; 1Ohio State University; 2Max-Planck-Institut für Eisenforschung GmbH; 3TIMET; 4University of Birmingham
4:50 PM
Combined In-situ Neutron and Synchrotron X-ray Diffraction Study of Tensile Deformation and Texture Evolution in a Magnesium Alloy: Tingkun Liu1; Aashish Rohatgi1; Ke An2; Yang Ren3; Bita Ghaffari4; Eric Barker4; Arun Devaraj1; 1Pacific Northwest National Laboratory; 2Oak Ridge National Laboratory; 3Argonne National Laboratory; 4Ford Motor Company

5:10 PM
Modeling the Effects of Free Surfaces on Twinning Behavior: Brandon Leu; M Arul Kumar; Irene Beyerlein; 1University of California Santa Barbara; 2Los Alamos National Laboratory

ADVANCED MATERIALS

Advanced Functional and Structural Thin Films and Coatings — Thin Films and Nanostructures for Optoelectronics I

Sponsored by: TMS Functional Materials Division, TMS: Thin Films and Interfaces Committee

Program Organizers: Adele Carrado, IPCMS - CNRS; Ramana Chintalapalle, University of Texas at El Paso; Gerald Ferblantier, ICube Laboratory - Strasbourg University; Nancy Michael, University of Texas at Arlington; Karine Mougin, Is2m CNRS; Heinz Paikowski, Clausthal University of Technology; Nuggehalli Ravindra, New Jersey Institute of Technology; Vikas Tomar, Purdue University

Wednesday PM  March 17, 2021

Session Chairs: Gerald Ferblantier, ICUBE; Ramana Chintalapalle, UTEP

2:00 PM  Keynote
Multi-photon Microfabrication: from Direct Laser Writing to 4D Microprinting: Arnaud Spangenberg; Is2m CNRS

2:45 PM
Facile Synthesis of 3D Dendritic Gold Nanostructures Assisted by a Templated Growth Process: Application at the Detection of Traces of Molecules: Karine Mougin; Pierre Bauer; Is2m CNRS

3:10 PM  Keynote
Highly Doped Si Metasurfaces Obtained by Coupling Top Down and Out of Equilibrium Approaches: Jean-Marie Poumirol; Clément Majorel; Nicolas Chery; Meiling Zhang; Christian Girard; Nicolas Mallet; Filadelfo Cristiano; Peter Wiecha; Guilhem Larrieu; Sébastien Kerdiles; Anne-Sophie Royet; Pablo Acosta; Vincent Paillard; Caroline Bonafos; Cemes CNRS; LAAS-CNRS; CEA-LETI

3:55 PM
Key Mechanical Test Methods to Characterize Optically Clear Adhesives: Mobin Yahyazadehfar; Aref Samadi; Leopoldo Carbajal; Mark Lamontia; DuPont

4:15 PM
Spin Coating of Doped-silica on Czochralski-Silicon for Enhanced Radiative Properties: Sufian Abedrabbo; EL Mostafa Benchafia; Anthony Fiory; Nuggehalli Ravindra; Khalifa University; New Jersey Institute of Technology

ENERGY & ENVIRONMENT

Advanced Magnetic Materials for Energy and Power Conversion Applications — Magnetocaloric and Energy Harvesting

Sponsored by: TMS Functional Materials Division, TMS: Magnetic Materials Committee

Program Organizers: Richard Beddingfield, North Carolina State University; Daniel Salazar, BCMaterials; Alex Leary, NASA Glenn Research Center; Huseyin Ucar, California Polytechnic University; Yongmei Jin, Michigan Technological University; Arcady Zhukov, University of the Basque Country

Wednesday PM  March 17, 2021

Session Chair: Huseyin Ucar, California Polytechnic University

2:00 PM
Bulk-Nano Spark Plasma Sintered Fe-Si-B-Cu-Nb Based Magnetic Alloys: Taban Larimian; Tushar Borkar; Varun Chaudhary; Raju V Ramanujan; Rajeev Gupta; Jijo Christudasjustus; Cleveland State University; Nanyang Technological University; University of Akron

2:20 PM Invited
Characterization of Binder Jet 3D Printed and Direct Laser Deposited Functional Magnetic Materials: Markus Chmielus; Jakub Toman; Pierangeli Rodriguez de Vecchisi; Tyler Paplham; Aaron Acierno; Katerina Kimes; Erica Stevens; University of Pittsburgh

2:50 PM
Magnetics and Magnetoelastics of Ce-doped Cobalt Ferrite Processed under the Influence of Magnetic Field: Monaji Reddy; Tanjore Jayaraman; Neeraj Pabli; Dibakar Das; University of Hyderabad; University of Michigan-Dearborn

3:10 PM
Overview of Material Thermal Properties for the Advancement of Machine Learning Based Magnetic Design: Zachery Miller; North Carolina State University

3:50 PM Invited
Spin Crossover Complexes as Multicaloric Materials: Steven Vallone; Karl Sandeman; The City University of New York
**ENERGY & ENVIRONMENT**

**Advanced Materials for Energy Conversion and Storage VII — Energy Storage with Emphasis on Batteries I**

*Sponsored by:* TMS Functional Materials Division, TMS: Energy Conversion and Storage Committee

**Program Organizers:** Jung Pyung Choi, Pacific Northwest National Laboratory; Soumendra Basu, Boston University; Armit Pandey, Lockheed Martin Space; Paul Ohodnicki, University of Pittsburgh; Kyle Brinkman, Clemson University; Partha Mukherjee, Purdue University; Surojit Gupta, University of North Dakota

**Wednesday PM**

**March 17, 2021**

**Session Chairs:** Partha Mukherjee, Purdue University; Pallab Barai, Argonne National Laboratory

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**2:00 PM**

**Lithium Solid State Batteries as Next Generation Energy Storage Devices:** Pallab Barai1; Ahn Ngo1; Larry Curtiss1; Venkat Srinivasan1; 1Argonne National Laboratory

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**2:30 PM**

**A Simple Method to Fabricate Cu6Sn5 Anodes for Lithium-ion Batteries:** Xin Tan1; Qinfen Gu2; Stuart McDonald1; Kazuhiro Nogita1; 1University of Queensland; 2Australian Synchrotron, ANSTO

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**2:50 PM**

**Bio-inspired, Machine Learning-enabled Vascular Structures for Fast-Charging Lithium-ion Batteries:** Po-Chun Hsu1; 1Duke University

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**3:10 PM**

**Coating Yeast-derived Carbon Nanotubes on Separators to Suppress Li-S Battery Shuttle Effect:** Jiajun He1; Zan Gao1; Xiaodong Li1; 1University of Virginia

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**3:30 PM**

**Electrochemically Grown Energy Dense Cathodes for Li and Na Ion Battery:** Arghya Patra1; Omar Kazi1; Jerome Davis1; Benjamin Zahiri1; Paul Braun1; 1University of Illinois at Urbana-Champaign

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**3:50 PM**

**Lithium-sulfur Batteries Featuring High Sulfur Loading and Low Electrolyte:** Sheng-Heng Chung1; Yun-Chung Ho1; 1National Cheng Kung University

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**4:10 PM**

**Mesoscale Origin of Morphological Instability in All-Solid-State Lithium Batteries:** Bairav Vishnugopi1; Partha Mukherjee1; 1Purdue University

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**CHARACTERIZATION**

**Advanced Real Time Imaging — Mechanical (Joint session with Mechanical Response of Materials Investigated through Novel In-situ Experiments and Modeling Symposium)**

*Sponsored by:* TMS Functional Materials Division, TMS Structural Materials Division, TMS: Advanced Characterization, Testing, and Simulation Committee, TMS: Alloy Phases Committee, TMS: Biomaterials Committee

**Program Organizers:** Jinichiro Nakano, US Department of Energy National Energy Technology Laboratory; David Alman, National Energy Technology Laboratory; Il Sohn, Yonsei University; Hiroyuki Shibata, Imram, Tohoku University; Antoine Allanore, Massachusetts Institute of Technology; Noritaka Saito, Kyushu University; Anna Nakano, US Department of Energy National Energy Technology Laboratory; Zuotai Zhang, Southern University of Science and Technology; Candan Tamerler, University of Kansas; Bryan Webler, Carnegie Mellon University; Wangzhong Mu, KTH Royal Institute of Technology; David Veytsset, Stanford University

**Wednesday PM**

**March 17, 2021**

**Session Chairs:** David Alman, USDOE National Energy Technology Laboratory; Robert Wheeler, Microtesting Solutions LLC

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**2:00 PM Invited**

**Real Time Studies of the Mechanics of Spherical Microparticles:** Lewei He1; Xuchen Wang1; David Veytsset1; Mostafa Hassan1; 1Cornell University; 2MIT

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**2:20 PM**

**Determination of Uranium Oxidation Kinetics Through White-Light Interferometry:** Yadvik Ideli1; Wigbert Siekhaus1; Kerri Blobaum1; William McLean1; 1Lawrence Livermore National Laboratory

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**2:40 PM**

**The Accurate Measurement of Elastic Modulus and Hardness of Different Cross-linked SU-8 Polymer:** Prahash Sarar1; Prita Pant1; Hemant Nanavati1; 1Indian Institute of Technology Bombay

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**3:00 PM**

**Lubrication Mechanism of Phosphonium Phosphate Ionic Liquid: a Combined In Situ Atomic Force Microscopy and Ex Situ Surface Spectroscopic Study:** Filippo Mangolini1; Zixuan Li1; Oscar Morales-Collazo1; Jerzy Sadowski1; Hugo Celio1; Andrei Dolocan1; Joan Brennecke1; 1University of Texas at Austin; 2Brookhaven National Laboratory

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**3:20 PM Invited**

**Mapping Local Strains during In Situ SEM Deformation of Nanoporous Materials:** Kevin Schmalbach1; Nathan Maro1; Antonia Antoniou1; 1University of Minnesota; 2Georgia Institute of Technology

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**3:40 PM**

**Local Shock Viscosity Measurement in Composites Using In-situ Time-Gated Raman Spectroscopy:** Abhijeet Dhiman1; Ayotomi Olokun1; Nolan Lewis1; Vikas Tornar1; 1Purdue University
CHARACTERIZATION

Advanced Real Time Imaging — Mechanical (Joint session with the ‘Mechanical Response of Materials Investigated through Novel In-situ Experiments and Modeling’ Symposium)

Sponsored by: TMS Functional Materials Division, TMS Structural Materials Division, TMS: Advanced Characterization, Testing, and Simulation Committee, TMS: Alloy Phases Committee, TMS: Biomaterials Committee

Program Organizers: Jinichiro Nakano, US Department of Energy National Energy Technology Laboratory; David Alman, National Energy Technology Laboratory; II Sohn, Yonsei University; Hiroyuki Shibata, Iimram, Tohoku University; Antoine Allanore, Massachusetts Institute of Technology; Nortakalo Saito, Kyushu University, Anna Nakano, US Department of Energy National Energy Technology Laboratory; Zuotai Zhang, Southern University of Science and Technology; Candan Tamerler, University of Kansas; Bryan Webler, Carnegie Mellon University; Wangzhong Mu, KTH Royal Institute of Technology; David Veyssset, Stanford University

Wednesday PM  March 17, 2021

Session Chairs: David Alman, USDOE National Energy Technology Laboratory; Robert Wheeler, Microtesting Solutions LLC

2:00 PM Invited
Real Time Studies of the Mechanics of Spherical Microparticles: Lewei He 1; Xuchen Wang 1; David Veyssset 2; Mostafa Hassani 1; 1Cornell University; 2MIT

2:20 PM
Determination of Uranium Oxidation Kinetics Through White-Light Interferometry: Yaakov Idell 1; Wigbert Siekhaus 1; Kerri Blobaum 1; William McLean 1; 1Lawrence Livermore National Laboratory

2:40 PM
The Accurate Measurement of Elastic Modulus and Hardness of Different Cross-linked SU-8 Polymer: Pratosh Sarhar 1; Prita Pant 1; Hemant Nanavati 1; 1Indian Institute of Technology Bombay

3:00 PM
Lubrication Mechanism of Phosphonium Phosphate Ionic Liquid: a Combined In Situ Atomic Force Microscopy and Ex Situ Surface Spectroscopic Study: Filippo Mangolini 1; Zixuan Li 1; Oscar Morales-Collazo 1; Jerzy Sadowski 1; Hugo Cello 1; Andrei Dolocan 1; Joan Brennecke 1; 1University of Texas at Austin; 2Brookhaven National Laboratory

3:20 PM Invited
Mapping Local Strains during In Situ SEM Deformation of Nanoporous Materials: Kevin Schmalbach 1; Nathan Mara 1; Antonia Antoniou 1; 1University of Minnesota; 2Georgia Institute of Technology

3:40 PM
Local Shock Viscosity Measurement in Composites Using In-situ Time-Gated Raman Spectroscopy: Abhijeet Dhiman 1; Ayotomi Otokuri 1; Nolan Lewis 2; Vikas Tomar 1; 1Purdue University

MATERIALS PROCESSING

Advances in Surface Engineering III — Session II

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Surface Engineering Committee

Program Organizers: Tushar Borkar, Cleveland State University; Arif Mubarok, PPG; Rajeev Gupta, North Carolina State University; Sandip Harimkar, Oklahoma State University; Bharat Jasthi, South Dakota School of Mines & Tech

Wednesday PM  March 17, 2021

Session Chairs: Praful Bari, Oklahoma State University; Tushar Borkar, Cleveland State University

2:00 PM
Electropolishing of Bronze in Concentrated H3PO4: Geng Ni 1; Choong-un Kim 1; 1University of Texas at Arlington

2:20 PM
Enhancement of Liquid Metal Wetting by Patterning Particles on Oxide Surfaces: Jiyun Park 1; Jason Nicholas 2; Yue Qi 1; 1Brown University; 2Michigan State University

2:40 PM
Magneton Sputtered Micro-lattice Structures: Expanding the Materials Working Space of Lattice Materials: Alina Garcia Toormina 1; Chantal Kerpiers 2; Andrea Hodge 1; Ruth Schwaiger 1; 1University of Southern California; 2Karlsruhe Institute of Technology; 3Karlsruhe Institute of Technology, Forschungszentrum Juelich GmbH

3:00 PM
Modifying Corrosion Performance of Plasma Electrolytic Oxidation (PEO) Coatings using Potassium Hydroxide (KOH) and Potassium Fluoride (KF) Additives: Navid Attarzadeh 1; Maryam Molaei 1; Arash Fattah-althosseini 1; 1University of Texas at El Paso; 2Bu-All Sina University

3:20 PM
Nitriding-assisted Surface Enhancement of Multi-principal Element Alloys: Yu-Hsuan Lin 1; David Poerschke 1; 1University of Minnesota

3:40 PM
Phase-field Approach on Modeling Wetting of Rough Surfaces: Dong-Uk Kim 1; Michael Tonks 1; 1University of Florida

4:00 PM
The Role of Particle Passivation Layers in the Critical Adhesion Velocity of Cold Sprayed Powders: Cameron Crook 1; Lorenzo Valdevit 1; Daniel Mumm 1; Diran Apelian 1; 1University of California, Irvine

4:20 PM
Trace Element Distributions in Al-Zn Based Coating Alloys on Steel Substrates: Dongdong Qu 1; Matthew Gear 2; Nega Setargew 2; Wayne Renshaw 2; Stuart McDonald 1; David StJohn 1; David Paterson 1; Kazuhiro Negita 1; 1The University of Queensland; 2BlueScope Steel Ltd; 3Australian Synchrotron
MATERIALS DESIGN

Advances in Titanium Technology — Phase Transformation and Deformation in Titanium Alloys

Sponsored by: TMS Structural Materials Division, TMS: Titanium Committee

Program Organizers: Don Li, Howmet Engineered Products; Yufeng Zheng, University of Nevada-Reno; Peeyush Nandwana, Oak Ridge National Laboratory; Matthew Dunstan, US Army Research Laboratory

Wednesday PM March 17, 2021

Session Chair: Yufeng Zheng, University of Nevada Reno

2:00 PM Hierarchical Twinning Microstructure in Beta Titanium Alloys: Dian Li1; Wenrui Zhao2; Zachary Kloenne3; Stoichko Antonov4; Dong Wang5; Yipeng Gao2; Yanzhi Wang5; Hamish Fraser2; Yufeng Zheng2; 1University of Nevada, Reno; 2Ohio State University; 3Max-Planck-Institut für Eisenforschung; 4Xi'an Jiaotong University

2:20 PM How Microtextured Regions Influence the Early Slip Activity in Ti Alloys: Joseph Wendorf1; Jean-Charles Stinvil2; Marie-Agathe Charpaigne3; McLean Echlin3; Andrew Polonsky1; Paul Dawson1; Tresa Pollock1; 1University of California Santa Barbara; 2Cornell University

3:00 PM Localization of Plastic Strain in Microtextured Regions of Ti-6Al-4V: Jonathan Cappola1; Jean-Charles Stinvil2; Marie-Agathe Charpaigne3; Patrick Callahan4; McLean Echlin3; Tresa Pollock1; Adam Pilchak1; Matthew Kasemer1; 1University of Alabama; 2University of California, Santa Barbara; 3US Naval Research Laboratory; 4Air Force Research Laboratory

3:20 PM Anomalous c+a Dislocation Activity in TiMETAL-407 (Ti-407): Zachary Kloenne1; Gopal Viswanathan1; Bo Pang1; Stephen Fox1; Michael Loretto1; Hamish Fraser1; 1Ohio State University; 2University of Birmingham; 3TIMET

3:40 PM Colony Orientation Dependence in the Deformation and Spheroidization of Two-Phase Titanium Alloys: Benjamin Begley1; Cameron Frampton1; Thomas Spradley1; Jennifer Perez1; Adam Pilchak1; Victoria Miller1; 1University of Florida; 2Air Force Research Laboratory

4:00 PM Effect of Grain Orientation on Slip Transmission in Titanium: An Analysis of Strain Localization within Slip Bands: Behnam Ahmadinia1; Irene Beyerlein1; 1University of California, Santa Barbara

MATERIALS DESIGN

AI/ML Data Informatics: Design of Structural Materials — AI/ML Frameworks; Grain Growth and Simulation Integration


Program Organizers: Jennifer Carter, Case Western Reserve University; Amit Verma, Carnegie Mellon University; Natasha Vermaak, Lehigh University; Jonathan Zimmerman, Sandia National Laboratories; Darren Pagan, Pennsylvania State University; Chris Haines, Ccdc Army Research Laboratory; Judith Brown, Sandia National Laboratories

Wednesday PM March 17, 2021

2:00 PM Invited Data Science Approaches for Microstructure-property Connections in Structural Materials: Elizabeth Holm1; bo Lei2; Katelyn Jones1; Ryan Cohn1; Nan Gao2; 1Carnegie Mellon University

2:30 PM Invited Physics-informed Data-driven Machine Learning Approach for Mesoscale Materials Science: Reju Polkhare1; Anup Pandey1; Alexander Scheinker1; 1Los Alamos National Laboratory

3:00 PM Invited Combined Statistical and Energetic Approach to Understand Grain Boundary Embrittlement for Segregation Engineering: Doruk Aksoy1; Remi Dingreville2; Douglas Spear1; 1University of Florida; 2Sandia National Laboratories

3:30 PM Machine Learning Approach to Understanding Abnormal Grain Growth: Ryan Cohn1; Megan Shah1; Adam Pilchak1; Eric Payton1; Anthony Rollett1; Elizabeth Holm1; 1Carnegie Mellon University; 2Air Force Research Laboratory

3:50 PM Machine Learning for the Recognition and Synthesis of Polycrystalline Metal Microstructures: Neal Brodnik1; Devendra Jangdi1; Amil Khan1; Michael Goebel1; McLean Echlin1; B. S. Manjunath1; Samantha Daly1; Tresa Pollock1; 1University of California Santa Barbara

4:10 PM Invited Using Machine Learning for Targeted Alloy Design in High Entropy Composition Spaces: Tanner Kirk1; Richard Coupertwaite1; Guillermo Vazquez2; Daniel Saucedo3; Pejman Honarmandi1; Prashant Singh1; Raymundo Arroyave1; 1Texas A&M University; 2Los Alamos National Laboratory

4:30 PM Unsupervised ML to Bridge Molecular Dynamics and Phase field Simulations: Sukriti Manna1; Henry Chan1; Subramanian Sankaranarayanan1; 1Argonne National Laboratory
**MATERIALS DESIGN**

**AI/Data informatics: Tools for Accelerated Design of High-temperature Alloys — High Temperature Mechanical Properties**

**Sponsored by:** TMS Materials Processing and Manufacturing Division, TMS; Integrated Computational Materials Engineering Committee, TMS; Computational Materials Science and Engineering Committee

**Program Organizers:** Michael Titus, Purdue University; Pinar Acar, Virginia Tech; Andrew Detor, GE Research; James Saal, Citrine Informatics; Dongwon Shin, Oak Ridge National Laboratory

**Wednesday PM March 17, 2021**

**Session Chairs:** Andrew Detor, GE Research; Dongwon Shin, Oak Ridge National Laboratory; Sudeepta Mondal, Argonne National Laboratory

**2:00 PM**
Elastic Properties Machine-learning-based Descriptor for a Refractory High Entropy Alloy: **Guillermo Vazquez**; Prashant Singh; Daniel Sauceda; Raymundo Arroyave; 1Texas A&M University; 2AMES Laboratory

2:20 PM
Predicting Yield Stress of High Temperature Alloys via Computer Vision and Machine Learning: **Nan Gao**; Zongrui Pei; Youhai Wen; Michael Gao; Elizabeth Holm; 1Carnegie Mellon University; 2National Energy Technology Laboratory

2:40 PM
Revealing Nanoscale Features Controlling Diffusion Within Multi-component Alloys through Machine Learning: **S. Sina Moeini-Ardakani**; Ryan W. Penny; Ju Li; A. John Hart; 1MIT

3:00 PM
Uncertainty Quantification for Thermo-mechanical Behavior of Aircraft Engine Materials in Elevated Temperatures: **Arunmurugan Senthamarai**; Pinar Acar; 1Virginia Tech

3:20 PM Invited
Coupling of Data Mining, Thermodynamics and Multi-objective Genetic Algorithms for the Design of High-temperature Alloys: **Franc Tancrèt**; Edern Menou; Gerard Ramstein; 1University of Nantes; 2Safran

3:50 PM
Machine Learning Augmented Predictive & Generative Models for Rupture Life in High Temperature Alloys: **Madison Wentzlich**; Osman Mamun; Ram Devanathan; Kelly Rose; Jeffrey Hawk; 1Leidos Research Support Team for the National Energy Technology Laboratory; 2Pacific Northwest National Laboratory; 3National Energy Technology Laboratory

4:10 PM
Determining Solute Site Preference and Correlations to Antiphase Boundary Energy in Ni-based Superalloys: **Enze Chen**; Tao Wang; Mario Epler; Timofey Frolov; Mark Asta; 1University of California, Berkeley; 2Carpenter Technology Corporation; 3Lawrence Livermore National Laboratory

**MATERIALS DESIGN**

**Algorithm Development in Materials Science and Engineering — Computational Simulations and Algorithms for Study Structure-Processing Relations**

**Sponsored by:** TMS Materials Processing and Manufacturing Division, TMS; Computational Materials Science and Engineering Committee, TMS; Integrated Computational Materials Engineering Committee, TMS; Phase Transformations Committee, TMS; Solidification Committee

**Program Organizers:** Mohsen Asle Zaeem, Colorado School of Mines; Mikhail Mendelev, KBR; Bryan Wong, University of California, Riverside; Ebrahim Asadi, University of Memphis; Garrett Tucker, Colorado School of Mines; Charudatta Phatak, Argonne National Laboratory; Bryce Meredig, Citrine Informatics

**Wednesday PM March 17, 2021**

**Session Chair:** Ebrahim Asadi, University of Memphis

**2:00 PM**
Real Time Boundary Condition Acquisition and Integration of Heats of Fusion and Phase Transformation Using an Implicit Finite Element Newton Raphson Based Approach for Thermal Behavior Prediction in Additively Manufactured Parts: **Deepankar Pal**; Madhu Keshavamurty; Grama Bhashyam; 1Ansys

2:20 PM
Global Local Modeling of Melt Pool Dynamics and Bead Formation in Laser Bed Powder Fusion Process Using a Comprehensive Multi-Physics Simulation: **Faiyaz Ahsan**; Jafar Razmi; Leila Ladani; 1Arizona State University

2:40 PM
Multi-scale Modeling of Hierarchical Microstructure in Ceramic Composites: **Matthew Guziewski**; David Montes de Oca Zapiai; Jennifer Synowczynski-Dunn; Remi Dingreville; Shawn Coleman; 1Army Research Laboratory; 2Sandia National Laboratory

3:00 PM
Analysis of Dendrite Growth and Microstructure Evolution during Solidification of Al 6061 via 2D and 3D Phase Field Models: **Neil Bailey**; **Yung Shin**; 1Purdue University

3:20 PM
LIGHT METALS

Aluminum Alloys, Processing and Characterization — Processing Innovation, New Applications and Products

Sponsored by: TMS Light Metals Division, TMS: Aluminum Committee

Program Organizer: Dimitry Sediako, University of British Columbia

Wednesday PM March 17, 2021

Session Chair: Xiaochun Li, University of California, Los Angeles

2:00 PM Shear Assisted Processing and Extrusion of Aluminum Alloy 7075 Tubing at High Speed: Scott Whalen¹; Md. Reza-E-Rabby²; Tianhao Wang¹; Xiaolong Ma¹; Timothy Roosendaal¹; Darrell Herling¹; Nicole Overman¹; Brandon Taysom¹; ¹Pacific Northwest National Laboratory

2:20 PM Shear Assisted Processing and Extrusion of Thin-walled AA 6063 Tubing: Brandon Taysom¹; Scott Whalen¹; MD Reza-E-Rabby²; Tim Skszek²; Massimo DiCiano²; ¹Pacific Northwest National Laboratory; ²Magna International

2:40 PM Influence of the Quench Rate and Trace Elements on 6XXX Alloys: Alexander Wimmer¹; Annika Haemmerle¹; ¹Neuman Aluminium

3:00 PM The Combined Method for Producing Long Products from Aluminium and Aluminium Alloys: Alexander Salnikov¹; Christoph Heinzel¹; ¹RUSAL ETC

3:20 PM Effect of Extrusion Process on Mechanical, Welding and Corrosion Behaviour of 6XXX Series of Aluminium Alloys: Mehmet Bugra Gunes¹; Murat Konar¹; Gorkem Ozcelik¹; Tolga Demirkiran¹; ¹Asas Aluminium

3:40 PM TIG Welding of Dissimilar High-Strength Aluminum Alloys 6061 and 7075 with Nano-treated Filler Wires: Narayanan Murati²; Xiaochun Li¹; ¹UCLA Department of Materials Science and Engineering

4:00 PM Question and Answer Period

LIGHT METALS


Sponsored by: TMS Light Metals Division, TMS: Aluminum Committee

Program Organizers: Arne Ratvik, SINTEF; Marc Dupuis, GeniSim Inc.; Kristian Etienne Einarsrud, Norwegian University of Science and Technology

Wednesday PM March 17, 2021

Session Chair: Kristian Etienne Einarsrud, ¹Norwegian University of Science and Technology (NTNU)

2:00 PM Introductory Comments: Aluminum Reduction Technology Across the Decades: An LMD Symposium Honoring Alton T. Tabereaux and Harald A. Øye: Kristian Etienne Einarsrud; ¹Norwegian University of Science and Technology

2:05 PM Forty Years of Trondheim International Course on Process Metallurgy of Aluminium: Michel Reverdy¹; Vinko Potocnik²; ¹Emirates Global Aluminium; ²Vinko Potocnik Consultant Inc

2:45 PM Establishing a Chemical Model of the Melt in the Cathode: Lorentz Petter Lossius¹; Harald Arnljot Øye²; ¹Hydro Aluminium AS; ²NTNU

3:05 PM Heating New Anodes Using the Waste Heat of Anode Butts Establishing the Interface Thermal Contact Resistance: Marc Dupuis¹; Kristian Etienne Einarsrud²; Henrik Gudbrandsen²; ¹GeniSim Inc.; ²Norwegian University of Science and Technology (NTNU)

3:25 PM Forty Years of Cathode Block Evolution at EGA: Michel Reverdy¹; Mustafa Mustafa²; Mohamed Boraie²; ¹Emirates Global Aluminium

3:45 PM Wetting of Carbon Cathodes by Molten Electrolyte and Aluminium: Samuel Senanu¹; Arne Petter Ratvik²; Zhaohui Wang²; Tor Grande²; ¹SINTEF; ²NTNU Norwegian University of Science and Technology

4:05 PM Question and Answer Period
Biomaterials Science — Biological Materials Science II

Sponsored by: TMS Functional Materials Division, TMS Structural Materials Division, TMS: Biomaterials Committee

Program Organizers: David Restrepo, University of Texas at San Antonio; Steven Nalawey, University of Utah; Jing Du, Pennsylvania State University; Ning Zhang, University of Alabama

Wednesday PM March 17, 2021

Session Chairs: Jing Du, Penn State University; Ning Zhang, The University of Alabama

2:00 PM Invited Cancer Testbed for Breast and Prostate Cancer Bone Metastasis: Kalpana Katti1; Haneesh Jasuja1; Sumanta Kar1; Dinesh Katti1; North Dakota State University

2:30 PM Conformational Transition of G-Actin Subunits Controls the Deformation Behavior of Actin Filament: Sharad Jaswandkar1; Kalpana Katti1; Dinesh Katti1; North Dakota State University

2:50 PM Nanotechnology Enhanced Novel Bioresorbable Zn Alloy Implant for Short Bowel Syndrome Treatment: Jingke Liu1; Zeyi Guan1; Yuxin Zeng1; Chase Linsley1; James Dunn1; Benjamin Wu1; Xiaochun Li1; University of California, Los Angeles; 2Stanford University School of Medicine

3:10 PM Novel Zn-Fe-Si Alloy as Biodegradable Stent Material: Yuxin Zeng1; Zeyi Guan1; Jingke Liu1; Xiaochun Li1; UCLA

3:30 PM Invited Investigating the Remodeling of the Cellular and Collagen Tissue Structures of the Optic Nerve Head in Mouse Models of Glaucoma: Thao Nguyen1; Johns Hopkins University

4:00 PM Invited Biomimeralized Low-density Structural Materials: Ling Li1; Virginia Polytechnic Institute

4:30 PM Euplectella Aspergillum: Multiscale Structural Characterization, Quantification and Micromechanical Properties: Swapnil Morankar1; Arun Singaravelu1; Sridhar Niverty1; Jason Williams2; Yash Mistry1; Clint Penick1; Dhruv Bhat1; Nikhil Chawla1; Purdue University; Arizona State University; 3Kennesaw State University

4:50 PM Freeze Casting of Bioinspired Materials with Extrinsic Control Techniques: Steven Nalawey1; Isaac Nelson1; Tony Yin1; Debora Lyn Porter1; Josh Fernquist1; Josh Alexander1; Max Mroz2; Paul Wadsworth1; University of Utah; 3Sandia National Lab

5:10 PM Employing Electric Field in the Fabrication of Directionally Porous Ice-templated Ceramics: Dipankar Ghosh1; Sashanka Akurati1; Diego Terrones1; Shizhi Qian1; Bharath Gundrat1; Old Dominion University

Advanced Materials

Bulk Metallic Glasses XVIII — Structures and Modeling

Sponsored by: TMS Structural Materials Division, TMS: Mechanical Behavior of Materials Committee

Program Organizers: Peter Liaw, University of Tennessee; Yanfei Gao, University of Tennessee-Knoxville; Hahn Choo, University of Tennessee; Yunfeng Shi, Rensselaer Polytechnic Institute; Robert Maass, Federal Institute for Materials Research and Testing (BAM); Xie Xie, FCA US LLC; Gongyao Wang, Alcoa Technical Center

Wednesday PM March 17, 2021

Session Chairs: Juergen Eckert, Eric Schmid Inst of Materials Science; Katharine Flores, Washington University

2:00 PM Invited Brittle-to-Ductile Transition in Metallic Glasses: Jurgen Eckert1; Eric Schmid Institute of Materials Science

2:25 PM Invited Correlated Disorder Order in a Model Binary Glass: Peter Derlet1; Paul Scherrer Institute

2:50 PM Effect of Porosity on Fracture Behavior of Porous Bulk Metallic Glasses: Devashish Rajput1; Parag Tandaiya1; Indian Institute of Technology Bombay

3:10 PM Effective Quantification of Liquid Structure in Metallic Alloys and its Relation to Glass-Forming Ability: Porter Weeks1; Katharine Flores1; Washington University in St Louis, Institute of Materials Science and Engineering

3:30 PM Invited Structural Relaxation and Mechanical Properties of Model Glass Systems at the Micro-second Timescale: Peter Derlet1; Robert Maass1; Paul Scherrer Institute; University of Illinois at Urbana Champaign

3:55 PM Emerging Fractal Potential Energy Landscape as the Origin of Activation Volume in Metallic Glasses: Chaoyi Liu1; Yue Fan1; University of Michigan

4:15 PM Glass Forming Ability of the Cu-Zr Alloys: What Do We Learn from Molecular Dynamics Simulation?: Mikhail Mendelev1; Yang Sun1; Feng Zhang1; Kai-Ming Ho1; Ames Laboratory; Columbia University

4:35 PM Stress Breaks Universal Aging Behavior in a Metallic Glass: Amlan Das1; Peter Derlet1; Chaoyang Liu1; Eric Dufresne1; Robert Maass1; University of Illinois at Urbana Champaign; Paul Scherrer Institute; Argonne National Laboratory

4:55 PM Local Structure of the Al-RE Marginal Metallic Glasses Studied by Molecular Dynamics Simulation: Doghuhan Sariturk1; Tolga Han Uluçan1; Yunus Kalay1; Middle East Technical University
**LIGHT METALS**

**Cast Shop Technology — Metal Treatment and Shape Casting**

*Sponsored by:* TMS Light Metals Division, TMS: Aluminum Committee  
*Program Organizer:* Samuel Wagstaff, Oculatus  
**Wednesday PM**  
**Session Chair:** Filippo Patiogianissi, Bridgnorth Aluminium  

**2:00 PM**  
**Grain Refinement Efficiency:** Rein Vainikko; John Courtenay; Frode Lien; MOP Ltd  

**2:20 PM**  
*A Comparison of AA6060 Grain Structures Achieved Using AMG’s TiBAL Advance™ and Alternative Al-Ti-B Grain Refiners via a 1D Upward Solidification Device:* Matthew Piper; Shahid Akhtar; Phil Enright; AMG Aluminium UK Limited; Hydro Aluminium Research Centre; NTEc  

**3:00 PM**  
*Resonance for Contactless Ultrasonic Treatment in Direct Chill Casting:* Catherine Tony; Valdis Bojarevics; Georgi Djambazov; Koulis Pericleous; University of Greenwich  

**3:20 PM**  
*Ultrasonic Melt Treatment in a DC Casting Launder: The Role of Melt Processing Temperature:* Christopher Bechwith; Tungky Subroto; Koulis Pericleous; Georgi Djambazov; Dmitry Eskin; Iakovos Tzanakis; University of Greenwich; Brunel University London; Oxford Brookes University  

**3:40 PM**  
*Residual Stress Prediction in the Casting Process of Automotive Powertrain Components:* Sina Kianfar; Joshua Stroh; Nasim Bahramian; DMITRY G. SEDIAKO; Anthony Lombardi; Glenn Byczynski; Philipp Mayr; Mark Reid; Anna Paradosska; University of British Columbia; Nemak Canada; Nemak Global; ANSTO  

**4:00 PM**  
*Coupled Modeling of Misrun, Could Shut, Air Entrainment and Porosity for High Pressure Die Casting Applications:* Juergen Jakumeit; Herfried Behnken; Romuald Laqua; Simon Mbewou; Martin Fehlbier; Julian Ganz; Leonard Becker; Access E.V.; Foundry technic; University Kassel; Siemens Industry Software GmbH; DI SW STS CCM TO  

**4:20 PM**  
*Study on the Mechanical Properties of Commercial Vehicle Wheel Through the Molten-Forged on the A356 Alloy with a Multi-cavity Fabrication Process:* Min Seok Moon; Meyeong Han Yoo; Kee Won Kim; Joon Hyuk Song; Je Ha Oh; Korea Institute of Carbon Convergence Technology; Rheoforge Co., Ltd.  

**4:40 PM**  
*Question and Answer Period*  

**NUCLEAR MATERIALS**

**Ceramic Materials for Nuclear Energy Research and Applications — Microstructure and Properties - Experiments and Modeling**

*Sponsored by:* TMS Extraction and Processing Division, TMS Structural Materials Division, TMS Light Metals Division, TMS: Advanced Characterization, Testing, and Simulation Committee, TMS: Energy Committee, TMS: Nuclear Materials Committee  
*Program Organizers:* Xian-Ming Bai, Virginia Polytechnic Institute and State University; Yongfeng Zhang, University of Wisconsin-Madison; Larry Aagesen, Idaho National Laboratory; Vincenzo Rondinella, Jrc-Ec  
**Wednesday PM**  
**Session Chairs:** William Weber, University of Tennessee, Knoxville; Marat Khafizov, Ohio State University  

**2:00 PM Invited**  
*Exotic Magneto-elastic Properties in Uranium Dioxide:* Krzysztof Gofryl; Idaho National Laboratory  

**2:30 PM Invited**  
*Towards a Model of Coupled Irradiation and Corrosion:* Amitava Banerjee; Aaron Kohnert; Edward Holby; Laurent Capolungo; Blas Uberuaga; Los Alamos National Laboratory  

**3:00 PM**  
*Impact of Dislocation Loops on Thermal Conductivity of CeO2:* Marat Khafizov; Lingfeng He; Xiaomiao Jin; David Hurley; Ohio State University; Idaho National Laboratory  

**3:20 PM**  
*Microstructural Analysis and Micro-mechanical Testing on Xenon-Irradiated Uranium Dioxide:* Mack Cullison; Fei Teng; David Fraser; Boopathy Kombaiah; Kun Mo; Jie Lian; Tianyi Chen; Fabiola Cappia; Oregon State University; Idaho National Laboratory; Argonne National Laboratory; Rensselaer Polytechnic Institute  

**3:40 PM Invited**  
*Comprehensive Treatment of Thermal Transport Under Irradiation in ThO2:* David Hurley; Marat Khafizov; Cody Dennett; Amey Khandalkar; Zilong Hu; Lingfeng He; Jian Gan; Anter ElAzab; Maneienda Salaken; Chao Jiang; Xiaomiao Jin; Ryan Deskins; Bawe Xuan Zhu; Chris Marianetti; Matthew Mann; Idaho National Laboratory; Ohio State University; Purdue University; Columbia University; AFRL  

**4:10 PM**  
*TEM Characterization of Dislocation Loops in Ion-Irradiated Single Crystal ThO2:* Kaustubh Bawane; Xiang Liu; Tiankai Yao; Marat Khafizov; Aaron French; Matthew Mann; Lin Shao; Jian Gan; David Hurley; Lingfeng He; Idaho National Laboratory; Ohio State University; Texas A&M University; Air Force Research Laboratory  

**4:30 PM**  
*Hydrothermal Corrosion of Silicon Carbide:* Jianqi Xi; Dane Morgan; Izabela Szlufarska; University of Wisconsin-Madison  

**4:50 PM**  
*TMIST-3A Post-irradiation Examination:* Mark Lanza; Walter Luscher; David Senor; Gary Hoggard; Pacific Northwest Nuclear Laboratory; Idaho National Laboratory
CHARACTERIZATION

Characterization of Materials through High Resolution Imaging — High Resolution Characterization of Materials with General Coherent Imaging Techniques

Sponsored by: TMS Structural Materials Division, TMS: Advanced Characterization, Testing, and Simulation Committee

Program Organizers: Richard Sandberg, Brigham Young University; Ross Hardar, Argonne National Laboratory; Xianghui Xiao, Brookhaven National Laboratory; Brian Abbey, La Trobe University; Saryu Fensin, Los Alamos National Laboratory; Ana Diaz, Paul Scherrer Institut; Mathew Cherukara, Argonne National Laboratory

Wednesday PM March 17, 2021

Session Chair: Richard Sandberg, Brigham Young University

2:00 PM Keynote
The Fourth is Strong in These Ones! Ian McNulty; 1MAX IV Laboratory

2:30 PM
X-ray Based Nanodiffraction to Study Strain in Materials for Nuclear Energy: Ericmoore Jossou; Mehmet Topsakal; Xiaojing Huang; Khalid Hattar; Hanfei Yan; Yong Chu; Cheng Sun; Lingfeng He; Jian Gan; Lynne Ecker; Simerjeet Gill; Brookhaven National Laboratory; Sandia National Laboratories; Idaho National Laboratory

2:50 PM Invited
Imaging Phase Transitions of Quantum Materials with Bragg Coherent X-ray Diffraction: Tadesse Assefa; Yao Cao; Jiecheng Diao; Wonsuk Cha; Ross Hardar; Kim Kissling; Mark Dean; Genda Gu; John Tranquada; Ian Robinson; Brookhaven National Laboratory; Argonne National Laboratory; University College London

3:20 PM
Mesoscale Defect Dynamics in the Bulk with Time-resolved Darkfield X-ray Microscopy: Leora Dresselhaus-Maraías; Lawrence Livermore National Laboratory

3:40 PM Invited
Laboratory and Synchrotron-based X-ray Tomographic Imaging during In Situ Loading of Materials: Brian Patterson; Lindsey Kueetner; Cindy Welch; Paul Welch; Axinte Ionita; Nikhilesh Chawla; Xianghui Xiao; Los Alamos National Laboratory; Arizona State University; Brookhaven National Laboratory

4:10 PM
Magnetic Correlations and Time Fluctuations in Assemblies of Fe3O4 Nanoparticles Probed via X-rays: Karine Chesnèi; Brigham Young University

4:30 PM
Using the Rotation Vector Base Line Electron Back Scatter Diffraction (RVB-EBSD) Method to Characterize Single Crystal Cast Microstructures: Pascal Thome; Felicitas Scholz; Jan Frenzel; Gunther Eggeler; Ruhr-University Bochum

CHARACTERIZATION


Sponsored by: TMS Extraction and Processing Division, TMS: Materials Characterization Committee

Program Organizers: Jian Li, CanmetMATERIALS; Mingming Zhang, ArcelorMittal Global R&D; Bowen Li, Michigan Technological University; Sergio Monteiro, Instituto de Engenharia; Shadia Ikhmayies; Yunus Kalay, Middle East Technical University; Jiaan-Yang Hwang, Michigan Technological University; Juan Escobedo-Diaz, University of New South Wales; John Carpenter, Los Alamos National Laboratory; Andrew Brown, Army Research Laboratory; Rajiv Soman, Eurofins EAG Materials Science LLC; Alex Moser, US Naval Research Laboratory

Wednesday PM March 17, 2021

Session Chairs: Jian Li, CanmetMATERIALS; Kim Jeongguk, Korea Railroad Research Institute

2:00 PM
Nanotwinned Ni-Mo-W Alloys with Ultrahigh Strength and Localized Plasticity: Gianna Valentino; Jessica Krogstad; Timothy Weils; Kevin Hemker; Johns Hopkins University; University of Illinois Urbana-Champaign

2:20 PM
FIB-SIMS in a Multi-Ion Source Plasma FIB: Daniel Murray; Xiaofei Pu; Idaho National Lab

2:40 PM

3:00 PM
A Study of the Absorption Edge of ZnO Thin Films Prepared by the Spray Pyrolysis Method: Shadia Ikhmayies; Idaho National Laboratory

3:20 PM
Modeling Empirical Estimators for the 3D Particle Size, Distribution, and Expected Error from 2D Cross Sections of a Lognormal Distribution of Spherical Particles: A Study of the Absorption Edge of ZnO Thin Films Prepared by the Spray Pyrolysis Method: Shadia Ikhmayies; Idaho National Laboratory

3:40 PM
Imaging Materials and their Evolution with High-Energy X-rays: Jonathan Almer; Peter Kencesi; Jun-Sang Park; Meinmi Li; Paul Shade; Argonne National Laboratory; Air Force Research Laboratory

4:00 PM
General Guideline of FIB Milling of Metal Alloys: Jian Li; CanmetMATERIALS

4:20 PM
Integrated, Table-top Instrumentation for High-temperature Thermal Property Measurements of Molten Salts: Haoxuan Yan; Federico Coppo; Uday Patil; Boston University
ADDITIVE TECHNOLOGIES

Computational Techniques for Multi-Scale Modeling in Advanced Manufacturing — Modeling of Microstructural Evolution

**Sponsored by:** TMS Materials Processing and Manufacturing Division, TMS Extraction and Processing Division, TMS: Computational Materials Science and Engineering Committee, TMS: Process Technology and Modeling Committee

**Program Organizers:** Adrian Sabau, Oak Ridge National Laboratory; Anthony Rollett, Carnegie Mellon University; Laurentiu Nastac, University of Alabama; Mei Li, Ford Motor Company; Alexandra Anderson, Gopher Resource; Srujan Rokkam, Advanced Cooling Technologies Inc

**Wednesday PM**  March 17, 2021

**Session Chair:** Laurentiu Nastac, The University of Alabama

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**2:00 PM**  Invited

In Situ and Operando Synchrotron Experiments for Additive Manufacturing Model Validation: **Peter Lee;** Chu Lun Alex Leung; Yunhui Chen; Samuel Clark; Sebastian Marussi; Robert Atwood; Martyn Jones; Gavin Baxter; "University College London; "Diamond Light Source; "Rolls-Royce plc

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**Investigation of Powder Spattering in Laser Powder Bed Fusion through Multi-physics Modeling and High-speed Synchrotron X-ray Imaging:** Xuxiao Li; Qilin Guo; Zachary Young; Fangzhou Li; Lianyi Chen; Wenda Tan; "University of Utah; "University of Wisconsin-Madison; "Missouri University of Science and Technology

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**3:05 PM**

Particle Resolved Simulation of Laser Powder-bed Fusion Including Metal Evaporation and Vapor Plume Dynamics: **Juergen Jakumeit;** Romuald Laqua; Gongyuan Zheng; Yuze Huang; Samuel Clark; Peter Lee; "Access E.V.; "University College London

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**3:30 PM**

Phase-field Modeling of The Evolution Kinetics of Porous Structure During Dealloying of Binary Alloys: **jie li;** "The Hong Kong Polytechnic University

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**3:55 PM**

Fluid Dynamics Effects on Microstructure Prediction in Single-Laser Tracks for Additive Manufacturing: **Adrian Sabau;** Lang Yuan; Narendran Raghavan; Matthew Bement; John Turner; "Oak Ridge National Laboratory; "University of South Carolina

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PHYSICAL METALLURGY

Computational Thermodynamics and Kinetics — Phase Stability II

**Sponsored by:** TMS Materials Processing and Manufacturing Division, TMS: Chemistry and Physics of Materials Committee, TMS: Computational Materials Science and Engineering Committee

**Program Organizers:** Nana Ofori-Opoku, Canadian Nuclear Laboratories; Eva Zarkadoula, Oak Ridge National Laboratory; Enrique Martinez Saez, Clemson University; Vahid Attari, Texas A&M University; Jorge Munoz, University of Texas at El Paso

**Wednesday PM**  March 17, 2021

**Session Chair:** Peter Galenko, Friedrich Schiller University Jena

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**2:00 PM**

Thermodynamic Stability of the Light Elements Doping in Sm(Fe,Co)12 Compounds: **Arkapol Saengdeeijing;** Ying Chen; "Tohoku University

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**2:20 PM**

First-principles Investigation of the Phase Structures and Stabilities in Mg-Zn Alloys: **Du Cheng;** Kang Wang; Bi-Cheng Zhou; "University of Virginia

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**2:40 PM**

Stability and Phase Transition of Cristobalite in SiO2: **Ying Chen;** Nguyen-Dung Tran; Hao Wang; Masanori Kohyama; Satoshi Kitaoka; Tetsuo Mohri; "Tohoku University; "Shanghai University; "Japan Fine Ceramics Center (JFCC)

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**3:00 PM**

Phase stability and Atomic Diffusion in fcc Fe-Ni Alloys: Interplay between Magnetic and Chemical Degrees of Freedom: **Kangming Li;** Chu-Chun Fu; Maylise Nastar; "DEN-Servie de Recherches de Metallurgie Physique, CEA, Université Paris-Saclay

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**3:20 PM**

Dislocation Formation Mechanism in Polycrystalline HCP Zr and Zr-2.5wt.%Nb Alloy: **Cong Dai;** Nana Ofori-Opoku; "Canadian Nuclear Laboratories
CORROSION

Environmental Degradation of Additively Manufactured Alloys — AM Materials and Aqueous Corrosion - Part I

Sponsored by: TMS Structural Materials Division, TMS: Corrosion and Environmental Effects Committee, TMS: Additive Manufacturing Committee

Program Organizers: Kinga Unocic, Oak Ridge National Laboratory; Jenifer Locke, Ohio State University; Sebastien Dryepondt, Oak Ridge National Laboratory; Michael Kirka, Oak Ridge National Laboratory; Xiaoyuan Lou, Auburn University; Brendy Rincon Troconis, University of Texas at San Antonio; Luke Brewer, University of Alabama

Wednesday PM March 17, 2021

Session Chairs: Jenifer S. Locke, The Ohio State University; Xiaoyuan Lou, Auburn University

2:00 PM
Comparing Corrosion of Alloys Made by Additive Manufacturing and Traditional Methods: Sohrab Ghiasi1; Vineeth Kumar Gattu2; William Ebert2; J Ernesto Indacochea1; 1University of Illinois at Chicago; 2Argonne National Laboratory

2:20 PM
Anisotropic Electrochemical Response of Laser Powder Bed Additively Fused Ti6Al4V in Chloride Medium: Sangram Mazumder1; Mangesh V. Pantawane2; Yee-Hsien Ho2; Narendra B. Dahotre1; 1University of North Texas

2:40 PM
Simulation of the Effect of Corrosion on the Mechanical Properties of Porous Mg Scaffolds Fabricated by Power Bed Laser Fusion for Biomedical Applications: M. Marvi-Mashhadi1; Muzi Li2; Wahaaj Ali1; Carlos González2; Javier Llorca3; 1Carlos III University; 2IMDEA Materials Institute; 3IMDEA Materials Institute & Technical University of Madrid

3:00 PM
Characterization of Corrosion Behavior in Additively Manufactured Al-6061 RAM Processed by Laser Powder Bed Fusion (L-PBF): Hamidreza T-Sarraf1; Nikhil Chawla1; 1Purdue University; 2Arizona State University

3:20 PM
Effect of Heat Treatment on the Stress Corrosion Cracking Behavior of an Additively Manufactured 7050 Aluminum Alloy Produced by Selective Laser Melting (SLM): Pranshul Varshney1; Rajiv Mishra2; Nilesh Kumar1; 1University of Alabama Tusaloosa; 2University of North Texas

3:40 PM
Influence of Cold Spray Deposition Parameters on Pitting of AA2024: Ozymandias Agar1; Luke Brewer1; 1University of Alabama

CORROSION

Environmentally Assisted Cracking: Theory and Practice — Stress Corrosion Cracking II

Sponsored by: TMS Structural Materials Division, TMS: Corrosion and Environmental Effects Committee

Program Organizers: Bai Cui, University of Nebraska-Lincoln; Raul Rebak, GE Global Research; Srujan Rokkam, Advanced Cooling Technologies Inc; Jenifer Locke, Ohio State University

Wednesday PM March 17, 2021

Session Chairs: James Burns, University of Virginia; Yiren Chen, Argonne National Lab

2:00 PM Invited
Cracking Growth Behavior of Irradiated Stainless Steels in Light Water Reactors: Yiren Chen1; Bogdan Alexanderanu1; Appajosula Rao1; 1Argonne National Laboratory; 2Nuclear Regulatory Commission

2:40 PM
Stress Corrosion Cracking of TRIP Fe39Mn20Co20Cr15Si5Al1 (at.%) High Entropy Alloy: Pranshul Varshney1; Rajiv Mishra2; Nilesh Kumar1; 1University of Alabama Tusaloosa; 2University of North Texas

3:00 PM
An Alternate Approach to DCB Specimens for Determining Sulfide Stress Cracking Thresholds: Constant or Increasing Driving Force Specimens: Carl Popelar1; W. Hickey1; James Sobotka1; Julian Hallai2; Yifei Zeng2; 1Southwest Research Institute; 2ExxonMobil Upstream Research Co

3:20 PM Invited
The Effect of Loading Rate on Environment-assisted Cracking Behavior in Ti, Fe, Al, and Ni-based Structural Alloys: James Burns1; Zachary Harris1; 1University of Virginia

4:00 PM
Comparison of Surface Treatment Technologies for the Mitigation of Stress Corrosion Cracking in Al-Mg: Matthew McMahon1; William Golumbfskie1; Eric Dau2; 1Naval Surface Warfare Center, Carderock Division; 2Vision Point Systems

4:20 PM
Understanding the Effect of Polarization on SCC Resistance and Crack Tip pH of AA6111-T8: Katrina Catledge1; Mark Nichols2; Gerald Frankel1; Jenifer Locke1; 1The Ohio State University; 2Ford Research and Advanced Engineering, Ford Motor Company
Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Chemistry and Physics of Materials Committee, TMS: Solidification Committee, TMS: Computational Materials Science and Engineering Committee

Program Organizers: Damien Tourret, IMDEA Materials; Amy Clarke, Colorado School of Mines; Ulrike Hecht, Access e.V.; Nana Ofori-Opoku, Canadian Nuclear Laboratories; Melis Serefoglu, Koc University; Tiberiu Stan, Northwestern University

Wednesday PM March 17, 2021

2:00 PM Invited
Morphological Evolution during Solidification: Tiberiu Stan1; Alexander Chadwick2; Kate Elder1; Xianghui Xiao1; Peter Voorhees3; 1Northwestern University; 2Brookhaven National Laboratory

2:30 PM Invited
Quantification of the Extent of Disequilibrium at the Solid-liquid Interface during Additive Manufacturing: Prabhat Pat1; André Phillion1; 1McMaster University

2:50 PM
Grain Refinement Mechanisms of A6061-RAM2 Metal Matrix Composite Alloys during Laser Powder Bed-fusion (LPBF): Chloe Johnson1; G. Becker2; Kamel Fezzaa2; Jonah Klemm-Toole2; Jeremy Iten2; Amy Clarke2; 1Colorado School of Mines; 2Argonne National Laboratory; 3Elementum 3D

3:10 PM Invited
In Situ Studies of Alloy Solidification Using Dynamic TEM: Joseph McKeown1; 1Lawrence Livermore National Laboratory

3:40 PM
Rapid Solidification of Polycrystalline Al-Cu with a Quantitative Phase Field Model and In-situ Imaging: Tatu Pinomaa1; Joseph McKeown1; Anssi Laukkanen2; Jörg Wiezorek3; Nikolas Provatas3; 1VTT Technical Research Centre of Finland; 2Lawrence Livermore National Laboratory; 3University of Pittsburgh; 4McGill University

4:00 PM
Numerical Model of Al-33wt.%Cu Eutectic Growth during Impulse Atomization: Jonas Villator1; Abdoul-Aziz Bogno2; Michel Rappaz3; 1University of Alberta; 2Ecole Polytechnique Fédérale de Lausanne


Sponsored by: TMS Functional Materials Division, TMS: Nanomaterials Committee

Program Organizers: Jiyoung Chang, University of Utah; Michael Cai Wang, University of South Florida; Sarah Zhong, University of South Florida; Sun Choi, Korea Institute of Science and Technology; Pei Dong, George Mason University

Wednesday PM March 17, 2021

Session Chairs: Michael Wang, University of South Florida; Sarah Zhong, University of South Florida

2:00 PM Invited
2D Thermoelectric Devices: Xian Zhang1; 1Stevens Institute of Technology

2:25 PM Invited
Intrinsic and Interfacial Fatigue of Graphene: Tobin Filleter1; 1University of Toronto

2:50 PM Invited
Janus Monolayer-Induced Abnormal Mechanical and Optical Properties in 2D Heterostructures: Shengxi Huang1; 1The Pennsylvania State University

3:15 PM
Photosresponse Characterization of Au Nanorods Coated PtSe2: Tatsuya Nakazawa1; Shinichi Kato2; Donghyun Kim3; Jwa-Min Nam3; Hyungjun Kim1; 1Yonsei University; 2Seoul National University

3:35 PM Invited
Rapid Water Harvesting and Non-thermal Drying in Humid Air by N-doped Graphene Micro-Pads: Yiyang Wan1; Yong Gao2; Zhenhai Xia3; 1University of North Texas; 2Northwestern Polytechnical University

4:00 PM Invited
Two-dimensional Transition Metal Dichalcogenides for Optoelectronics and Chemiresistive Applications: Jungwook Choi1; 1Yeungnam University
WSe2 Growth on Hafnium Zirconium Oxide by Molecular Beam Deposition: The Effect of Growth Conditions on the Substrate Properties

Maria Gabriela Sales1; Shelby Fields2; Samantha Jaszewski1; Sean Smith1; Riley Christopher1; Nikhil Shukla1; Jon Ihlefeld2; Stephen McDonnell1; 1University of Virginia; 2Department of Materials Science and Engineering, University of Virginia; 3Materials Science and Engineering Center, Sandia National Laboratories; 4Department of Electrical and Computer Engineering, University of Virginia

NANOSTRUCTURED MATERIALS

Heterostructured and Gradient Materials (HGM IV): Tailoring Heterogeneity for Superior Properties — Functional Heterostructured Materials

Sponsored by: TMS Structural Materials Division, TMS: Mechanical Behavior of Materials Committee

Program Organizers: Yuntian Zhu, City University of Hong Kong; Kei Amano, Ritsumeikan University; Irene Beyentein, University of California-Santa Barbara; Yves Brechet, Grenoble Institute of Technology; Huaqian Gao, Nanyang Technological University; Hyong Seop Kim, Pohang University of Science and Technology; Ke Lu, Institute of Metal Research; Xiaolei Wu, Chinese Academy of Sciences

Wednesday PM  March 17, 2021

Session Chairs: Peter Anderson, Ohio State University; Jagannathan Rajagopalan, Arizona State University; Anding Wang, City University of Hong Kong

2:00 PM Invited
Shape Memory Alloys: Using Heterostructure-induced Defects to Train Thermo-mechanical Response

Peter Anderson1; Harshad Paranjape2; Sivorn Manchiraju1; Michael Mills1; 1Ohio State University; 2Confluent Medical Technologies; 3Ansys, Inc.

2:25 PM
High Strength and Low Coercivity Cobalt with Three-dimensional Planar Defects Introduced by Heterogeneous Coherent Interface

Jian Song1; Guisen Liu1; Y. Liu1; J. Wang2; X. Zhang1; 1Shanghai Jiao Tong University; 2University of Nebraska-Lincoln; 3Purdue University

2:45 PM
Analysis of Inertially Dampered Structure in High Strain Rate Impacts

Trenin Bayless1; Jerome Downey1; 1Montana Technological University

3:05 PM
Interface Engineered Tungsten-Based Nanocomposites and Nanofoams for Harsh Environments

Daniel Kiener1; Mingyue Zhao1; Inas Issa1; Michael Wurmshuber1; 1University of Leoben

3:25 PM
Hydrogen Charging Behavior of Gradient Structured High-Mn Steels

Jung Gi Kim1; Hyun Joo Seo1; Jeong Min Park1; Seung Mi Baek1; Auezhan Amanov1; Chong Soo Lee1; Hyong Seop Kim1; 1Gyeongsang National University; 2Pohang University of Science and Technology; 3Sun Moon University

3:45 PM
Effects of Constituent Properties on Propagating Stress Waves in Multiphase Composites

Avery Samuel1; Irene Beyentein1; Frank Zok1; 1University Of California, Santa Barbara

ADVANCED MATERIALS

High Entropy Alloys IX: Alloy Development and Properties — Structures and Mechanical Properties II

Sponsored by: TMS Functional Materials Division, TMS Structural Materials Division, TMS: Alloy Phases Committee, TMS: Mechanical Behavior of Materials Committee

Program Organizers: Peter Liaw, University of Tennessee; Michael Gao, National Energy Technology Laboratory; E-Wen Huang, National Chiao Tung University; Srivatsan Tirumalai, The University of Akron; Xie Xie, FCA US LLC; Gongyao Wang, Alcoa Technical Center

Wednesday PM  March 17, 2021

Session Chairs: Saryu Fensin, Los Alamos National Laboratory; Nan Li, Los Alamos National Laboratory

2:00 PM Invited
Dynamic Properties of a High Entropy Alloy -- FeCrMnNi

Michelle Hawkins1; Robert Hixson1; Jonathan Giga2; Nan Li2; Sarah Thomas3; Saryu Fensin1; 1Mission Support and Test Services, LLC; 2Los Alamos National Laboratory

2:20 PM
Effect of Cooling Rate on the High Strain Rate Deformation of Dual-phase High Entropy Alloy: Samrat Tamuly1; Saurabh Dixit2; V Parameswaran1; Prasenjit Khanikar1; 1Indian Institute of Technology Guwahati

2:40 PM
Mechanical and Elastic Behavior as Well as Microstructural Response of NbTaTiV and NbTaTiVZr as a Function of Strain Rate

Matthew Hayne1; Saryu Fensin1; Tarik Saleh1; Chancoo Lee2; Peter Liaw1; 1Los Alamos National Laboratory; 2The University of Tennessee

3:00 PM
Deformation Mechanism and Microstructural Evolution in Al0.4CoCrFeNi High Entropy Alloy

Anumat Sittiho1; Jadzia Graves1; Sanjit Bhowmick1; Indrajit Charit1; Rajiv Mishra1; 1University of Idaho; 2Bruker; 3University of North Texas

3:20 PM
On the Phase Stability, Mechanical Properties, and Deformation Mechanisms of the Equiatomic CrFeNi Medium-entropy Alloy

Mike Schneider1; Guillaume Laplanche1; 1Ruhr-Universitat Bochum
ADVANCED MATERIALS

High Entropy Alloys IX: Structures and Modeling — Modeling and Machine Learning

Sponsored by: TMS Functional Materials Division, TMS Structural Materials Division, TMS: Alloy Phases Committee, TMS: Mechanical Behavior of Materials Committee

Program Organizers: Peter Liaw, University of Tennessee; Michael Gao, National Energy Technology Laboratory; E-Wen Huang, National Chiao Tung University; Srivatsan Tirumalai, The University of Akron; Xie Xie, FCA US LLC; Gongyao Wang, Alcoa Technical Center

Wednesday PM March 17, 2021

Session Chairs: Yu Zhong, Worcester Polytechnic Institute; Jia Li, Hunan University

2:00 PM Invited
The Application of High-throughput Calculations in High Entropy Alloys: Yu Zhong1; Worcester Polytechnic Institute

2:25 PM Invited
Extrapolation of Machine Learning Models for Designing Multi-principal Element Alloys: James Saal1; Chris Borg1; Clara Nyby4; Bryce Meredig1; Citrine Informatics

2:50 PM
Machine Learning Enabled Prediction of Stacking Fault Energies in Concentrated Alloys: Gaurav Arora1; Anus Manzoor1; Dilpuneet Aidhy1; University of Wyoming

3:10 PM Invited
Optimalizing Properties of High Entropy Alloy by Machine Learning and Multiscale Simulations: Jia Li1; Yang Chen1; Qihong Fang1; Hunan University

3:35 PM
Accelerated Exploration of Refractory Multi-principal Element Alloys by Machine Learning: Carolina Frey1; Christopher Borg2; James Saal3; Bryce Meredig1; Daniel Miracle4; Tresa Pollock1; University of California, Santa Barbara; Citrine Informatics; Air Force Research Laboratory

3:55 PM
Ab Initio Modeling on the Elastic Properties of Al-Co-Cr-Fe-Ni High Entropy Alloys: A Case Study with FCC Phase: Songge Yang1; Jize Zhang1; Yu Zhong1; Worcester Polytechnic Institute

MATERIALS PROCESSING

High Temperature Electrochemistry IV — Session V

Sponsored by: TMS Extraction and Processing Division, TMS: Nuclear Materials Committee, TMS: Hydrometallurgy and Electrometallurgy Committee

Program Organizers: Prabhat Tripathy, Batelle Energy Alliance (Idaho National Laboratory); Guy Fredrickson, Idaho National Laboratory

Wednesday PM March 17, 2021

Session Chair: Hojong Kim, The Pennsylvania State University

2:00 PM
Advances in Solid Oxide Membrane Based Electrolysis for Solar-grade Silicon Deposition: Michelle Sugimoto1; Haoxuan Yan2; Federico Coppo3; Adam Powell4; Uday Pal5; Boston University; Worcester Polytechnic Institute

2:30 PM
Feasibility of Potentiometry for Monitoring Activity of GdCl3 in Molten LiCl-KCl Salt: Guoping Cao1; Steven Herrmann2; Guy Fredrickson1; Robert Hoover2; Kevin Tolman1; Idaho National Laboratory

3:00 PM
First-principles Molecular Dynamics and CALPHAD Modeling of the CaF2-MgF2-SiO2 Molten Salt System: Yifan Zhang1; Uday Pal2; Adam Powell1; Michael Gao3; Yu Zhong1; Worcester Polytechnic Institute; Boston University; National Energy Technology Laboratory

MATERIALS DESIGN

Hume-Rothery Symposium: Accelerated Measurements and Predictions of Thermodynamics and Kinetics for Materials Design and Discovery — Session VI

Sponsored by: TMS Structural Materials Division, TMS: Alloy Phases Committee

Program Organizers: Wei Xiong, University of Pittsburgh; Shuangjin Chen, CompuTherm LLC; Wei Chen, Illinois Institute of Technology; James Saal, Citrine Informatics; Greta Lindwall, KTH Royal Institute of Technology

Wednesday PM March 17, 2021

Session Chair: Qiaofu Zhang, QuesTek Innovations LLC

2:00 PM Invited
Integrative Predictive Materials Science: Filling the ICME Pipeline: John Allison1; University of Michigan

2:40 PM Invited
Phonon Anharmonicity Causes the Large Thermal Expansion of NaBr: Brent Fultz2; Yang Shen3; Claire Saunders1; Camille Bernal1; Michael Manley2; California Institute of Technology; Oak Ridge National Laboratory

3:20 PM Invited
Multi-cell Monte Carlo Method for Phase Prediction: Maryam Ghaziaei2; You Rao1; Edwin Antillon2; changning Niu2; Wolfgang Windl2; Ohio State University; Naval Research Lab; QuesTek Innovations LLC
4:00 PM Invited
Insights from a Comprehensive Assessment of Diffusion Coefficients of 20 Binary Systems and a Comprehensive Diffusion Mobility Database for Magnesium Alloys: Wei Zhong; Qiaofu Zhang; Ji-Cheng Zhao; 1University of Maryland; 2QuestTek Innovations LLC

LIGHT METALS
Magnesium Technology 2021 — Alloying & Processing / Primary Production

Sponsored by: TMS Light Metals Division, TMS: Magnesium Committee

Program Organizers: Victoria Miller, University of Florida; Petra Maier, University of Applied Sciences Stralsund; J. Brian Jordon, University of Alabama; Neale Neelameggham, IND LLC

Wednesday PM March 17, 2021

Session Chairs: Vineet Joshi, Pacific Northwest National Laboratory; Joshua Caris, Terves, LLC

2:00 PM
Absorbable Wire Radiopacity: Influence of Composition and Size on X-ray Visibility: Adam Griebel; Aubrey Ehle; Jeremy Schaffer; 1Fort Wayne Metals; 2Indiana University School of Medicine

2:20 PM
Magnesium and Magnesium Alloy Powder Processing Towards the Development of Near Shape Structural Materials: Steven Johnson; Dylan Goncalves; 1Central Connecticut State University

2:40 PM
Effect of Processing Parameters on the Microstructure and Mechanical Behavior of Additively Manufactured WE43 Mg Alloy: Leila Sorkhi; Joshua Hammell; Grant Crawford; 1South Dakota School of Mines & Technology

3:00 PM
Effects of Hot Isostatic Pressing on the Microstructure and Properties of Mg-Gd-Y-Zn Alloys: Janet Meier; Joshua Caris; Alan Luo; 1Ohio State University; 2Terves LLC

3:20 PM
Low-cost Magnesium Primary Production Using Gravity-driven Multiple Effect Thermal System (G-METS) Distillation: Madison Rutherford; Armaghan Telgerafchi; Gabriel Espinosa; Adam Powell; David Dussault; 1Worcester Polytechnic Institute; 2Elemental Beverage

3:40 PM
Efficient Low-cost Gravity-driven Multiple Effect Thermal System (G-METS) Distillation of Magnesium: Armaghan Telgerafchi; Gabriel Espinosa; Madison Rutherford; Adam Powell; David Dussault; 1Worcester Polytechnic Institute; 2Elemental Beverage Company

4:00 PM
Industrial Practice of Extracting Magnesium from Serpentine: Huimin Lu; Neale Neelameggham; 1Beijing Offkintai Technology Co., Ltd.; 2IND LLC

MATERIALS PROCESSING
Materials Engineering -- From Ideas to Practice: An EPD Symposium in Honor of Jiann-Yang Hwang — Wastewater Treatment

Sponsored by: TMS Extraction and Processing Division, TMS: Materials Characterization Committee, TMS: Pyrometallurgy Committee

Program Organizers: Bowen Li, Michigan Technological University; Baojun Zhao, University of Queensland; Jian Li, CanmetMATERIALS; Sergio Monteiro, Instituto Militar de Engenharia; Zhiwei Peng, Central South University; Dean Gregurek, RHI Magnesita; Tao Jiang, Central South University; Yong Shi, Futianbao Environment Technologies; Cuiping Huang, FutianBao Environment Protection Technology Company Ltd.; Shadia Ikhmayies

Wednesday PM March 17, 2021

Session Chairs: Jinjing Luo, Xiamen University; Jiann-Yang Hwang, Michigan Technological University

2:00 PM Invited
Development and Management of Industrial Park for Chinese Electroplating Industry: Yong Shi; Cuiping Huang; Zhibo Huang; Jiann-Yang Hwang; 1Futianbao Environmental Protection, Ltd; 2Futianbao Environment Protection Technology, Ltd; 3Michigan Technological University

2:20 PM Invited
Mercury Removal by Bio-chars with Plasma Surface Modification: Jinjing Luo; 1Xiamen University

2:40 PM Invited
Electroplating Wastewater Treatment in China: Zhibo Huang; Jiann-Yang Hwang; Cuiping Huang; Yong Shi; 1Futianbao Environment Protection Technology, Ltd; 3Michigan Technological University

3:00 PM Invited
Effects of Ozone on COD Reduction in Electroplating Wastewater: Yahui Sun; Jiann-Yang Hwang; Lili Xi; Zhixing Fu; Fujiu Nian; Yang Yang; Xin Chen; 1Futianbao Environment Protection Technology, Ltd; 3Michigan Technological University

3:20 PM
Extraction of Cerium from Catalyst of Waste Automobile Exhaust Gas Purifier: Chen Ailiang; Guanwen Luo; Mao Jiale; Lu Sujun; 1Futianbao Environment Protection Technology, Ltd; 2State Key Laboratory of Nickel and Cobalt Resources Comprehensive Utilization; 3Michigan Technological University

3:40 PM Invited
A New Electroplating Wastewater Treatment Process Using Electric Lime and Vacuum Filtration: Zhixing Fu; Jiann-Yang Hwang; Yahui Sun; Yang Yang; Fujiu Nian; Lili Xi; Zhibo Huang; 1Futianbao Environment Protection Technology, Ltd; 3Michigan Technological University

4:00 PM
COD Removal from Electroplating Degreasing Wastewater by UV/H2O2 Process: Jianjun Liu; Zhichao Chen; Lili Xi; Jiann-Yang Hwang; Yong Shi; 1Futianbao Environmental protection technology; 3Michigan Technological University
4:20 PM Invited
Oxidation of Cyanide and Simultaneous Copper Electrodeposition from Electroplating Wastewater in an Electrochemical Reactor: Yang Yang1; Fujii Nian1; Dong Xu1; Yahui Sun2; Jiann-Yang Hwang3; Peiyu Qiao1; Zhixing Fu1; Lili Xi1; 1Futianbo Environment Protection Technology, Ltd; 2Michigan Technological University

4:40 PM Invited
Treatment of Electroless Nickel Plating Wastewater by Ozone Oxidation: Lili Xi1; Yahui Sun2; Jiann-Yang Hwang3; Fujii Nian1; Zhixing Fu1; Yang Yang1; Cuiping Huang1; 1Futianbo Environment Protection Technology, Ltd; 2Michigan Technological University

ADVANCED MATERIALS

Materials for High Temperature Applications: Next Generation Superalloys and Beyond — Refractory Alloys: Processing and Properties of Novel Materials

Sponsored by: TMS Structural Materials Division, TMS: Refractory Metals Committee

Program Organizers: Govindarajan Muralidharan, Oak Ridge National Laboratory; Martin Heilmaier, KIT Karlsruhe; Benjamin Adam, Portland State University; Mario Bochecio, Pratt & Whitney; Katerina Christofidou, University of Sheffield; Eric Lass, University of Tennessee-Knoxville; Jeremy Rame, Safran Aircraft Engines; Pierre Saltot, Safran Aircraft Engines; Pierre Saltot, Safran; Akane Suzuki, GE Research; Michael Titus, Purdue University; Mario Bochiechio, Pratt & Whitney

Wednesday PM March 17, 2021

2:00 PM Invited
High-temperature, Thermally-cyclable, Reaction-formed, Co-continuous Refractory Metal/Ceramic Composites for Extreme Environments: Kenneth Sandhage1; Yujie Wang1; Priyatham Tumurugoti1; Camilla McCormack1; Alex Strayer1; Adam Caldwell1; Gregory Scofield1; Zhenhui Chen1; Raheleh Rahimi1; Thuan Nguyen1; Saeed Bagherzadeh1; Kevin Tumblie1; Michael Sangid1; Grigoris Itskos1; Mario Caccia1; 1Purdue University

2:30 PM
ICME-guided Design of Novel Metal Matrix Composites for Extreme Environments: David Linder1; Martin Walbrüh1; Qiaofu Zhang1; 1QuesTek Europe AB; 2QuesTek Innovations

2:50 PM Invited
Advanced Refractory Alloys for Use at Temperatures above 1273K: Oleg Senkov1; Satish Rao1; Todd Butler1; Tinuade Daboiku1; Eric Payton1; 1Air Force Research Laboratory

3:20 PM
Oxidation-resistant, Thermally-cyclable, Robust Oxide/Metal Composite Materials for Concentrated Solar Power: Camilla McCormach1; Mario Caccia1; Thuan Dinh Nguyen1; Gregory Scofield1; Grigoris Itskos1; Michael Sangid1; Kenneth Sandhage1; 1Purdue University

3:40 PM
Hot Isostatic Pressing of Niobium-based Refractory Alloy Powders: Calvin Miller1; Brian Weik1; Benjamin Georgin1; Todd Butler1; Noah Phillips1; Hamish Fraser1; 1The Ohio State University; 2Air Force Research Laboratory; 3ATI Specialty Alloys and Components

4:00 PM A Review of Plastic Flow and Microstructure Evolution at Elevated-temperatures in Unalloyed Niobium: Emily Brady2; Eric Taleff2; 1University of Texas at Austin

4:20 PM
Effect of Alloy Composition on the Microstructure of Developmental Iridium Alloys: Noah Kohlhorst3; Glenn Romanoski3; Govindarajan Muralidharan1; Roger Miller2; Ji-Cheng Zhao3; 1Ohio State University; 2Oak Ridge National Laboratory (ORNL); 3University of Maryland, Department of Materials Science and Engineering

4:40 PM
Kinetics of Grain Boundary Segregation in an Ir Alloy*: Dean Pierce1; Govindarajan Muralidharan1; Jon Poplewsly1; George Ulrich1; 1Oak Ridge National Laboratory

MATERIALS PROCESSING

Materials Processing Fundamentals — Metal Processing and Manufacturing

Sponsored by: TMS Extraction and Processing Division, TMS Materials Processing and Manufacturing Division, TMS: Process Technology and Modeling Committee

Program Organizers: Jonghyun Lee, Iowa State University; Samuel Wagstaff, Occlusus; Alexandra Anderson, Gopher Resource; Fiseha Tesfaye, Abo Akademi University; Guillaume Lambotte, Boston Metal; Antoine Allanore, Massachusetts Institute of Technology

Wednesday PM March 17, 2021

Session Chairs: Allie Anderson, Gopher Resource; Yunbo Wang, Caterpillar Inc.

2:00 PM
Effect of Dissolution of Titanium Ions on Ti Alloys Electrodeposition from EMIC-AlCl3 Ionic Liquid at Low Temperature: Pravin Shinde1; Ramana Reddy2; 1The University Of Alabama

2:20 PM
Cylindrical and Planar Magnetron Sputtering for Microstructural Control: Adie Alwen1; Alina Garcia Taormina1; A.M. Hodge1; 1University of Southern California

NUCLEAR MATERIALS

Mechanical Behavior of Nuclear Reactor Components — Creep, Fatigue, and Fracture

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS Structural Materials Division, TMS: Nanomechanical Materials Behavior Committee, TMS: Nuclear Materials Committee

Program Organizers: Clarissa Yablinsky, Los Alamos National Laboratory; Assel Altkaliyeva, University of Florida; Eda Aydogan, Middle East Technical University; Laurent Capolungo, Los Alamos National Laboratory; Khalid Hattar, Sandia National Laboratories; Kayla Yano, Pacific Northwest National Laboratory; Caleb Massey, Oak Ridge National Laboratory

Wednesday PM March 17, 2021

2:00 PM Invited
Multiscale Modeling of Creep and Transient Conditions in Steels: Application to HT9 Steel Alloy: Mariyappan Arul Kumar1; Aaron Tallman1; Christopher Matthews1; Laurent Capolungo1; 1Los Alamos National Laboratory
2:30 PM
Creep Crack Growth Behaviour of Austenitic Stainless Steels Alloy 709 and 316H: Suyang Yu1; Jin Yan1; Hangyue Li2; Afsaneh Rabiei1; Paul Bowen1; 1University of Birmingham; 2North Carolina State University

2:50 PM
Stress Corrosion Cracking Resistance of FeCrAl Alloys in Light Water Reactor Environments: Raoul Rebal1; Liang Yin1; Andrew Hoffman1; 1GE Global Research

3:10 PM
Enabling In-situ Crack Growth Testing and Monitoring in VTR Cartridge Loop Environments: Samuel Briggs1; Peter Beck1; Dustin Mangus1; Jake Quincey1; Andrew Brittan1; George Young1; Guillaume Mignot1; Julie Tucker1; 1Oregon State University

3:30 PM Invited
In-situ Scanning Electron Microscopic Observation of Creep and Creep-fatigue of Alloy 709: Amrita Lal1; Rengen Ding2; Paul Bowen1; Afsaneh Rabiei1; North Carolina State University; 1University of Birmingham

4:00 PM
Mechanical Characterization of Neutron Irradiated HT-9 Heats (ORNL, LANL and EBR II) at LWR and Fast Reactor Relevant Temperatures: Ramprasad Prabaharan1; Mychalio Toloczko1; Kumar Sridharan1; 1Pacific Northwest National Laboratory; 1University of Wisconsin-Madison

4:20 PM
Burst Behavior of Accident Tolerant Fuel Cladding Concepts under Simulated Loss-of-coolant Conditions: Samuel Bell1; Bruce Pint1; Ken Kane1; 1Oak Ridge National Laboratory

4:40 PM
C-ring Compression of SiC-SiC Cladding at 1200°C with In-situ X-ray Computed Micro-tomography: Dong Liu1; Jon Ell1; Guanjie Yuan1; Peng Xu1; Roger Lu1; Edward Lahoda1; Harold Barnard1; Dula Parkinson2; Robert Ritchie2; 1University of Bristol; 2Lawrence Berkeley National Laboratory; 1Idaho National Laboratory; 1Westinghouse Electric Company

5:00 PM
Non-destructive Inspection of Contaminated Epoxy Plates Using Propagating Acoustic Waves: Ayotomi Olokun1; Abhijeet Dhiman1; Vikas Nardi1; 1Tescan USA, Inc; 1TESCAN XRE; 1Math2Market

MATERIALS PROCESSING

Ni-Co 2021: The 5th International Symposium on Nickel and Cobalt — Pyrometallurgy II

Sponsored by: The Metallurgy & Materials Society of the Canadian Institute of Mining, Metallurgy and Petroleum, TMS Extraction and Processing Division, TMS: Hydrometallurgy and Electrometallurgy Committee, TMS: Pyrometallurgy Committee

Program Organizers: Corby Anderson, Colorado School of Mines; Dean Gregurek, RHI Magnesita; Mari Lundström, Aalto University; Christina Meskers; Prabhath Tripathy, Batelle Energy Alliance (Idaho National Laboratory); Fiseha Tesfaye, Abo Akademi University; Yuanbo Zhang, Central South University; Sari Muinonen, Glencore; Graeme Goodall, XPS- Glencore; Shijie Wang, Rio Tinto Kennecott Utah Copper Corp (Retired)

Wednesday PM March 17, 2021

2:00 PM
A Novel Process to Reduce SO2 Emissions during Electric Furnace Smelting of Sulphides: David Tisdale1; Sari Muinonen1; Michael Molinski1; Arthur Stokreef1; 1Glencore Sudbury Integrated Nickel Operations

2:20 PM
Influence of the Cemented Carbides Composition on the Disintegration in Liquid Zinc: Tamara Ebner1; Stefano Luigold1; Christoph Czetl1; Christian Storf1; 1Montanuniversitaet Leoben; 1CERATIZIT Austria GmbH

2:40 PM
Study on CFD and Oxygen Lance Injection Technology of High Nickel Ternary Cathode Material Roasting Process in Roller Hearth Furnace: Zhong Ling1; Weigang Wei1; Gang Zhang1; Xu Qian1; Heng Zhu1; 1Linde Technology Center Shanghai; 1Zhongtian Energy Materials Co., Ltd.

3:00 PM
Real-time Fe End-point Determination at Sudbury INO Smelter Finishing Converter Using Thermodynamic Process Simulation: Tanai Marin-Alvarado1; Brett MacKinnon1; Arina Moraes1; Kurt Westhaver; Phil Nelson; Nicolas Lazare; Vince Mclver; Sari Muinonen1; XPS Expert Process Solutions; 1Sudbury Integrated Nickel Operations

CHARACTERIZATION

Mechanical Response of Materials Investigated through Novel In-situ Experiments and Modeling — Session VI

Sponsored by: TMS Structural Materials Division, TMS: Thin Films and Interfaces Committee, TMS: Advanced Characterization, Testing, and Simulation Committee

Program Organizers: Saurabh Puri, Microstructure Engineering: Amit Pandey, Lockheed Martin Space; Dhiril Bhattacharya, Australian Nuclear Science and Technology Organization; Dongchan Jang, KAIST; Jagannathan Rajagopalan, Arizona State University; Josh Kacher, Georgia Institute of Technology; Minh-Son Pham, Imperial College London; Robert Wheeler, Microtesting Solutions LLC; Shailendra Joshi, University of Houston

Wednesday PM March 17, 2021
Session Chair: Dongchan Jang, KAIST

2:00 PM
Synchrotron X-ray Studies of Deformation and Failure in Cold Spray Composites: Leewo He1; Darren Pagan1; Qi An1; Aaron Nardi1; Mostafa Hassan1; 1Cornell University; 1U.S. Army Research Laboratory
### ELECTRONIC MATERIALS

**Phase Stability, Phase Transformations, and Reactive Phase Formation in Electronic Materials**  
**XX — Properties and Microstructures of Electronic Materials**

**Sponsored by:** TMS Functional Materials Division, TMS Structural Materials Division, TMS: Alloy Phases Committee

**Program Organizers:** Hiroshi Nishikawa, Osaka University; Shih-kang Lin, National Cheng Kung University; Chao-Hong Wang, National Chung Cheng University; Chih-Ming Chen, National Chung Hsing University; Jae Ho Lee, Hongik University; Zhi-Quan Liu, Shenzhen Institutes of Advanced Technology; Ming-Tzier Lin, National Chung Hsing University; Dajian Li, Karlsruhe Institute of Technology; Yu Zhong, Worcester Polytechnic Institute; Yee-wen Yen, National Taiwan University of Science and Technology; A.S. Md Abdul Haseeb, University of Malaya; Ligang Zhang, Central South University; Sehoon Yoo, KITECH; Vesa Vuorinen, Aalto University; Yu-chen Liu, National Cheng Kung University

**Wednesday PM  March 17, 2021**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session Title</th>
<th>Presenters</th>
</tr>
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<tbody>
<tr>
<td>2:00 PM</td>
<td>Keynote Effect of Initial Volume Ratio and Reflow Temperature on the Microstructure of SnBiAg-SAC Mixed Solder Joints</td>
<td>Eric Cotts; Faramarz Hadian; Randy Owen; Mohammed Genanu; Binghamton University</td>
</tr>
<tr>
<td>2:40 PM</td>
<td>Effect of Low Bi Content on Mechanical Property of Sn-Bi-Zn Alloy before and after Thermal Aging</td>
<td>Hiroshi Nishikawa; Shiqi Zhou; Chih-han Yang; Yu-An Shen; Shih-kang Lin; Osaka University; National Cheng Kung University</td>
</tr>
<tr>
<td>3:00 PM</td>
<td>High-throughput Calculations for Sn-Bi-Ag and Sn-Bi-Ag-In Low-temperature Lead-free Solders</td>
<td>Chih-Han Yang; Yuki Hirata; Hiroshi Nishikawa; Shih-kang Lin; National Cheng Kung University; Osaka University</td>
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<tr>
<td>3:20 PM</td>
<td>Solid-liquid Interfacial Reaction between Cu and In-48Sn Alloy</td>
<td>F. L. Chang; C. Robert Kao; H. T. Hung; S. Y. Lin; National Taiwan University</td>
</tr>
<tr>
<td>3:40 PM</td>
<td>Using Machine Learning to Predict Hardness of Sn-based Alloys</td>
<td>Yu-chen Liu; Chih-han Yang; Hannah Carillo; Chuan-cheng Lin; Shih-kang Lin; National Cheng Kung University</td>
</tr>
</tbody>
</table>

### PHYSICAL METALLURGY

**Phase Transformations and Microstructural Evolution — High Entropy Alloys**

**Sponsored by:** TMS Materials Processing and Manufacturing Division, TMS: Phase Transformations Committee

**Program Organizers:** Rongpei Shi, Lawrence Livermore National Laboratory; Yipeng Gao, Idaho National Laboratory; Fadi Abdeljawad, Clemson University; Bharat Gwalani, Pacific Northwest National Laboratory; Qi An, University of Nevada-Reno; Eric Lass, University of Tennessee-Knoxville; Huajing (Wilson) Song, Los Alamos National Laboratory

**Wednesday PM  March 17, 2021**

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<tr>
<th>Time</th>
<th>Session Title</th>
<th>Presenters</th>
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<tr>
<td>2:00 PM</td>
<td>Microstructural Evolution of Metals at High Temperature Revealed by In-situ Neutron and Synchrotron X-ray Diffraction</td>
<td>Klaus-Dieter Liss; Guangdong Technion - Israel Institute of Technology (GTIIT)</td>
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<tr>
<td>2:20 PM</td>
<td>Atomistic Modeling of the Effects of Precipitates in Phase Stability of Fe-Ni Based Alloys</td>
<td>Eva Zarkadoula; Ying Yang; Albina Borisiević; Easo George; Oak Ridge National Laboratory</td>
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<tr>
<td>2:40 PM</td>
<td>Microstructural Characterization of As-cast Al$_7$CrFeMnV, Al$_7$CrFeTiV, and Al$_7$CrMnTiV High Entropy Alloys</td>
<td>Keith Knipling; Patrick Callahan; David Beaudry; Richard Michi; U.S. Naval Research Laboratory; Johns Hopkins University; Oak Ridge National Laboratory</td>
</tr>
<tr>
<td>3:00 PM</td>
<td>Comparison of Low Temperature Oxidation Behavior of Pure W and MoNbTaW Thin Films</td>
<td>Robert Quammen; Paul F. Rottmann; University of Kentucky</td>
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<td>3:20 PM</td>
<td>Hydrogen-induced Microstructural Transformations in an FeMnCoCr High-entropy Alloy</td>
<td>Maria Ronchi; Haoxue Yan; Shaohou Wei; C. Tasan; Massachusetts Institute of Technology</td>
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<tr>
<td>3:40 PM</td>
<td>Stacking Fault Energy in Metastable Alloys</td>
<td>Mulaine Shih; Maryam Ghazisaeidi; Ohio State University</td>
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MATERIALS PROCESSING

Rare Metal Extraction & Processing — V, Ce, Mo, Cr, Fe

Sponsored by: TMS Extraction and Processing Division, TMS: Hydrometallurgy and Electrometallurgy Committee

Program Organizers: Gisele Azimi, University of Toronto; Takanari Ouchi, The University of Tokyo; Kerstin Forsberg, KTH Royal Institute of Technology; Hojong Kim, Pennsylvania State University; Shafiq Alam, University of Saskatchewan; Alafara Baba, University of Ilorin; Neale Neelameggham, IND LLC

Wednesday PM March 17, 2021

2:00 PM
Study on the Enhancement of Iron Removal in the Becher Aeration by a Novel Tubular Reactor: Lei Zhou1; Qiuyue Zhao1; Mingzhao Zheng2; Zimu Zhang1; Guozhi Lv1; Tingan Zhang1; 1Northeastern University

ELECTRONIC MATERIALS

Recent Advances in Functional Materials and 2D/3D Processing for Sensors, Energy Storage, and Electronic Applications — Functional Materials and Printed Electronic Devices

Sponsored by: TMS Functional Materials Division, TMS: Thin Films and Interfaces Committee

Program Organizers: Pooran Joshi, Oak Ridge National Laboratory; Rahul Panat, Carnegie Mellon University; Ravindra Nuggehalli, New Jersey Institute of Technology; Tolga Aytug, Oak Ridge National Laboratory; Yong Lin Kong, University of Utah; Konstantinos Sierras, West Virginia University

Wednesday PM March 17, 2021

Session Chairs: Pooran Joshi, Oak Ridge National Laboratory; Ravindra Nuggehalli, New Jersey Institute of Technology; Konstantinos Sierras, West Virginia University

2:00 PM Invited
3D Printed Passive Sensors: An Overview: Vishal Mehta1; Nuggehalli Ravindra2; 1Ohio Northern University; 2New Jersey Institute of Technology

2:25 PM Invited
Direct Metal Contacts Printing on 4H-SiC for Radiation Detection: Neil Taylor1; Yongchao Yu1; Mihee Ji1; Nora Dianne Ezell1; Pooran Joshi1; Lei Raymond Cao1; 1Oak Ridge National Laboratory; The Ohio State University; 2Oak Ridge National Laboratory; 3The Ohio State University

2:50 PM
Modeling of Rheological Properties of Metal Nanoparticle Conductive Inks for Printed Electronics: Patrick Dzisah1; Nuggehalli Ravindra1; 1New Jersey Institute of Technology

3:10 PM
High Strength Nanotwinned Copper Foils for Current Collectors in Lithium Ion Battery: Fu Chian Chen1; Chen Chih1; 1National Chiao Tung University

3:30 PM Invited
Advancing Multiscale 3D Printing of Bioelectronics with Soft Matter Physics: Yong Lin Kong1; 1University of Utah

ENERGY & ENVIRONMENT

Recycling and Sustainability for Emerging Technologies and Strategic Materials — Recycling & Process Optimization II

Sponsored by: TMS Extraction and Processing Division, TMS Light Metals Division, TMS: Recycling and Environmental Technologies Committee

Program Organizers: John Howarter, Purdue University; Mingming Zhang, ArcelorMittal Global R&D; Elsa Olivetti, Massachusetts Institute of Technology; Hong Peng, University of Queensland

Wednesday PM March 17, 2021

Session Chair: Mingming Zhang, ArcelorMittal Global R&D

2:00 PM
Ecodesign and Strategic Design of Alloys by Combinatorial Optimisation: Franck Tancret1; Madeleine Bignon1; Edern Menou1; Gérard Ramstein1; Emmanuel Bertrand1; Pedro Rivera-Diaz-Del-Castillo1; 1University Of Nantes; 2Safran; 3Lancaster University

2:20 PM
Hydrometallurgical Recycling of Bauxite Residue: Himanshu Tanvar1; Brajendra Mishra; 1Worcester Polytechnic Institute

2:40 PM
Investigation of Ionic Liquids Isolated Iron for Ductile Iron Castings: Blake Stewart1; Haley Doude1; Morgan Abney2; Eric Fox2; Jennifer Edmunson2; Hongjoo Rhee2; 1Mississippi State University; 2National Aeronautics and Space Administration

3:00 PM
Uncertainty Analysis and Reduction for Environmental Impact Modeling of Emerging Manufacturing Technologies: Jiankuan Liao1; Daniel Cooper1; 1University of Michigan

3:55 PM Invited
Nanostructured Thin Film Enabled Thermal Emission Based Passive Sensing for Extreme Environment Applications with Optical Fibers: Paul Ohodnicki1; Sheng Shen2; Henry Du3; 1University of Pittsburgh; 2Carnegie Mellon University; 3Stevens Institute of Technology

WEDNESDAY PM
NUCLEAR MATERIALS

Thermal Property Characterization, Modeling, and Theory in Extreme Environments — Thermal Transport Theory & Mechanisms

Sponsored by: TMS Structural Materials Division, TMS: Nuclear Materials Committee

Program Organizers: Janelle Wharry, Purdue University; Mukesh Bachhav, Idaho National Laboratory; Marat Khafizov, Ohio State University; Eric Lass, University of Tennessee-Knoxville; Vikas Tomar, Purdue University; Tiankai Yao, Idaho National Laboratory; Cody Dennett, Idaho National Laboratory; Karim Ahmed, Texas A&M University

Wednesday PM March 17, 2021

Session Chairs: Vikas Tomar, Purdue University; Mukesh Bachhav, Idaho National Laboratory; Karim Ahmed, Texas A&M University

2:00 PM Invited
Thermal Transport in Irradiated ThO2: A Combined Experimental and Phonon Level Investigation: Anter El-Azab1; Walter Deskins2; Maniesha Singh1; Sanjoy Mazumder1; Kumagai Tomohisa3; Jie Peng1; Marat Khafizov2; Zilong Hua3; Lingfeng He3; David Hurley3; 1Purdue University; 2Ohio State University; 3Idaho National Laboratory

2:30 PM Invited
Thermal Conductivity and Heat Transport Processes of Ion Irradiated and Laser Heated Solids: Patrick Hopkins1; Thomas Pfeifer1; Ethan Scott1; John Gaskins2; David Olson2; Khalid Hattar2; Mark Goorsky3; 1University of Virginia; 2Sandia National Labs; 3UCLA

3:00 PM
Thermal Gradient Effect on the Transport Properties of Helium and Intrinsic Defects in Tungsten: Enrique Martinez Saez1; Thomas Pfeifer2; Ethan Scott3; John Gaskins1; David Olson1; Khalid Hattar1; Mark Goorsky3; 1University of Virginia; 2Sandia National Labs; 3UCLA

3:20 PM Invited
Phonon Transport in ThO2 from Neutron Scattering and First-principles Computation: Michael Manley1; Matthew Bryan2; Chris Marianetti2; Lyuwen Fu3; Krzystof Gofryk4; 1Oak Ridge National Laboratory; 2Columbia University; 3Idaho National Laboratory

3:50 PM Invited
Theory of Non-equilibrium Thermal Transport at High Temperatures from First-principles: Keivan Esfajani1; 1University of Virginia

ADVANCED MATERIALS

2D Materials – Preparation, Properties & Applications — Modeling & Simulations II

Sponsored by: TMS Functional Materials Division, TMS: Thin Films and Interfaces Committee

Program Organizers: Nugeghalli Ravindra, New Jersey Institute of Technology; Ramana Chintalapalle, University of Texas at El Paso; Gerald Ferblantier, Icube Laboratory - Strasbourg University; Sufan Abedrabbo, Khalifa University; Amber Shrivastava, Indian Institute of Technology Bombay

Thursday AM March 18, 2021

Session Chairs: Gerald Ferblantier, University of Strasbourg; Amber Shrivastava, Indian Institute of Technology

8:30 AM
Cesium Lead Bromides - Structural, Electronic & Optical Properties: Aneer Lamichhane1; Nugeghalli Ravindra2; 1New Jersey Institute of Technology

8:50 AM
Thermoelectric Properties of 2-D B,C Nanosheets: Adway Gupta1; Arunima Singh1; 1Arizona State University

9:10 AM
Low Temperature Phonon Anharmonicity in Tungsten Diselenide: Qingan Cai1; 1University of California, Riverside

9:30 AM
Mechanism of Strain Transfer in Transition Metal Dichalcogenides for Phase Change Transistors: Shoieb Ahmed Chowdhury1; Tara Peña1; Stephen Wu1; Hesam Askari1; 1University of Rochester

NUCLEAR MATERIALS

Accelerated Discovery and Qualification of Nuclear Materials for Energy Applications — Innovative Design and Development of Nuclear Materials

Sponsored by: TMS Structural Materials Division, TMS Materials Processing and Manufacturing Division, TMS: Integrated Computational Materials Engineering Committee, TMS: Nuclear Materials Committee, TMS: Additive Manufacturing Committee

Program Organizers: Yongfeng Zhang, University of Wisconsin-Madison; Adrien Couet, University of Wisconsin-Madison; Michael Tonks, University of Florida; Jeffery Aguilar, Idaho National Laboratory; Andrea Jokisaari, Idaho National Laboratory; Karim Ahmed, Texas A&M University

Thursday AM March 18, 2021

Session Chairs: Julie Tucker, Oregon State University; Andrea Jokisaari, Idaho National Laboratory

8:30 AM
Compositionally Graded Bulk Specimen: A High-throughput Approach for Nuclear Alloy Development and Qualification: Xiaoyuan Lou1; Jingfan Yang1; Xiang Liu2; Miaojing Song3; Lingfeng He3; Yongfeng Zhang1; Daniel Schwen1; 1Auburn University; 2Idaho National Lab; 3University of Michigan; 4University of Wisconsin-Madison
ADDITIONAL TECHNOLOGIES

Additive Manufacturing: Beyond the Beam II — Deformation Based Processing

**Sponsored by:** TMS Functional Materials Division, TMS: Additive Manufacturing Committee

**Program Organizers:** Paul Prichard, Kennametal Inc.; James Paramore, US Army Research Laboratory; Peeyush Nandwana, Oak Ridge National Laboratory; Nihan Tuncer, Desktop Metal

**Thursday AM**

**March 18, 2021**

8:30 AM

In Situ Monitoring of Additive Friction Stir Deposition: An Overview: Hang Yu1; Virginia Polytechnic Institute and State University

8:50 AM

Texture Development and Influence in Solid-state Additive Manufacturing: Robert Griffiths1; Mackenzie Perry2; David Garcia1; Hang Yu1; Virginia Polytechnic Institute

9:10 AM

Complex Material Deformation and Flow Phenomena during Additive Friction Stir Deposition of Dissimilar Aluminum Alloys: Mackenzie Perry1; Hunter Rauch2; Robert Griffiths1; Jennifer Sietins2; Yunhui Zhu2; David Garcia1; Hang Yu1; Virginia Tech; CCDC Army Research Laboratory

9:30 AM

Friction Stir Additive Manufacturing of Al 6061-T6: Modeling and Experimental Analysis: Nitin Rohatgi1; Yung Shin1; Purdue University

9:50 AM

Cold Spray Processing of Soft Metals and Hard Tool Steels: Yu Zou1; University of Toronto

10:10 AM

Heat Treatment of Recycled Battlefield Stainless-Steel Scrap for Cold Spray Applications: Christopher Massar1; Kyle Tsaknopoulos2; Byer Sousa2; Jack Grubbs3; Danielle Cote1; Worcester Polytechnic Institute

10:30 AM

Understanding the Effects of Repeated Environmental Exposure on Powder Properties for Additive Manufacturing Applications: Jack Grubbs1; Aaron Birt1; Aaron Nardi1; Danielle Cote1; Worcester Polytechnic Institute; Solvus Global; Army Research Lab

10:50 AM

Aluminum Alloy Powders for Solid State Additive Manufacturing Processing: Kyle Tsaknopoulos2; Jack Grubbs3; Danielle Cote1; Worcester Polytechnic Institute

11:10 AM

Linear Friction Welding: a Solid-state Joining Process for the Manufacturing of Aerospace Titanium Parts: Nicolas Piolle1; ACB
ADDITIVE TECHNOLOGIES

Additive Manufacturing: Solid-State Phase Transformations and Microstructural Evolution — Aluminium Alloys

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Additive Manufacturing Committee, TMS: Phase Transformations Committee, TMS: Shaping and Forming Committee

Program Organizers: Biji-Na Kim, Carpenter Additive; Andrew Wessman, University of Arizona; Chantal Sudbrack, National Energy Technology Laboratory; Eric Lass, University of Tennessee-Knoxville; Katerina Christofidou, University of Sheffield; Peeypush Nandwana, Oak Ridge National Laboratory; Rajarshi Banerjee, University of North Carolina; Whitney Poling, General Motors Corporation; Yousub Lee, Oak Ridge National Laboratory

Thursday AM  March 18, 2021

Session Chairs: Whitney Poling, General Motors; Andrew Wessman, The University of Arizona

8:30 AM  Invited Connecting Microstructure Evolution to Mechanical Behavior of an Al-Mn-Sc Alloy Designed for Selective Laser Melting: Fan Zhang1; Qingbo Jia2; Xinhua Wu3; 1National Institute of Standards and Technology; 2Monash University

9:00 AM  Characterization and Simulation of Eta and Eta-prime Precipitates Evolution in Laser Heat Treated Cold Spray of AA7050: Shaloo Wei1; 1University of Alabama

9:20 AM  Possibilities for Replacing Scandium in High Strength Al-Mg Alloys for 3D Printing by Transition Metal Alloying: Viktor Mann1; Roman Vakhromov2; Dmitriy Ryabov2; Vladimir Korolev2; Daria Daubaraneyt3; Maria Gol4; Alexander Seferyan5; Kirill Nyaza5; 1RUSAL Management; 2Light Materials and Technologies Institute

9:40 AM  Solidification Structure Characterization of an AlCuMnZr Alloy with respect to geometric features and Multiple Parameters: Kevin Sisco1; Sumit Bahi2; Matthew Chisholm2; Richard Michi3; Jonathan Polplawsky4; Amit Shyam5; Ryan Dehoff5; Alex Plotkowski5; Suresh Babu5; 1University of Tennessee Knoxville; 2Oak Ridge National Lab

10:00 AM  Effects of Thermal Processing on the Microstructure and Mechanical Properties of Additively Manufactured AISI10Mg: John Fite1; Suhas Prameela2; John Slotwinski3; Timothy Weihs4; 1Jhu Applied Physics Lab; 2Johns Hopkins University

10:20 AM  Evolution of Microstructure and Dispersoids in Al-Mg 5xxx Alloys Under Wire + Arc Additive Manufacturing and Permanent Mold Casting: Kun Liu1; Ahmed Algindy2; Jianglong Gu3; X. Grant Chen4; 1University of Quebec at Chicoutimi; 2Yangzhou University

10:40 AM  Effect of Laser Glazing on Powder-Processed Icosahedral-Phase-Strengthened Aluminum Alloys: From Single Track to Overlapping Tracks: Minxuan Li5; Hannah Leonard6; Sarshad Rommel6; Cain Hung6; Thomas Watson6; Tod Pohlcadriotes6; Rainer Hebert6; Mark Aindow6; 1University of Connecticut; 2Pratt & Whitney; 3Collins Aerospace

CHARACTERIZATION

Advanced Characterization Techniques for Quantifying and Modeling Deformation — Session VII

Sponsored by: TMS Extraction and Processing Division, TMS Materials Processing and Manufacturing Division, TMS Structural Materials Division, TMS: Advanced Characterization, Testing, and Simulation Committee, TMS: Materials Characterization Committee

Program Organizers: Rodney McCabe, Los Alamos National Laboratory; Marko Knezevic, University of New Hampshire; Irene Beyerlein, University of California-Santa Barbara; Wolfgang Pantleon, Technical University of Denmark; C. Tasan, Massachusetts Institute of Technology; Anil Kumar Mariyappan, Los Alamos National Laboratory; Olivia Underwood, Sandia National Laboratories

Thursday AM  March 18, 2021

8:30 AM  Materials Processing in a Synchrotron Beam: Klaus-Dieter Liss1; 1Guangdong Technion - Israel Institute of Technology (GTIIT)

8:50 AM  On the Coupled Effects of Hydrogen Diffusion and Hydride Precipitation in Zirconium Alloys: Alireza Tondro1; Hamidreza Abdolvand2; 1Western University

9:10 AM  Crystal Plasticity-based Modelling of Taylor Impact Test of Single Crystal Tantalum: Zhangxi Feng1; Miroslav Zecevic2; Ricardo Lebensohn1; Marko Knezevic1; 1University of New Hampshire; 2Los Alamos National Laboratory

9:30 AM  Slip-twin Transfer Across Phase Boundaries: An In-situ Investigation of a Ti-Al-V-Fe (a+ß) Alloy: Jianglong Gu1; Gaoming Zhu2; Cem Tasan3; 1Massachusetts Institute of Technology

9:50 AM  Variability in Mechanical Properties Related to Porosity in LMD Waspaloy: Azdine Nait-Al1; Romain Bordas2; Roland Fortunier3; Patrick Villechaize1; Lucie Rat4; Sebastien Rix5; Samuel Hemery6; Jonathan Cormier7; 1Isae Ensma; 2Safran Aircraft Engines

All times listed are in EDT time zone (UTC-4:00).

www.tms.org/TMS2021
ADVANCED MATERIALS

Advanced Functional and Structural Thin Films and Coatings — Coating Technologies and Surface Structuring for Tools II

Sponsored by: TMS Functional Materials Division, TMS: Thin Films and Interfaces Committee

Program Organizers: Adele Carrado, IPCMS - CNRS; Ramana Chintalapalle, University of Texas at El Paso; Gerald Ferblantier, Icube Laboratory - Strasbourg University; Nancy Michael, University of Texas at Arlington; Karine Mougin, Is2m Cnrs; Heinz Palkowski, Clausthal University of Technology; Nuggehalli Ravindra, New Jersey Institute of Technology; Vikas Tomar, Purdue University

Thursday AM March 18, 2021

Session Chairs: Heinz Palkowski, IMET; Ravindra Nuggehalli, New Jersey Institute of Technology

8:30 AM Invited
Nanoengineered Coating: Lotus Effect, Morphology, Contact Angles and Wettability: Narsingh Singh1; Lisa Kelly2; Narasimha Prasad1; Brett Setera2; Stacey Sova3; David Sachs1; Bradley Arnold1; Fow-Sen Choa4; Christopher Cooper5; 1University of Maryland; Baltimore County

9:00 AM
High-quality Diamond films on Q-carbon Coated Austenitic Stainless Steels 304 and 316: Pratik Joshi1; Siddharth Gupta2; Ariful Haque1; Jagdish Narayan2; 1NC State University; 2Intel Corporation

9:20 AM
Ni-Zn-Al2O3 Cermet Nanocomposite Coatings by High-pressure Cold Spraying: Jagannadh Sripada1; Gobinda Saha2; 1University of New Brunswick

9:40 AM Invited
Manipulating Polyolefin Performance by Control of Morphology through Processing: Michael Jaffe1; 1New Jersey Innovation institute

ENERGY & ENVIRONMENT

Advanced Magnetic Materials for Energy and Power Conversion Applications — Developments in Emerging Permanent Magnets

Sponsored by: TMS Functional Materials Division, TMS: Magnetic Materials Committee

Program Organizers: Richard Beddingfield, North Carolina State University; Daniel Salazar, BCMaterials; Alex Leary, NASA Glenn Research Center; Huseyin Ucar, California Polytechnic University; Yongmei Jin, Michigan Technological University; Arcady Zhukov, University of the Basque Country

Thursday AM March 18, 2021

Session Chairs: Yongmei Jin, Michigan Technological University; Zachary Morgan, Oak Ridge National Laboratory

8:30 AM Atomic Cooperation in Enhancing Magnetism: (Fe, Cu)-doped CeCo5: Durga Paudyal1; Renu Choudhary2; 1Ames Laboratory

8:50 AM Computational Modeling of Fracture in Sm-Co Magnet: Ilenna Niebedin1; Xubo Liu1; Baozhi Cui1; Jun Cui2; 1Ames Laboratory

9:10 AM Effects of Lattice Distortions on Magnetic Properties of Fe16N2: First-principles Study: Yusuke Asari1; Tomohiro Tabata1; Shinya Tamura1; Matachiro Komuro2; Shohei Terada1; 1HITACHI, LTD.
Heterogeneous Sm-Co Sintered Magnets with Enhanced Mechanical Properties: Baozhi Cui; Kubo Liu; Gaoyuan Ouyang; Caijeter Niebedim; Jun Cui; 1Ames Laboratory

9:50 AM Invited
MnBi Thin Film Micromagnets with Tunable Anisotropy for High Temperature Applications: M. Villanueva; E. H. Sánchez; P. Pedraza; P. Ollero; P. Perma; P. S. Normile; C. Navioli; J. Camarero; Jose De Toro; A. Bollero; 1IMEA Nanoscience, Madrid, Spain; 2IRICA & Applied Physics Dept. University of Castilla-La Mancha, Spain

10:20 AM
Role of Fe in Stabilizing Ce(Co, Fe, Cu)5 and Enhancing Its Magnetic Properties: Matthew Kramer; Oleana Palasyuk; Tae-Hoon Kim; Lin Zhou; Sergey Budko; Paul Canfield; Andriy Palasyuk; 1Ames Laboratory

9:30 AM
Heterogeneous Sm-Co Sintered Magnets with Enhanced Mechanical Properties: Baozhi Cui; Kubo Liu; Gaoyuan Ouyang; Caijeter Niebedim; Jun Cui; 1Ames Laboratory

9:50 AM Invited
MnBi Thin Film Micromagnets with Tunable Anisotropy for High Temperature Applications: M. Villanueva; E. H. Sánchez; P. Pedraza; P. Ollero; P. Perma; P. S. Normile; C. Navioli; J. Camarero; Jose De Toro; A. Bollero; 1IMEA Nanoscience, Madrid, Spain; 2IRICA & Applied Physics Dept. University of Castilla-La Mancha, Spain

10:20 AM
Role of Fe in Stabilizing Ce(Co, Fe, Cu)5 and Enhancing Its Magnetic Properties: Matthew Kramer; Oleana Palasyuk; Tae-Hoon Kim; Lin Zhou; Sergey Budko; Paul Canfield; Andriy Palasyuk; 1Ames Laboratory

10:40 AM
Evaluation of Medium-entropy FexCoyNiz Alloys as Precursors for FeCoNi-based High Entropy Magnetic Alloys: Alex Paul; Tanjore Jayaraman; 1University of Michigan-Dearborn

11:00 AM
Substitutional and Interstitial Doping in 1-5 and Its Derivative Structures for the Development of Hard Magnetic Properties: A First Principles Study: Huseyin Ucar; Durga Padulya; 1California Polytechnic University, Pomona; 2Ames Laboratory

ENERGY & ENVIRONMENT

Advanced Materials for Energy Conversion and Storage VII — Energy Storage with Emphasis on Batteries II

Sponsored by: TMS Functional Materials Division, TMS: Energy Conversion and Storage Committee

Program Organizers: Jung Pyung Choi, Pacific Northwest National Laboratory; Soumendra Basu, Boston University; Amit Pandey, Lockheed Martin Space; Paul Ohodnicki, University of Pittsburgh; Soumendra Basu, Boston University; Amit Pandey, National Cheng Kung University

Thursday AM March 18, 2021

Session Chairs: Eric Detsi, University of Pennsylvania; Scott Roberts, Sandia National Laboratory

8:30 AM
Mesoscale Mechanics: Simulating the Role of Stress on Electrode Electrochemical Performance: Scott Roberts; Mark Ferraro; Jeffrey Horner; Julia Meyer; Benjamin Ng; 1Sandia National Laboratories; 2Purdue University

9:00 AM
Metal-sulfur nanocomposite for developing high-loading electrochemical cathode: Sheng-Heng Chung; Cun-Sheng Cheng; 1National Cheng Kung University

9:20 AM
Molecular-level Characterization of the Electrode-electrolyte Interfaces in Li Batteries: Lauren Marbella; 1Columbia University

9:50 AM
New Insights Linking Material Properties and Performance of the Lithium SEI: Beter Gallant; 1MIT

10:20 AM
Simulations of Phase Transformation in Complex Graphite Electrode Microstructures: Afwan Malik; Kent Snyder; Minghong Liu; Hui-Chia Yu; 1Michigan State University; 2Ford Auto Company

MATERIALS DESIGN

Advances in Titanium Technology — Powder Metallurgy and Additive Manufacturing of Ti and Ti Alloys

Sponsored by: TMS Structural Materials Division, TMS: Titanium Committee

Program Organizers: Don Li, Howmet Engineered Products; Yufeng Zheng, University of Nevada-Reno; Peeyush Nandwana, Oak Ridge National Laboratory; Matthew Dunstan, US Army Research Laboratory

Thursday AM March 18, 2021

Session Chair: Matthew Dunstan, U.S. Army Research Laboratory

8:30 AM
Development of Cold Spray Additive Technology for Manufacturing Titanium Mill Products: Stefan Gulizia; Leon Prentice; Peter King; Sadan Zahiri; Alejandro Vargas Uscategui; Christian Dobslin; 1CSIRO Manufacturing

8:50 AM
Investigation to Hole Surface Microstructure Evolution in Drilling of Aerospace Alloys: Ti-5553: David Yan; 2San Jose State University

9:10 AM
Process Design for Laser Hot Wire Additive Manufacturing of Ti-6Al-4V: Brandon Abranovic; Elizabeth Chang-Davidson; Jack Beuth; 1Carnegie Mellon University

9:30 AM
Opportunities to Develop Superior Titanium Alloys by Laser Powder Bed Fusion: Marco Simonelli; Graham McCartney; Zou Zhiyi; Nesma Aboulkhair; Yau Yau Tse; Adam Clare; Richard Hague; 1University of Nottingham

9:50 AM
Towards an ICME Framework of Designing Post-process for Additively Manufactured Ti-6Al-4V: Shengyen Li; Kirby Matthew; James Sobotka; 1Southwest Research Institute

MATERIALS DESIGN


Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Integrated Computational Materials Engineering Committee, TMS: Computational Materials Science and Engineering Committee

Program Organizers: Michael Titus, Purdue University; Pinar Acar, Virginia Tech; Andrew Detor, GE Research; James Saal, Citrine Informatics; Dongwon Shin, Oak Ridge National Laboratory

Thursday AM March 18, 2021

Session Chairs: Pinar Acar, Virginia Tech; Michael Titus, Purdue University

8:30 AM Invited
Knowledge-driven Platform for Federated Multimodal Big Data Storage & Analytics: Kareem Aggour; Vipul Gupta; Andy Detor; Scott Oppenheimer; Joe Vinciquerra; 1GE Research
9:00 AM  Exploring the Compositional Space of High Entropy Alloys via Sequential Learning: Juan Verduzco1; Zachary McClure2; David Farache3; Saaketh Desai1; Alejandro Strachan1; 1Purdue University

9:20 AM  Uncertainty Reduction for Calculated Phase Equilibria: Richard Otis4; Brandon Bocklund2; Zi-Kui Liu6; 1Jet Propulsion Laboratory; 2Pennsylvania State University

9:40 AM  Predicting Vibrational Entropy of FCC Solids Uniquely from Bond Chemistry Using Machine Learning: Anus Manzoor1; Dilpuneet Aidhy1; 1University of Wyoming

LIGHT METALS

Aluminum Reduction Technology — Environment (Material and Equipment)

Sponsored by: TMS Light Metals Division, TMS: Aluminum Committee

Program Organizers: Nadia Ahli, Emirates Global Aluminium; Nancy Holt, Hydro Aluminium AS

Thursday AM  March 18, 2021

Session Chair: Shane Polle, EGA

8:30 AM  Low and High Voltage PFC Slope Coefficient Monitoring during Pot Start-up: Christine Dubois1; Luis Espinoza-Nava2; 1Alcoa

8:50 AM  Latest Developments in GTC Design to Reduce Fluoride Emissions: Philippe Martineau1; Youssef Joumani1; Bassam Hureiki1; Jérémy Neveu1; Fabienne Virieux1; 1Fives

9:10 AM  Process and Environmental Aspects of Applying Unshaped Carbon Materials for Cell Lining Purposes: Alexander Proshkin1; Vitaly Pingin1; Viktor Mann1; Aleksey Zherdev1; Andrey Sbitnev1; Yury Shtefanyuk1; 1RUSAL

9:30 AM  Characterisation of Powders-precondition for Plant Engineering: Peter Hilgraf1; Arne Hilck1; Jan Paepeche1; 1HAW, Hamburg, University of Applied Science; 2Claudius Peters Projects GmbH

9:50 AM  Gas Treatment in the GE Pot Integrated ABART Modules (PIA): Anders Sorhuis1; Håvard Olsen1; Eivind Holmefjord1; Roger Theodorsen1; Mikkel Sørum1; 1GE Power

10:10 AM  New Phase in Upgrade of Soderberg Technology at RUSAL’s Smelters: Viktor Buzunov2; Viktor Mann1; Vitaliy Pingin1; Aleksey Zherdev1; Maksim Kazantsiev1; Andrey Pinaev1; Yuriy Bogdanov1; 1Rusal Etc; 2UC RUSAL

10:30 AM  Question and Answer Period

BIOLOGICAL MATERIALS

Biological Materials Science — Biological Materials Science III

Sponsored by: TMS Functional Materials Division, TMS Structural Materials Division, TMS: Biomaterials Committee

Program Organizers: David Restrepo, University of Texas at San Antonio; Steven Naleway, University of Utah; Jing Du, Pennsylvania State University; Ning Zhang, University of Alabama

Thursday AM  March 18, 2021

Session Chairs: Santiago Orrego, Temple University; Alexander Ossa, Universidad EAFIT

8:30 AM  Invited  Microstructural Variations in Mammalian Enamel: An Exploration of Decussation from the Micro- to the Macro-scale: Cameron Renteria1; Juliana Fernández-Artega1; Alexander Ossa2; Dwayne Arola1; 1University of Washington; 2Universidad EAFIT

9:00 AM  On the Structure and Mechanical Properties of Aprismatic Enamel in Crocodilian Teeth: Jack Grimm1; Cameron Renteria1; Savannah Camacho1; Xitlalit Sanchez-Martinez1; Dwayne Arola1; 1University of Washington

9:20 AM  Tough Enlightenments From the Prayer Bead: Fracture-tolerant Endocarp of Elaeocarpus Ganitrus Seed (Rudraksha): Ashish Ghimire1; Po-Yu Chen1; 1National Tsing Hua University

9:40 AM  Invited  Bioinspired Graphene Nanocomposites with Exceptionally High Mechanical Performance: Xiaodong Li1; 1University of Virginia

10:10 AM  Invited  Tapes: An Overlooked Biological Material Archetype: Hannes Schniepp1; 1College of William & Mary

10:40 AM  Invited  Mechanical Properties of Tough, Mechanochemically Active Hydrogels and Hydrogel-based Composites: Jamie Kruzic1; Yuwan Huang3; Bhakti Jayathilaka1; Shariful Islam1; Meredith Silberstein1; Kristopher Kilian1; 1University of New South Wales; 2Cornell University
ADVANCED MATERIALS

Bulk Metallic Glasses XVIII — Structures and Mechanical Properties

Sponsored by: TMS Structural Materials Division, TMS: Mechanical Behavior of Materials Committee

Program Organizers: Peter Liaw, University of Tennessee; Yanfei Gao, University of Tennessee-Knoxville; Hahn Choo, University of Tennessee; Yunfeng Shi, Rensselaer Polytechnic Institute; Robert Maass, Federal Institute for Materials Research and Testing (BAM); Xie Xie, FCA US LLC; Gongyao Wang, Alcoa Technical Center

Thursday AM March 18, 2021

Session Chairs: Jamie Kruzic, University of New South Wales; Xie Xie, FCA US LLC

8:30 AM Invited
Microstructure - Fracture Toughness Relationships in Bulk Metallic Glasses: Jamie Kruzic1; Bosong Li1; Bernd Gludovatz2; Anna Ceguerra3; Keita Nomoto3; Simon Ringer3; Shenghui Xie3; Sergio Scudino4; 1University of New South Wales; 2The University of Sydney; 3Shenzhen University; 4IFW Dresden

8:55 AM Invited
Structural Heterogeneities Dictate Strength and Fracture Toughness of a Zr-based Metallic Glass: Bernd Gludovatz2; Lisa Krämer2; Bosong Li1; Anton Hohenwarter1; Jamie Kruzic1; 1UNSW Sydney; 2EIS-Leoben; 3Montanuniversität Leoben

9:20 AM Invited
Mechanical Behavior and Phase Stability of Ductile Metallic Glass Nanoparticles: Wendy Gu1; Mehrdad Kiani2; Abhinav Parakh1; 1Stanford University

9:45 AM Invited
Microscopic Description of Plasticity, Relaxation and Rejuvenation Using Anelastic Relaxation Spectra: Michael Atzmorn1; Tianjiao Lei1; Luis Rangel DaCosta2; 1University of Michigan; 2University of California, Irvine; 3University of California, Berkeley

10:10 AM
Competing Effects of Topology and Chemical Bonding on Mechanical Properties of Metallic Glasses: Vishank Jamburi1; Chaiyapat Tangpatjaroen1; Jianqi Xi1; Meng Gao1; John Perepezko1; Izabela Sztufarska1; 1University of Wisconsin - Madison

LIGHT METALS

Cast Shop Technology — DC Casting

Sponsored by: TMS Light Metals Division, TMS: Aluminum Committee

Program Organizer: Samuel Wagstaff, Oculatus

Thursday AM March 18, 2021

Session Chairs: Philippe Jarry, Constellium; Samuel Wagstaff, Oculatus

8:30 AM Invited
Simulation-based Analysis for Optimization of Casting Process in AA7075: Siamak Rafiezadeh1; Philip Pucher1; Steffen Neubert1; Waldemar Ivanov1; 1AMAG

8:50 AM
Characterization of Ingots Cast with the APEX™ Casting System: Craig Cordill1; Gerhard Castro2; Bin Zhang1; 1Wagstaff

9:10 AM
Effect of Ultrasonic Melt Treatment on the Sump Profile and Microstructure of a Direct-chill Cast AA6008 Aluminum Alloy: Tunghy SubROTO2; Gerard Serge Bruno Lebon1; Dmitriy Eskin1; Ivan Skalicky1; Dan Roberts1; Iakovos Tsanakis1; Koulsis Pericleous1; 1Brunel University London; 2Constellium UTC; 3Oxford Brookes University; 4University of Greenwich

9:30 AM
The Influence of the Casting Speed in Horizontal Continuous Casting of Aluminium Alloy EN AW 6082: Akib Obali1; Kerem Dilek2; Mertol Gokelma1; Seracettin Akdi1; Deniz Kavrar Urk1; 1Sistem Teknik Industrial Furnaces Ltd.; 2Izmir Institute of Technology; 3Akdi Engineering and Consultancy

9:50 AM
The Impact of Casting Conditions on Edge Cracking of AA5182 Ingots during Hot Rolling: Samuel Wagstaff1; 1Oculatus

10:10 AM
Reducing Gas Shrinkage Porosity in AlMg Alloy Slabs: Igor Kostin1; Aleksandr Sidorov1; Aleksy Startsev1; Andrey Kretchetov1; Aleksandr Krokhin1; Sergey Belyaev2; 1UC RUSAL; 2FU

10:30 AM
Molecular Dynamics Simulations of the Evolution of Residual Stresses during Rapid Solidification of Aluminium: Michael Papanikolaou1; Konstantinos Salonitis1; Mark Joly1; 1Cranfield University

10:50 AM Question and Answer/Panel Discussion

NUCLEAR MATERIALS

Ceramic Materials for Nuclear Energy Research and Applications — Radiation Effects and Mass Transport

Sponsored by: TMS Extraction and Processing Division, TMS Structural Materials Division, TMS Light Metals Division, TMS: Advanced Characterization, Testing, and Simulation Committee, TMS: Energy Committee, TMS: Nuclear Materials Committee

Program Organizers: Xian-Ming Bai, Virginia Polytechnic Institute and State University; Yongfeng Zhang, University of Wisconsin-Madison; Larry Aagesen, Idaho National Laboratory; Vincenzo Rondinella, Jrc-Ec

Thursday AM March 18, 2021

Session Chairs: Simon Pimblott, Idaho National Laboratory; Walter Luscher, Pacific Northwest National Laboratory

8:30 AM Invited
Irradiation Effects on Zirconium Alloy Oxides and Their Impacts on In-reactor Corrosion Rates: Adrien Couet1; Zefeng Yu1; Taeho Kim2; Hongliang Zhang3; Mukesh Bachhav2; Lingfeng He2; 1University of Wisconsin-Madison; 2Idaho National Laboratory

9:00 AM
Effect of UV and Gamma Irradiation on the Hydrothermal Corrosion of Ion-irradiated SiC: Arunthumar Seshadri1; Koroush Shirvani1; Taeho Kim2; Adrien Couet1; 1Massachusetts Institute of Technology; 2University of Wisconsin-Madison

9:20 AM Invited
In-situ Measurement of Tritium Release from Lithium Aluminate Under Neutron Irradiation: Walter Luscher1; David Senor2; Gary Hoggard2; 1Pacific Northwest National Laboratory; 2Idaho National Laboratory

All times listed are in EDT time zone (UTC-4:00).

www.tms.org/TMS2021
CHARACTERIZATION

Characterization of Materials through High Resolution Imaging — High Resolution Characterization of Materials with Phase Contrast Imaging

Sponsored by: TMS Structural Materials Division, TMS: Advanced Characterization, Testing, and Simulation Committee

Program Organizers: Richard Sandberg, Brigham Young University; Ross Harder, Argonne National Laboratory; Xianghui Xiao, Brookhaven National Laboratory; Brian Abbey, La Trobe University; Saryu Fensin, Los Alamos National Laboratory; Ana Diaz, Paul Scherrer Institut; Mathew Cherukara, Argonne National Laboratory

Thursday AM  March 18, 2021

Session Chair: Xianghui Xiao, Brookhaven National Laboratory

ADDITIVE TECHNOLOGIES

Computational Techniques for Multi-Scale Modeling in Advanced Manufacturing — Multiscale Solidification Models

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS Extraction and Processing Division, TMS: Computational Materials Science and Engineering Committee, TMS: Process Technology and Modeling Committee

Program Organizers: Adrian Sabau, Oak Ridge National Laboratory; Anthony Rollett, Carnegie Mellon University; Laurentiu Nastac, University of Alabama; Mei Li, Ford Motor Company; Alexander Anderson, Gopher Resource; Srujan Rokkam, Advanced Cooling Technologies Inc

Thursday AM  March 18, 2021

Session Chair: Anthony Rollett, Carnegie Mellon
9:20 AM  
**Computational Modeling of Nanoparticles Dispersion in Hybrid Process of Ink Jetting and Laser Powder Bed Fusion**
*Milad Ghayoor1; Bryce Cox2; Joshua Gess1; Somayeh Paseban1; Oregon State University*

9:45 AM  
**Multi-scale, Multi-physics Modeling of Additive Manufacturing Challenges and Potential Solutions**
*Dayalan Gunasegaram1; Anthony Murphy2; CSIRO*

10:10 AM  
**Multiphysics Simulation of Microstructure Evolution in Selective Laser Melting of AlSi10Mg**
*Dehao Liu1; Yan Wang1; Georgia Institute of Technology*

**PHYSICAL METALLURGY**

**Computational Thermodynamics and Kinetics — Data Methods, Tools and High Throughput**

*Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Chemistry and Physics of Materials Committee, TMS: Computational Materials Science and Engineering Committee*

**Program Organizers:** Nana Ofor-Oppoku, Canadian Nuclear Laboratories; Eva Zarkadoula, Oak Ridge National Laboratory; Enrique Martinez Saez, Clemson University; Vahid Attari, Texas A&M University; Jorge Munoz, University of Texas at El Paso

**Session Chairs:**  
Rodrigo Freitas, Stanford University; Dehao Liu, Georgia Institute of Technology; Arunima Singh, Arizona State University; Raymundo Arroyave, Texas A&M University

**Thursday AM  March 18, 2021**

8:30 AM  
**Invited**  
**Data-driven Discovery of Microstructure Evolution in Selective Laser Melting of AlSi10Mg**
*Dehao Liu1; Yan Wang1; Georgia Institute of Technology*

9:00 AM  
**High-throughput Density-functional Theory Methods for Discovery of Actinide Materials**
*Matthew Christian1; Erin Johnson2; Theodore Besmann3; University of South Carolina; Dalhousie University*

9:20 AM  
**The High Entropy Alloy Space is Not as Big as We Think It is**
*Roymundo Arroyave1; Tanner Kirk1; Texas A&M University*

9:50 AM  
**Invited**  
**Uncovering Atomic Mechanisms of Crystallization Using Machine Learning**
*Rodrigo Freitas1; Evan Reed2; Massachusetts Institute of Technology; Stanford University*

10:20 AM  
**A Data-driven Approach to Long-Time Molecular Dynamics**
*Danny Perez1; Nithin Mathew2; Enrique Martinez3; Los Alamos National Laboratory*

10:50 AM  
**Dendritic Growth Prediction in Metal Additive Manufacturing with Physics-constrained Neural Networks**
*Dehao Liu1; Yan Wang1; Georgia Institute of Technology*

**CORROSION**

**Environmental Degradation of Additively Manufactured Alloys — AM Materials and Aqueous Corrosion - Part II: Stainless Steel, Inconel 718 and Coatings**

*Sponsored by: TMS Structural Materials Division, TMS: Corrosion and Environmental Effects Committee, TMS: Additive Manufacturing Committee*

**Program Organizers:** Kinga Unocic, Oak Ridge National Laboratory; Jenifer Locke, Ohio State University; Sebastian Dryepondt, Oak Ridge National Laboratory; Michael Kirka, Oak Ridge National Laboratory; Xiaoyuan Lou, Auburn University; Brendy Rincon Troconis, University of Texas at San Antonio; Luke Brewer, University of Alabama

**Thursday AM  March 18, 2021**

8:30 AM  
**Invited**  
**Localized Corrosion of Additively Manufactured Stainless Steels**
*Micheal Melia1; Jesse Duran2; Rebecca Marshall3; Ryan Katona2; Rebecca Schaller1; Jeffrey Rodelas1; Michael Heiden1; Bradley Jared2; Robert Kelly3; Eric Schindelholz2; Sandia National Laboratories; University of Virginia; The Ohio State University*

8:50 AM  
**Invited**  
**Melt Pool Boundaries and the Corrosion of Laser Powder Fusion Stainless Steels**
*Eric Schindelholz2; Michael Melia1; Christopher Barr1; Bradley Jared2; Jeffrey Rodelas1; Paul Kotula2; Ohio State University; Sandia National Laboratories; Sandia National Laboratories*

9:20 AM  
**Invited**  
**Selective Corrosion and Sensitization Behavior in Laser Powder Bed Fusion 316L**
*Robert Kelly1; Duane Macatangay1; Jenna Conrades1; Keegan Brunner1; University of Virginia*

9:50 AM  
**High Performance AM Stainless Steel 316L Under Corrosive Environment**
*Thomas Voisin1; Zhen Qi1; Yuilang Zhang1; Rongpei Shi1; Jos Kacher1; Manyalibo Matthews1; Brandon Wood1; Y. Morris Wang1; Lawrence Livermore National Laboratory; Georgia Tech*

10:10 AM  
**Improving the Corrosion Performance of Additively Manufactured 316L via Chemically-modified Feedstock**
*Joseph Sopcisak1; Steven Storck1; Rengaswamy Srinivasan1; Jason Trelewicz1; David Sprouster1; Kevin Hemker1; Mo-Rigen He2; Timothy Montalbano1; Johns Hopkins University Applied Physics Laboratory; Stony Brook University; Johns Hopkins University*

10:30 AM  
**Electrochemical Response of Additively Printed Inconel 718 by Laser-based Direct Energy Deposition**
*Sangram Mazumder1; Mangesh V. Pantawane1; Yee-Hsien Ho1; Narenda B. Dahotre1; University of North Texas*

10:50 AM  
**Corrosion Behavior of Functionally Graded Inconel 718 Produced by Additive Manufacturing**
*Yaiza Gonzalez-Garcia1; Lola Devignes2; Aytacl Yilmaz1; Arjan de Groot1; Evgenii Borisov1; Vera Popovich1; Delft University of Technology; SIGMA Clermont; Peter de Great Saint-Petersburg Polytechni University*
11:10 AM
Nano-crystalline Cold Spray Coatings for Repair and Retrofit of Existing Large-Scale Structures: Rose Roy1; Baillie Haddad2; Kris Klus3; Christian Widener3; 2VRC Metal Systems

11:30 AM Invited
Tailoring Microstructure in Additively Manufactured Stainless Steels for Enhanced Corrosion Performance: Jason Televezic2; David Sprouster3; Gary Halada3; Joseph Sopicak3; Steven Storck3; 1Stony Brook University; 2The Johns Hopkins University Applied Physics Laboratory

CORROSION
Environmentally Assisted Cracking: Theory and Practice — Environmental Embrittlement, Fracture, and Fatigue

Sponsored by: TMS Structural Materials Division, TMS: Corrosion and Environmental Effects Committee

Program Organizers: Bai Cui, University of Nebraska-Lincoln; Raul Rebak, GE Global Research; Srujan Rokkam, Advanced Cooling Technologies Inc; Jenifer Locke, Ohio State University

Thursday AM  March 18, 2021

Session Chairs: Jian Luo, University of California, San Diego; Stephen Raiman, Texas A&M University

8:30 AM  Invited
Corrosion, Irradiation, and Cracking Studies in Support of Coating Development for SiC-based Accident Tolerant Fuel Cladding: Stephen Raiman1; Peter Doyle2; Peter Mouche3; Yutai Katoh4; 1Texas A&M University; 2University of Tennessee; 3Oak Ridge National Laboratory

9:00 AM
Modeling of Corrosion Crack Dynamics and Fracture Using a Physics-based Meshless Peridynamics Approach: Srujan Rokkam2; Masoud Behzadinasab2; Max Gunzburger3; Sachin Shanbhag3; Nam Phan4; 1Advanced Cooling Technologies Inc; 2Brown University; 3Florida State University; 4Naval Air Systems Command

9:30 AM
Humidity and Chemistry Dependent Embrittlement in the Al-Ga-In Liquid Metal Embrittlement System: Justin Norrett1; Cameron Frampton1; Victoria Miller1; 1University of Florida

9:50 AM
The Effect of Additive Manufacturing Process Parameter on the Fatigue Crack Growth Rates of Alloy 718 in Elevated-pressure and Elevated temperature Hydrogen Gas: William Hickey1; John Macha2; Vinicio Ynciarte1; Brenda Rincon Troconis2; 1Southwest Research Institute; 2University of Texas at San Antonio

10:10 AM
Influence of Hydrogen on Softened HAZ during In-situ Slow Strain Rate Testing in YS 550 MPa Grade Steel Welds: Namthyon Kang1; Hanji Park1; Cheolho Park1; Junghoon Lee2; Stephen Liu2; Dae-Geun Nam4; 1Pusan National University; 2Chosun University; 3Colorado School of Mines; 4Korea Institute of Industrial Technology

10:30 AM
Hydrogen Permeability for Determining Hydrogen Embrittlement Susceptibility of High Hardness Steels: William Williams1; David Salley2; Haley Doude2; David Wipf2; Daniel Field2; Krista Limmer2; Kevin Doherty2; Hongjoo Rhe3; 1Mississippi State University, CAVS; 2Ohio State University; 3Mississippi State University

10:50 AM
Characterization of Hydrogen Embrittlement Sensitivity of Various High Hardness Steels: David Salley1; Will Williams2; Haley Doude1; Wilburn Whittington1; Dan Field2; Krista Limmer2; Kevin Doherty2; Hongjoo Rhe3; Shiraz Mujahid4; 1Center for Advanced Vehicular Systems, Mississippi State University; 2Metals Branch, US CCDC Army Research Laboratory; 3Mississippi State University

MATERIALS DESIGN
Fatigue in Materials: Fundamentals, Multiscale Characterizations and Computational Modeling — Multiscale Modeling Approaches to Improve Fatigue Predictions


Program Organizers: Garrett Pataky, Clemson University; Ashley Spear, University of Utah; Antonios Kontsos, Drexel University; Brian Wisner, Ohio University; Jean-Charles Stinville, University of California-Santa Barbara

Thursday AM  March 18, 2021

Session Chair: Antonios Kontsos, Drexel University

8:30 AM
Experimental Analysis and Numerical Simulation of Cyclic Deformation and Fatigue Behavior of AZ31 Mg Alloy: Abbas Jamali1; Meijuan Zhang2; Anxin Ma6; Javier Llorca3; 1IMDEA Materials Institute & Technical University of Madrid; 2IMDEA Materials Institute

8:50 AM
PRISMS-fatigue: A General Framework for Fatigue Analysis in Polycrystalline Metals and Alloys Using the Crystal Plasticity Finite Element Method: Mohammadreza Yaghoobi1; Krzysztof S. Stopka2; Aaditya Lakshmanan1; John E. Allison6; Veera Sundararaghavan1; David L. McDowell1; 1University of Michigan; 2Georgia Institute of Technology

9:10 AM
Propagation of Microstructure-induced Fatigue Variability onto Stress Concentrations: Gustavo Castelluccio1; Farhan Ashraf1; 1Cranfield University

9:30 AM
Origin of Long-range Internal Stress with Heterogeneous Dislocation Distributions: Yegun Gu1; Jaafar El-Awady1; 1Johns Hopkins University

9:50 AM
A Simplified Formula to Estimate the Size of the Cyclic Plastic Zone in Metals Containing Elastic Particles: Tito Andriollo1; Varvara Koznetsosova1; 1Technical University of Denmark; 2Eindhoven University of Technology

All times listed are in EDT time zone (UTC-4:00).
**MATERIALS PROCESSING**

**Friction Stir Welding and Processing XI — Modeling: Process & Properties**

**Sponsored by:** TMS Materials Processing and Manufacturing Division, TMS: Shaping and Forming Committee

**Program Organizers:** Yuri Hovanski, Brigham Young University; Prush Upadhyay, Pacific Northwest National Laboratory; Yutaka Sato, Tohoku University; Nilesh Kumar, University of Alabama; Tuscaloosa; Anton Naumov, Peter the Great St. Petersburg Polytechnic University

**Thursday AM**  
March 18, 2021

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**8:30 AM**

Application of Machine Learning for Prediction of Microstructure and Mechanical Performance in Solid-state Joining Processes: Benjamin Klusermann; Frederic Bock; Uceu Suhuddin; Lucian Blaga; Jorge dos Santos; Helmholtz-Zentrum Geesthacht

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**8:50 AM**

Friction Stir Welding Defect Prediction Using Computational Solid Mechanics’ Modeling: Rafael Giorjao; Julian Avila; Eduardo Monlevade; Antonio Ramirez; Andre Tschiptschin; The Ohio State University; UNESP; USP

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**9:10 AM**

The Development of FSW Process Modelling for Use by Process Engineers: Mike Lewis; Simon Smith; FTS Engineering Answers Ltd.; Transforming Stress Ltd.

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**9:30 AM**

Effect of Tool Geometries on “Heat-input” during Friction Stir Welding of Aluminum Alloys: Yutaka Sato; Yuichiro Tanai; Tianbo Zhao; Dalong Yi; Tohoku University; Tsinghua University/Tohoku University

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**9:50 AM**

Experimental and Numerical Investigations of High Strain Rate Torsion Tests of Al-based Alloys at Elevated Temperatures: Anton Naumov; Anatoli Borisov; Anastasiya Borisova; Peter the Great St. Petersburg Polytechnic University

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**10:10 AM**

Numerical Simulation and Analysis of Solid Phase Processing: A Validated Friction Extrusion Smoothed Particle Hydrodynamics Model: Lei Li; Xiao Li; Anthony Reynolds; Glenn Grant; Ayoub Soulami; Pacific Northwest National Laboratory; University of South Carolina

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**10:30 AM**

Effect of Temperature and Strain Parameters of High Strain Rate Torsion Tests on the Microstructure Evolution of Al-based Alloys: Anastasiya Borisova; Elizaveta Anhimova; Oleg Zotov; Anton Naumov; Anatoli Borisov; Peter the Great St. Petersburg Polytechnic University

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**PHYSICAL METALLURGY**

**Frontiers in Solidification Science VIII — Processing, Defects & Segregation / Steel & Cast Iron**

**Sponsored by:** TMS Materials Processing and Manufacturing Division, TMS: Chemistry and Physics of Materials Committee, TMS: Phase Transformations Committee, TMS: Solidification Committee, TMS: Computational Materials Science and Engineering Committee

**Program Organizers:** Damien Tourret, IMDEA Materials; Amy Clarke, Colorado School of Mines; Ulrike Hecht, Access e.V.; Nana Ofori-Opoku, Canadian Nuclear Laboratories; Melis Serefoglu, Koc University; Tiberiu Stan, Northwestern University

**Thursday AM**  
March 18, 2021

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**8:30 AM**

Cellular Automaton Modeling of Solidification Microstructure and Microporosity in Multi-component Aluminum Alloys: Cheng Gu; Michael Moodispaw; Colin Ridgeway; Alan Luo; Ohio State University

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**8:50 AM**

Effects of Process Conditions and Morphology Evolution on Microsegregation During Solidification: A Combined Phase-field and Experimental Study: Zhenjie Yao; David Montiel; Mei Li; Katsuyo Thornton; John Allison; University of Michigan; Ford Motor Company

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**9:10 AM**

Effect of Vacuum during Flow in High-pressure Die Casting: Water Analog Experiments: Nicole Trometer; Xuejun Huang; Emre Cinkilic; Alan Luo; The Ohio State University

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**9:30 AM Invited**

Grain Selection after a Massive-like Transformation from Ferrite to Austenite during Solidification in Fe-based Alloys: Hideyuki Yasuda; Taka Narumi; Takeru Suga; Yukihiro Nannri; Kyoto University

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**10:00 AM**

Synchrotron Examination of Nucleation and Growth of Nodular and Compacted Graphite Particles during Cyclic Solidification of Ductile Cast Iron: Chaoling Xu; Tim Wigger; Mohammed Azeem; Tito Andriollo; Samuel Clark; Robert Atwood; Jesper Hattel; Peter Lee; Niels Tiedje; Technical University of Denmark; University College London, Mechanical Engineering; University of Leicester; Diamond Light Source

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**10:20 AM**

In Situ Quantification of Degenerate Graphite Nodule Formation during the Solidification of Ductile Cast Iron: Tim Wigger; Tito Andriollo; Mohammed Azeem; Chaoling Xu; Samuel Clark; Robert Atwood; Niels Tiedje; Peter Lee; UCL; DTU; University of Leicester; Diamond Light Source
SPECIAL TOPICS

Frontiers of Materials Award Symposium: Radiation Processing of Materials — Session I: Radiation Synthesis and Processing of Materials

Program Organizer: Jessika Rojas, Virginia Commonwealth University

Thursday AM March 18, 2021

8:30 AM
Introductory Comments: Frontiers of Materials Award Symposium: Radiation Processing of Materials
Jessika Rojas
Virginia Commonwealth University

8:35 AM Keynote
Ionizing Radiation in the Synthesis and Processing of Nanocomposites for Medical and Environmental Applications: Jessika Rojas
Virginia Commonwealth University

9:05 AM Invited
Radiation-grafting of Smart Polymers for Potential Biomedical Applications: Emilio Bucio
Nuclear Science Institute at National University of Mexico

9:35 AM Invited
Direct Prompt Synthesis of Radioactive Nanoparticles (Prompt Nano Radiosotopes): Carlos Castano
Missouri University of Science and Technology

10:05 AM Invited
Probing and Processing Nanomaterials and Devices with Radiation: Cory Cress
U.S. Naval Research Laboratory

10:35 AM Invited
Nanochannels, Nanowires, and Nanotubes Fabricated by Ion-track Nanotechnology: Maria Eugenia Toimil-Molares
GSI Helmholtz Center

11:05 AM Invited
Ionizing Radiation Synthesis of Novel Fabrics for Extraction of Uranium from Seawater: Mohammed Al-Sheikhly
University of Maryland

11:35 AM Live Question and Answer

NANOSTRUCTURED MATERIALS


Sponsored by: TMS Functional Materials Division, TMS: Nanomaterials Committee

Program Organizers: Jiyoung Chang, University of Utah; Michael Cai Wang, University of South Florida; Sarah Zhong, University of South Florida; Sun Choi, Korea Institute of Science and Technology; Pei Dong, George Mason University

Thursday AM March 18, 2021

Session Chairs: Sun Choi, Korea Institute of Science and Technology; Jiyoung Chang, University of Utah

8:30 AM Invited
3D Assembled Functional Structures from Crumpled 2D Nanomaterials: Baoxing Xu
University of Virginia

8:55 AM
Facile Green Synthesis of ZnInS Quantum Dots: Temporal Evolution of Its Optical Properties and Cell Viability against Normal and Cancersous Cells: Samuel Oluwafemi
Nkosingiphile Zikalala; Sundararajan Parani
University of Johannesburg

9:15 AM Invited
Scalable Synthesis of Nanofibers for Energy Storage and Filtration Applications: Yuepeng Zhang
Devon Powers; Byeongdu Lee; Erik Dahl; Sanja Tepavcevic; Peter Zapoli; Hee Je Seong; Ashley Simmons; Mark Kozel; Michael LeResche; Krzysztof Pupek; Gregory Krumdick
Argonne National Laboratory

9:40 AM
Growth Mechanism Study of Boron Carbide Nanowires: Manira Akter; Terry Xu
University of North Carolina, Charlotte; UNCC

10:00 AM
Unveiling the Origin of Morphological Instability in Topologically Complex Electrocatlytic Nanostructures: Ian Mccue; Yawei Li; Zhiyong Xia; Joshua Snyder; Johns Hopkins Applied Physics Laboratory; National Renewable Energy Laboratory; Drexel University

ADVANCED MATERIALS

High Entropy Alloys IX: Alloy Development and Properties — Alloy Development and Application IV

Sponsored by: TMS Functional Materials Division, TMS Structural Materials Division, TMS: Alloy Phases Committee, TMS: Mechanical Behavior of Materials Committee

Program Organizers: Peter Liaw, University of Tennessee; Michael Gao, National Energy Technology Laboratory; E-Wen Huang, National Chiao Tung University; Srvatsan Tirumalai, The University of Akron; Xie Xie, FCA US LLC; Gongyao Wang, Alcoa Technical Center

Thursday AM March 18, 2021

Session Chairs: Wei Chen, Illinois Institute of Technology; Jian Luo, University of California, San Diego

8:30 AM Invited
From High-entropy Ceramics (HECs) to Compositionaly Complex Ceramics (CCCs): Jian Luo
University of California, San Diego

8:55 AM
Direct Production of High Entropy Alloy Powders: Jawad Haidar
Kinaltek Pty Ltd.

9:15 AM
Hierarchical Eutectoid Nano-lamellar Decomposition in an Al0.3CoFeNi Complex Concentrated Alloy: Sriswaroop Dasari
Bharat Gwalani; Abhishek Sharma; Vishal Soni; Abhinav Jagetia; Stephane Gorsse; Rajarshi Banerjee; University of North Texas; University of Bordeaux, France

9:35 AM Invited
Data-driven Design of Refractory High-entropy Alloys: Wei Chen; George Kim; Chanho Lee; Peter Liaw; Illinois Institute of Technology; University of Tennessee

10:00 AM
Accelerated Alloy Development and Characterization of Compositionaly Complex Alloys via High-throughput Methods: Phalgun Nalput; Michael Moorehead; Thien Duong; Michael Niezgoda; Adrien Couet; Kumar Sridharan; Santanu Chaudhuri; Dan Thoma; University of Wisconsin; Argonne National Laboratory
10:20 AM
Nanostructured Oxide-dispersion-strengthened High-entropy Alloys: Xiang Zhang1; Fei Wang1; Xueliang Yan1; Xing-Zhong Li1; Khalid Hattar1; Bai Cui2; 1University of Nebraska-Lincoln; 2Sandia National Laboratories

10:40 AM
A High-throughput Strategy to Study Phase Stability and Mechanical Properties in Nb-Ti-V-Zr: Mu Li1; Zhaohan Zhang1; Arashdeep Thind1; Guodong Ren1; Rohan Mishra1; Katharine Flores2; 1Washington University in St. Louis

ADVANCED MATERIALS

High Entropy Alloys IX: Structures and Modeling — Structures and Characterization III

Sponsored by: TMS Functional Materials Division, TMS Structural Materials Division, TMS: Alloy Phases Committee, TMS: Mechanical Behavior of Materials Committee

Program Organizers: Peter Liaw, University of Tennessee; Michael Gao, National Energy Technology Laboratory; E-Wen Huang, National Chiao Tung University; Srivatsan Tirumalai, The University of Akron; Xie Xie, FCA US LLC; Gongyao Wang, Alcoa Technical Center

Thursday AM  March 18, 2021

Session Chairs: Keith Knipling, US Naval Research Laboratory; Jonathan Poplawsky, Oak Ridge National Laboratory

8:30 AM
Analysis of Multi-hit Events in Atom Probe Tomography of Refractory High Entropy Alloys: Patrick Callahan1; Keith Knipling1; 1US Naval Research Laboratory

8:50 AM Invited
Heavy Ion Irradiation Response of AlxFeCrNiMn High Entropy Alloys: Nan Li1; Di Chen2; Youxing Chen3; Jordan Weaver4; Yongqiang Wang4; Saryu Fensin1; Stuart Maloy1; Amit Misra5; 1Los Alamos National Laboratory; 2University of Houston; 3University of North Carolina; 4National Institute of Standards and Technology; 5University of Michigan

9:15 AM Invited
Understanding Radiation Resistance in High Entropy Alloys Through Atom Probe Tomography: Jonathan Poplawsky1; Xing Wang1; Wei-Ying Chen1; Tengfei Yang3; William Weber1; Yanwen Zhang1; 1Oak Ridge National Laboratory; 2Argonne National Laboratory; 3Hunan University

9:40 AM
Grain-scale Plastic Response of Equiatomic CoCrFeMnNi High-entropy Alloy Using High Energy Diffraction Microscopy: Jerard Gordon1; Rachel Lim1; Tony Rollett1; Darren Pagan2; 1Carnegie Mellon University; 2Cornell High Energy Sychrotron Source

10:00 AM
Characteristics of Dislocation Slip in Refractory Multi-principal Element Alloys: Fulin Wang1; Jean-Charles Stinville1; Marie-Agathe Charpogne1; Glenn Balbus2; Leah Mills2; Tresa Pollock3; Daniel Gianola4; 1University Of California. Santa Barbara

10:20 AM
Nitrogen-induced Solid Solution Hardening of an Austenitic (CrFeMnNi) HEA: Mathieu Traversier1; Pierre Rinn1; Emmanuel Rigat2; Anna Fraczkiewicz2; 1Ecole des mines de Saint-Etienne; 2CEA LITEN
CHARACTERIZATION

Mechanical Response of Materials Investigated through Novel In-situ Experiments and Modeling — Session VII

**Sponsored by:** TMS Structural Materials Division, TMS: Thin Films and Interfaces Committee, TMS: Advanced Characterization, Testing, and Simulation Committee

**Program Organizers:** Saurabh Puri, Microstructure Engineering; Amit Pandey, Lockheed Martin Space; Dhriti Bhattacharyya, Australian Nuclear Science and Technology Organization; Dongchan Jang, KAIST; Jagannathan Rajagopalan, Arizona State University; Josh Kacher, Georgia Institute of Technology; Minh-Son Pham, Imperial College London; Robert Wheeler, Microtesting Solutions LLC; Shailendra Joshi, University of Houston

**Thursday AM March 18, 2021**

**Session Chair:** Dhriti Bhattacharyya, Australian Nuclear Science and Technology Organization

**8:30 AM Keynote**
Microstructural Influences on Grain Boundary Sliding in High Purity Aluminum: Marissa Linne\(^1\); Thomas Bieler\(^2\); Samantha Daly\(^3\); \(^1\)University of Michigan; Lawrence Livermore National Laboratory; \(^2\)Michigan State University; \(^3\)University of California at Santa Barbara

**9:10 AM**
In-situ Analysis of Powder Bed Quality during Selective Laser Melting: Tan-Phuc Le\(^1\); Matteo Setta\(^1\); \(^1\)Nanyang Technological University

**9:30 AM**
Non-linear Reversible Behaviour of Metallic Alloys at Low Stresses: Jaji Naveena Chamakura\(^1\); Vera Popovich\(^1\); Jilt Sietsma\(^1\); \(^1\)TU Delft

**9:50 AM**
Creation of Strength Diagrams of Aluminum Flat Products, Dependent on the Different Thermomechanical Processes: Kaan Ipek\(^1\); Emel Caliskan\(^2\); Derya Dispinar\(^2\); \(^1\)Teknik Aluminyum San. A.S.; \(^2\)Istanbul University; \(^3\)Istanbul Teknik University

**10:10 AM**
Microscale Insight into the Effect of Twinning on Fracture in a Manganese Steel: Xinzhu Zheng\(^1\); Ankit Srivastava\(^1\); \(^1\)Texas A&M University

**10:30 AM**
Surface Erosion of Spacecraft by High-velocity Regolith Impacts to Simulate Wind Storms on Martian Surfaces: Nicole Bocca\(^1\); Cheng Zhang\(^1\); Arvind Agarwal\(^1\); \(^1\)Florida International University

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MATERIALS PROCESSING

Ni-Co 2021: The 5th International Symposium on Nickel and Cobalt — Market, Materials and Mineral Processing

**Sponsored by:** The Metallurgy & Materials Society of the Canadian Institute of Mining, Metallurgy and Petroleum, TMS Extraction and Processing Division, TMS: Hydrometallurgy and Electrometallurgy Committee, TMS: Pyrometallurgy Committee

**Program Organizers:** Corby Anderson, Colorado School of Mines; Dean Gregurek, RHI Magnesita; Mari Lundström, Aalto University; Christina Meskers; Prabhat Tripathy, Batelle Energy Alliance (Idaho National Laboratory); Fiseha Tesfaye, Abo Akademi University; Yuanbo Zhang, Central South University; Sari Muinonen, Glencore; Graeme Goodall, XPS- Glencore; Shijie Wang, Rio Tinto Kennecott Utah Copper Corp (Retired)

**Thursday AM March 18, 2021**

**8:30 AM Invited**
Global Electrification of Electric Vehicles and Intertwined Material Supply Chains of Cobalt, Copper and Nickel: Ruby Nguyen\(^1\); Roderick Eggert\(^2\); Corby Anderson; Mike Severson\(^3\); \(^1\)Idaho National Laboratory; \(^2\)Colorado School of Mines; \(^3\)Miami University of Ohio

**8:50 AM**
An Innovative Beneficiation Process Developed for Jinchuan Nickel Ore Resources: Shijie Wang\(^1\); \(^1\)Rio Tinto Kennecott Utah Copper Corp

**9:10 AM**
Effect of Fluorine on the High Temperature Oxidation Behavior of Nickel-based Alloys: Alexander Donchev\(^1\); Mathias Galetz\(^2\); \(^1\)DECHEMA-Forschungsinstitut

**9:30 AM**
The Increasing Use of Nickel in the 21st Century: Gary Coates\(^1\); \(^1\)Nickel Institute
TMS2021 VIRTUAL FINAL TECHNICAL PROGRAM

ELECTRONIC MATERIALS

Phase Stability, Phase Transformations, and Reactive Phase Formation in Electronic Materials XX — Advanced Electronic Materials

Sponsored by: TMS Functional Materials Division, TMS Structural Materials Division, TMS: Alloy Phases Committee

Program Organizers: Hiroshi Nishikawa, Osaka University; Shih-kang Lin, National Cheng Kung University; Chao-Hong Wang, National Chung Cheng University; Chih-Ming Chen, National Chung Hsing University; Jaejo Lee, Hongik University; Zhi-Quan Liu, Shenzhen Institutes of Advanced Technology; Ming-Tzer Lin, National Chung Hsing University; Dajian Li, Karlsruhe Institute of Technology; Yu Zhong, Worcester Polytechnic Institute; Yee-wen Yen, National Taiwan University of Science and Technology; A.S.Md Abdul Haseeb, University of Malaya; Ligang Zhang, Central South University; Sehoon Yoo, KITECH; Vesa Vuorinen, Aalto University; Yu-chen Liu, National Cheng Kung University

Thursday AM March 18, 2021

Session Chairs: Vuorinen Vesa, Aalto University; Hiroshi Nishikawa, Osaka University

8:30 AM Keynote
Solid-Liquid Interdiffusion (SLID) Bonding: For Thermal Challenges in Microsystem Bonding: Knut Aasmundtveit1; Hoang Vu Nguyen1; 1University of South-Eastern Norway

9:10 AM Invited
Change in Electric Resistance of Conductive Pastes Including Ag Particles Coated with Various Higher Fatty Acids during Curing Process: Shinji Fukushima2; Kazuhiro Makimoto2; Kengo Ohta1; Yoshihiro Kashiba1; Michiya Matsushima2; Kozo Fujimoto2; 2Osaka University; 1Osaka University

9:40 AM
IMC-free Low-temperature TLP Cu-to-Cu Interconnection with Excellent Thermal Stability: Shih-kang Lin1; Yu-chen Liu2; Chih-han Yang2; Yu-Hsiang Hsieh1; Chien-wei Huang1; Chih-feng Lin1; 1National Cheng Kung University

10:00 AM
Intermetallic Reactions and Interfacial Stability in Cu-Co-Sn System: Fatimeh Emadi1; Vesa Vuorinen1; Hongqun Dong1; Mervi Paulasto-Kröckel1; 1Aalto University

10:20 AM
Synthesis and Characterization of Silver Tin Alloy Powders by High Energy Ball Milling: Wei-Chen Huang1; Chin-Hao Tsai1; C. Robert Kao1; 1National Taiwan University

10:40 AM
Interfacial Microstructure Evolution of Ag/ENIG and Ag/Cu Joint under Thermal Aging: Min-Su Kim1; Sehoon Yoo1; Hiroshi Nishikawa2; 1Korea Institute of Industrial Technology; 2Osaka University

PHYSICAL METALLURGY

Phase Transformations and Microstructural Evolution — General Topic I

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Phase Transformations Committee

Program Organizers: Rongpei Shi, Lawrence Livermore National Laboratory; Yipeng Gao, Idaho National Laboratory; Fadi Abdeljawad, Clemson University; Bharat Gwalani, Pacific Northwest National Laboratory; Qi An, University of Nevada-Reno; Eric Lass, University of Tennessee-Knoxville; Huajing (Wilson) Song, Los Alamos National Laboratory

Thursday AM March 18, 2021

Session Chair: Qi An, University of Nevada, Reno

8:30 AM
About the Plasticity of Cobalt upon Phase Transformation: A High Temperature Nanoindentation Study: Verena Maier-Kiener1; Johann Kappacher1; Helmut Clemens1; 1Montanuniversitaet Leoben

8:50 AM
Atomistic Modeling of the Twinning fcc/bcc Phase Transformation in Binary Systems: Quasi-particle Approach and Experiment: Gilles Demange1; Helena Zapolsky2; Kaixuan Chen3; Renaud Patte1; Zidong Wang4; Pavel Korzhavyi4; 1CNRS-University Of Rouen Normandy; 2Cnrs-University Of Rouen Normandy; 3University of Science and Technology Beijing; 4 KTH - Royal Institute of Technology

9:10 AM
Data Assimilation-based Approach to Estimate Grain Boundary Properties Using Phase-field Grain Growth Simulations: Eisuke Miyoshi1; Tomohiro Takaki2; Yasushi Shibuta3; Munekazu Ohno3; 1Kyoto Institute of Technology; 2The University of Tokyo; 3Hokkaido University

9:30 AM
Effects of Oxygen Interstitials on Phase Transformation Paths in Nb-Ti Alloys: Raphaële Clément1; Carlos Levi1; 1University of California, Santa Barbara

9:50 AM
In Situ Transformations during Heating of Copper-intercalated Bismuth Telluride: Pratibha Shetty1; Matthew McDowell1; 1Georgia Institute of Technology

10:10 AM
Intrinsic Coupling between Phase Transformation and Deformation Twinning: Yipeng Gao1; 1The Ohio State University
ELECTRONIC MATERIALS

Recent Advances in Functional Materials and 2D/3D Processing for Sensors, Energy Storage, and Electronic Applications — Functional Materials and 2D/3D Devices

Sponsored by: TMS Functional Materials Division, TMS: Thin Films and Interfaces Committee

Program Organizers: Pooran Joshi, Oak Ridge National Laboratory; Rahul Panat, Carnegie Mellon University; Ravindra Nuggehalli, New Jersey Institute of Technology; Tolga Aytug, Oak Ridge National Laboratory; Yong Lin Kong, University of Utah; Konstantinos Sierros, West Virginia University

Thursday AM  March 18, 2021

Session Chairs: Rahul Panat, Carnegie Mellon University; Tolga Aytug, Oak Ridge National Laboratory; Yong Lin Kong, University of Utah

8:30 AM  Invited
Additive Manufacturing of NdFeB Bonded Permanent Magnets: Prospects and Challenges: Mariappan Paranatham1; Oak Ridge National Laboratory

8:55 AM  Invited
Copper-carbon Nanotube Composites Enabled by Electrospinning for Advanced Conductors: Kai Li1; Michael McGuire1; Andrew Lupini1; Lydia Skolrood1; Fred List1; Burak Ozpineci1; Soydan Ozcan1; Tolga Aytug1; Oak Ridge National Laboratory

9:20 AM
Performance of Chromium Doped Zinc Selenide Nanocrystals: Morphological and Fluorescence Characteristics: Narsingh Singh1; Ching Hua Su1; Bradley Arnold1; Fow-Sen Choa1; David Sachs1; Brett Setera1; Christopher Cooper1; Brian Cullum1; Kamdeo Mandal1; University of Maryland, Baltimore County

9:40 AM  Invited
Revealing Meso-structure Dynamics in Additive Manufacturing of Energy Storage via Operando Coherent X-ray Scattering: Cheng-Hung Lin1; Karol Dyro1; Olivia Chen1; Dean Yen1; Bingqian Zheng1; Surita Bhailal1; Ke Sun1; Qingkun Meng1; Lutz Wiegart1; Yu-chen Karen Chen-Wiegart1; Stony Brook University; China University of Mining and Technology; Stony Brook University; Brookhaven National Laboratory

10:05 AM  Invited
Sterilize and Recharge Masks Simultaneously for Safe Reuse: Ying Zhang1; Siriram Krishnamoorthy1; Vladislav Paley1; Xudong Wang1; Linbin Ye1; University of South Florida

NUCLEAR MATERIALS

Thermal Property Characterization, Modeling, and Theory in Extreme Environments — Nuclear Fuel Performance & Advanced Thermal Analysis

Sponsored by: TMS Structural Materials Division, TMS: Nuclear Materials Committee

Program Organizers: Janelle Wharry, Purdue University; Mukesh Bachhav, Idaho National Laboratory; Marat Khafizov, Ohio State University; Eric Lass, University of Tennessee-Knoxville; Vikas Tomar, Purdue University; Tiankai Yao, Idaho National Laboratory; Cody Dennett, Idaho National Laboratory; Karim Ahmed, Texas A&M University

Thursday AM  March 18, 2021

Session Chairs: Janelle Wharry, Purdue University; Elizabeth Sooby Wood, University of Texas at San Antonio

8:30 AM
Ultra-high Lattice Thermal Conductivity and the Effect of Pressure in Superhard Hexagonal BC2N: Safoura Nayeb Sadeghi1; S. Mehdi Vaez Allaei2; Mona Zebarjadi1; Keivan Esfarjani1; University of Virginia; University of Tehran

8:50 AM  Invited
Performance of UO2 Reactor Fuel with High Thermal Conductivity Additives: Michael Tonks1; Floyd Hilty1; University of Florida

9:20 AM  Invited
Atmosphere Controlled Thermogravimetric Analysis as a Tool to Screen, Test and Qualify Advanced Fuels under Extreme Conditions: Elizabeth Sooby1; University of Texas at San Antonio

9:50 AM
Thermal Stability of Metallic Multilayers with Triple Junctions: Tongjun Niu1; Yifan Zhang1; Jaehun Cho1; Jin Li1; Haiyan Wang1; Xinghang Zhang1; Purdue University

10:10 AM
Energy Balance Investigation of Close-coupled Optimized-pressure Gas Atomization Pour-tube Design Geometry to Prevent Melt Freeze-off: Franz Hernandez1; Eric Deaton1; Iver Anderson1; Ames Laboratory of US DOE
NUCLEAR MATERIALS

Accelerated Discovery and Qualification of Nuclear Materials for Energy Applications — Irradiation Effect in Nuclear Fuels and Materials

Sponsored by: TMS Structural Materials Division, TMS Materials Processing and Manufacturing Division, TMS: Integrated Computational Materials Engineering Committee, TMS: Nuclear Materials Committee, TMS: Additive Manufacturing Committee

Program Organizers: Yongfeng Zhang, University of Wisconsin-Madison; Adrien Couet, University of Wisconsin-Madison; Michael Tonks, University of Florida; Jeffery Aguair, Idaho National Laboratory; Andrea Jokisaari, Idaho National Laboratory; Karim Ahmed, Texas A&M University

Thursday PM March 18, 2021

Session Chair: Mohammed Abdoelatef, Texas A&M U

2:00 PM
Point Defect Capture Characteristics and Stress States of Dislocation Loops in α-zirconium: Jose March-Rico; Brian Wirth; 1University of Tennessee Knoxville

2:20 PM
Comparison of Void Swelling in Conventional and Novel HT9 Alloys after High Damage Level Ion Irradiation: Hyosim Kim; Jonathan Gigax; 1; Lee Bernstien 2;  1University of Tennessee; 2Oak Ridge National Laboratory

2:40 PM
Dislocation Loop Formation in Self-Ion Irradiated Ultra-high Purity FeCr Alloys: Yao Li; Yajie Zhao; Arunodaya Bhattacharya; 1; Jean Henry; 4; Steven Zinkle; 1; 1The University of Tennessee, Knoxville; 2Oak Ridge National Laboratory; 3Oak Ridge National Laboratory; 4The French Alternative Energies and Atomic Energy Commission

3:00 PM
Effect of Microstructure and Rolling Treatment on Static Recrystallization Behavior in Monolithic U-10Mo Fuel Foils: William Frazier; Kyoo Sil Choi; Lei Li; Zhile Xu; Vineet Joshi; Ayoub Soulami; 1; Pacific Northwest National Laboratory

3:20 PM
Properties of a Helium Ion Beam Degrader for Implanting SSJ2 Tensile Specimens at the LBL 88-Inch Cyclotron: Sarah Sterverson; Adi Ben-Artzy; Lee Bernstien; Peter Hosemann; 1; University of California, Berkeley; 2LBL

3:40 PM
Proton Irradiation Induced Microstructural Evolution in Compositionally Graded Type 316L Stainless Steel: Xiang Liu; Mingfan Yang; 1; Miao Song; 2; Xiaoyuan Lou; 2; Yongfeng Zhang; 2; Lingfeng He; 1; Daniel Schwen; 1; Idaho National Laboratory; 2Auburn University; 3University of Michigan; 1University of Wisconsin-Madison

4:00 PM
Sink Strength Effect on Bubble Formation in Helium-implanted Nanostructured Ferritic Alloys: Yan-Ru Lin; Zhanfeng Yan; 1; David Hoelzer; 1; Lizhen Tan; 1; Steven Zinkle; 1; 1University of Tennessee; 2Peking University; 3Oak Ridge National Laboratory

4:20 PM
Synergistic Irradiation and Ageing Effect on Microstructure and Mechanical Properties of Grade 92 at ~700C: Weicheng Zhong; Lizhen Tan; 1; Oak Ridge National Laboratory

4:40 PM
Dislocation Loop Characterization Using STEM-Contrast Techniques in an Irradiated FCC Alloy: Pengyuan Xiú; Lumin Wang; 1; Kevin Field; 2; 1University of Michigan

ADDITIVE TECHNOLOGIES

Additive Manufacturing of Functional, Energy, and Magnetic Materials — Advanced Manufacturing of Other Functional Materials

Sponsored by: TMS Functional Materials Division, TMS: Additive Manufacturing Committee, TMS: Magnetic Materials Committee

Program Organizers: Markus Chmielus, University of Pittsburgh; Sneha Prabha Narra, Worcester Polytechnic Institute; Mohammad Elahinia, University of Toledo; Reginald Hamilton, Pennsylvania State University; Iver Anderson, Iowa State University Ames Laboratory

Thursday PM March 18, 2021

2:00 PM
Inconel-steel Multi-metal-material by Liquid dispersed Metal Powder Bed Fusion: Microstructure, Stress and Property Gradients: Sabine Bodner; 1; L.T.G. van de Vorst; 1; Jakub Zalesak; 1; Juraj Todt; 1; Julius Keckes; 2; Verena Maier-Kiener; 1; Bernhard Sartory; 1; Norbert Schell; 2; Jaap Hooijmans; 1; Jacek Saurwalt; 1; Josef Keckes; 1; Montanuniversität Leoben; 2; TNO; 3; Austrian Academy of Sciences; 4Materials Center Leoben GmbH; 5Helmholtz-Zentrum Geesthacht; 6Admatec Europe BV

2:20 PM
Meltpool Oxidation and Reduction and Inclusion Evolution during the PBF Type Additive Manufacturing: Durim Eo; Seong Gyu Chung; Jungwook Cho; 1; Pohang University of Science and Technology

2:40 PM
Engineered Interconnected Porosity for Enhanced Functional Devices: Scott Roberts; 1; Ben Furst; 1; Eric Sunada; 1; 1Jet Propulsion Laboratory

ADDITIVE TECHNOLOGIES

Additive Manufacturing: Beyond the Beam II — Novel Solid State Processing

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Powder Materials Committee, TMS: Additive Manufacturing Committee

Program Organizers: Paul Prichard, Kennametal Inc.; James Paramore, US Army Research Laboratory; Peeyush Nandwana, Oak Ridge National Laboratory; Nihan Tuncer, Desktop Metal

Thursday PM March 18, 2021

Session Chair: Peeyush Nandwana, Oak Ridge National Lab

2:00 PM
Control of High-temperature Drop-on-demand Metal Jetting Through Numerical Modelling and Experimentation: Negar Gilani; 1; Nesma Aboulkhair; 1; Marco Simonelli; 1; Ian Ashcroft; 1; Richard Hague; 1; 1University of Nottingham
ADDITIVE TECHNOLOGIES

Additive Manufacturing: Solid-State Phase Transformations and Microstructural Evolution — In Situ Characterisation and Material Response to Build Processes

**Sponsored by:** TMS Materials Processing and Manufacturing Division, TMS; Additive Manufacturing Committee, TMS; Phase Transformations Committee, TMS; Shaping and Forming Committee

**Program Organizers:** Biji-Na Kim, Carpenter Additive; Andrew Wessman, University of Arizona; Chantal Sudbrack, National Energy Technology Laboratory; Eric Lass, University of Tennessee-Knoxville; Katerina Christofidou, University of Sheffield; Peeyush Nandwana, Oak Ridge National Laboratory; Rajarshi Banerjee, University of North Texas; Whitney Poling, General Motors Corporation; Yousub Lee, Oak Ridge National Laboratory

**Thursday PM** March 18, 2021

**Session Chairs:** Katerina Christofidou, The University of Sheffield; Biji-Na Kim, Carpenter Additive

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2:00 PM

**In Situ Synchrotron Observation of Directed Energy Deposition Additive Manufacturing Process**

*Yunhui Chen1, Samuel Clark2, David Collins3, Sebastian Marussi4, Thomas Connolley5, Robert Atwood6, Oxana Magdyssyk7, Gavin Baxter8, Martyn Jones9, Chu Lun Alex Leung2, Peter Lee10, University College London; The University of Birmingham; Diamond Light Source; Rolls-Royce plc

2:20 PM

**In-situ TEM Solid-state Thermal Cycling of a Stainless Steel Fabricated via AM**

*Mansoo Upadhya1, Lluis Yedra-Cardona2, Eva Heripré3, Simon Hallais4, Alexandre Tanguy5, LMS, CNRS, Ecole Polytechnique, Institut Polytechnique de Paris; MSSMat and SPMS, CNRS, CentraleSupélec; Université Paris-Saclay; MSSMat, CNRS, CentraleSupélec; Université Paris-Saclay

2:40 PM

**Time-resolved Synchrotron X-ray Diffraction Studies of Phase Evolution in Ni alloy 718 during Laser Melting**

*Seunghee Oh1, Rachel Lim2, Joseph Aroth3, Joseph Pauza4, Andrew Chuang5, Benjamin Gould6, Joel Bernier7, Tao Sun8, Robert Suter9, Anthony Rollett10, Carnegie Mellon University; Argonne National Laboratory; Lawrence Livermore National Laboratory; University of Virginia

3:00 PM

**The Effects of Scanning Strategy on Cracking and Grain Structure of the IN738LC Superalloy Produced by Selective Laser Melting**

*Marcus Lam11, Monash University

3:20 PM

**Aging Effects on Phase Transformation and Microstructure Evolution in Selective Laser Melted NiTi Shape Memory Alloy**

*Madhavan Radhakrishnan1, Sayed Saghahian2, Mohammadreza Nematiolah1, Keyvan Safaei1, Osman Anderogi1, Mohammad Elahinia1, Haluk Karaca2, University of New Mexico; University of Kentucky; University of Toledo

3:40 PM

**Study of the Role of Beam Scan Strategies on the Microstructure and Mechanical Properties of EBM Additively Manufactured Ti-6Al-4V Builds**

*Meyiue Shao1, Sriram Vijayan2, Sabina Kumar1, Sudarsanam Babu1, Joerg Jinschek1, The Ohio State University; University of Tennessee

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4:00 PM

**Microstructural Control and Refinement in DMLS Ti-6Al-4V**

*Matthew Vaughn1, Justin Unger2, Matthew Dunstan3, Andrew Gaynor2, Brandon McWilliams2, James Guest1, Kevin Hemker1, Johns Hopkins University; Army Research Laboratory

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ADVANCED MATERIALS

Advanced Functional and Structural Thin Films and Coatings — Thin Films and Nanostructures for Optoelectronics II

**Sponsored by:** TMS Functional Materials Division, TMS; Thin Films and Interfaces Committee

**Program Organizers:** Adele Carrado, IPCMS - CNRS; Ramana Chintalapalle, University of Texas at El Paso; Gerald Ferblantier, Icube Laboratory - Strasbourg University; Nancy Michael, University of Texas at Arlington; Karine Mougin, Is2m Cnrs; Heinz Palkowski, Clausthal University of Technology; Nuggehalli Ravindra, New Jersey Institute of Technology; Vikas Tomar, Purdue University

**Thursday PM** March 18, 2021

**Session Chairs:** Ramana Chintalapalle, UTEP; Gerald Ferblantier, ICUBE

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2:00 PM Keynote

**Metamaterial Coatings for Tuning Optical and Fluid Wetting Behavior**

*Shawn Putnam1, University of Central Florida

2:45 PM

**Simulation of Optical Properties for Multilayers from Extreme Ultraviolet to Far Infrared**

*Leqi Lin1, Nuggehalli Ravindra2, New Jersey Institute of Technology

3:05 PM Invited

**Localization of Dopants and Optical Properties of Phosphorus Doped Silicon Nanocrystals**

*Hervé Rinnert1, Alaa Eldin Giba1, Fatme Trad1, Mathieu Stoffel1, Xavier Devaux1, Alexandre Bouché2, Michel Vergnat3, Rémi Demoulin1, Etienne Talbot1, Anne-Sophie Royet1, Pablo Acosta Alba1, Sébastien Kerdiles1, University of Lorraine, IJL; Université de Rouen, GPM; Université Grenoble Alpes, CEA

3:40 PM

**Interface Characteristics in Transparent Optical Nanomultilayers**

*Danielle White1, Chelsea Appleget1, Andrea Hodge1, University of Southern California

4:00 PM

**Pulsed-laser Deposition and Optical Characterization of Gallium Oxide (Ga2O3) Thin Films**

*Vishal Zade1, Nanthikoshore Makeswaran1, Ramana Chintalapalle2, UTEP
TMS2021 VIRTUAL FINAL TECHNICAL PROGRAM
All times listed are in EDT time zone (UTC-4:00).

ENERGY & ENVIRONMENT

Advanced Magnetic Materials for Energy and Power Conversion Applications — Advances in Characterization, Processing, and Design of Magnetic Materials

Sponsored by: TMS Functional Materials Division, TMS: Magnetic Materials Committee

Program Organizers: Richard Beddingfield, North Carolina State University; Daniel Salazar, BCMaterials; Alex Leary, NASA Glenn Research Center; Huseyin Ucar, California Polytechnic University; Yongmei Jin, Michigan Technological University; Arcady Zhukov, University of the Basque Country

Thursday PM March 18, 2021
Session Chair: Daniel Salazar, BCMaterials

2:00 PM Invited
Magnetic Domain Tomography: Rudolf Schaefer1; 1Ifw Dresden

2:30 PM
A Refinement Program to Characterize Single Crystal Magnetic Diffuse Scattering from Neutron Diffraction Experiments: Zachary Morgan1; Feng Ye2; 1Michigan Technological University; 2Oak Ridge National Laboratory

2:50 PM
Scale-up Production on MnBi Magnet with High Performance: Wei Tang1; 1Scale-up Production on MnBi Magnet with High Performance

3:10 PM Invited
Exchange-coupled Ferromagnetism in Self-assembled Co-Pt Nanochessboards: Jerold Floro1; 1University of the Basque Country

3:40 PM Invited
Neutron Diffraction: A Key Tool to Unravel the Magnetic Behaviour in Heusler Alloys: Jose Maria Porro1; 1BCMaterials & Ikerbasque

4:10 PM
Magnetic Field-assisted HDR Processing of NdFeB Powders: Michael Kesler1; Xubo Liu1; Ikenna Nlebedim2; Matthew Kramer2; Michael McGuire1; 1Oak Ridge National Laboratory; 2Ames Laboratory

4:30 PM
Magnetic Domain Observation by Soft X-ray Magnetic Circular Dichroism Microscopy of Nd-Fe-B-Ga Sintered Magnets Under High Magnetic Field and High Temperature: Andres Martin-Cid1; Shintaro Kobayashi2; David Billington1; Kentaro Toyoki1; Yoshinori Koto1; Yukio Takada1; Takashi Sato1; Yuji Kaneko1; Akira Kato1; Taisuke Sasaki1; Tadakatsu Ohkubo1; Kazuhiro Hono1; Satoshi Hiroawa2; Motohiro Suzuki2; Tetsuya Nakamura2; 1Japan Synchrotron Radiation Research Institute (JASRI); 2Spring-8; 2Japan Synchrotron Radiation Research Institute (JASRI); 2Spring-8; 1Toyota Central R&D Labs, Inc; 2Advanced Material Engineering Division, Toyota Motor Corporation; 3National Institute for Materials Science; 4Institute of Multidisciplinary Research for Advanced Materials (IMRAM), Tohoku University

MATERIALS DESIGN

Advances in Titanium Technology — General Topic of Ti and Ti Alloys

Sponsored by: TMS Structural Materials Division, TMS: Titanium Committee

Program Organizers: Don Li, Howmet Engineered Products; Yufeng Zheng, University of Nevada-Reno; Peeyush Nandwana, Oak Ridge National Laboratory; Matthew Dunstan, US Army Research Laboratory

Thursday PM March 18, 2021
Session Chair: Peeyush Nandwana, Oak Ridge National Laboratory

2:00 PM
The Effect of Process Parameters on Abnormal Grain Growth during Beta Annealing of Hot-Forged Ti-6Al-4V: Nathan Levkulich1; Lee Semiatin2; Adam Pilchak2; Eric Payton2; 1Ues Inc.; 2Air Force Research Laboratory
## LIGHT METALS

**Aluminum Reduction Technology — Continue Environment (Material and Equipment) & Fundamental Studies (Alumina Dissolution and Bath)**

**Sponsored by:** TMS Light Metals Division, TMS: Aluminum Committee

**Program Organizers:** Nadia Ahli, Emirates Global Aluminium; Nancy Holt, Hydro Aluminium AS

**Thursday PM** | **March 18, 2021**
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**Session Chair:** Bertrand Allano, RIO TINTO

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<tr>
<th>Time</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:00 PM</td>
<td>Instant Monitoring of Aluminum Chemistry in Cells Using a Portable Liquid Metal Analyzer</td>
<td>Sveinn Hinrik Gudmundsson¹; Birna Björnsdóttir²; Kristján Leosson¹; ¹DT Equipment; ²Nordural ehf</td>
</tr>
<tr>
<td>2:20 PM</td>
<td>Dissolution Characteristics and Concentration Measurements of Alumina in Cryolite Melts</td>
<td>Luis Bracamonte¹; Vegard Aulie¹; Christian Rosenkilde²; Kristian Einarsrud¹; Espen Sandnes¹; ¹Ntnu University; ²Hydro Aluminium</td>
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<td>2:40 PM</td>
<td>On Gaseous Emissions during Alumina Feeding: Inert Anodes in Aluminium Electrolysis Cells</td>
<td>Sindre Engzelius Gylver¹; Åste Follo¹; Vegard Aulie¹; Espen Sandnes¹; ¹Norwegian University of Science and Technology; ²Elkem; ³Alcoa Mosjøen; ⁴GE Power</td>
</tr>
<tr>
<td>3:00 PM</td>
<td>On the Feasibility of Using Low-melting Bath to Accommodate</td>
<td>Asbjorn Solheim¹; ¹SINTEF Industry</td>
</tr>
<tr>
<td>3:20 PM</td>
<td>Electrochemical Reduction and Dissolution of Aluminium in a Thin-layer Refinery Process</td>
<td>Andrey Yasinskiy¹; Peter Polyakov¹; Ilya Moiseenko¹; Sai Krishna Padamata¹; ¹Siberian Federal University</td>
</tr>
<tr>
<td>3:40 PM</td>
<td>Influence of Additives on Alumina Dissolution in Superheated Cryolite Melts</td>
<td>Jonathan Alarie¹; László Kiss¹; Sándor Poncsák¹; Renaud Santerre²; Sébastien Guérard²; Jean-François Bilodeau¹; ¹University of Quebec at Chicoutimi; ²Technical Advisor, Retired from Rio Tinto; ³Arvida Research and Development Centre, Rio Tinto</td>
</tr>
<tr>
<td>4:00 PM</td>
<td>Question and Answer Period</td>
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</tbody>
</table>

## BIOMATERIALS

**Biological Materials Science — Biological Materials Science IV**

**Sponsored by:** TMS Functional Materials Division, TMS Structural Materials Division, TMS: Biomaterials Committee

**Program Organizers:** David Restrepo, University of Texas at San Antonio; Steven Naleway, University of Utah; Jing Du, Pennsylvania State University; Ning Zhang, University of Alabama

**Thursday PM** | **March 18, 2021**
---|---
**Session Chair:** Steven Naleway, The University of Utah; Ning Zhang, The University of Alabama

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<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:00 PM</td>
<td>Invited Understanding Heterogeneity in Bone Adaptation Following Exercise</td>
<td>Mariana Kersh¹; Sony Manandhar¹; Hyungwi Song¹; John Polk¹; ¹University of Illinois at Urbana-Champaign</td>
</tr>
<tr>
<td>2:30 PM</td>
<td>Internal Strain Mapping for Native and Implanted Glenoids</td>
<td>Yuxiao Zhou¹; Gregory Lewis¹; April Armstrong¹; Jing Du¹; ¹Penn State University</td>
</tr>
<tr>
<td>2:50 PM</td>
<td>Negative Compressibility Architected Materials for Novel Cardiac Patches</td>
<td>Juan Sebastian Rincon Tabares¹; David Restrepo¹; Juan Velasquez²; Hai-Chao Han¹; ¹University of Texas at San Antonio</td>
</tr>
<tr>
<td>3:10 PM</td>
<td>Investigating the Effect of Morphological Parameters on the Sound-Induced Mechanical Response of Mosquito Antennae</td>
<td>Adwait A. Trikanad¹; Hoover Pantoja-Sánchez¹; Ximena Bernal²; Pablo Zavattieri¹; ¹Purdue University; ²Purdue University, Smithsonian Tropical Research Institute</td>
</tr>
</tbody>
</table>

## ADVANCED MATERIALS

**Bulk Metallic Glasses XVIII — Alloy Design and Development**

**Sponsored by:** TMS Structural Materials Division, TMS: Mechanical Behavior of Materials Committee

**Program Organizers:** Peter Liaw, University of Tennessee; Yanfei Gao, University of Tennessee-Knoxville; Hahn Choo, University of Tennessee; Yufeng Sh, Rensselaer Polytechnic Institute; Robert Maass, Federal Institute for Materials Research and Testing (BAM); Xie Xie, FCA US LLC; Gongyao Wang, Alcoa Technical Center

**Thursday PM** | **March 18, 2021**
---|---
**Session Chair:** Kefu Yao, Tsinghua University; Qiaoshi Zeng, Center for High Pressure Science and Technology Advanced Research

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Authors</th>
</tr>
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<tbody>
<tr>
<td>2:00 PM</td>
<td>Atomistic Characterization and Modeling of Corrosion in Al-based Amorphous Metals</td>
<td>Jia Chen¹; Wenjun Cai¹; ¹Virginia Polytechnic Institute and State University</td>
</tr>
<tr>
<td>2:20 PM</td>
<td>Synthesis of Bulk Metallic Glass-alumina Composites with Intertwined Dendritic Structure</td>
<td>Je In Lee¹; Amy Wat²; Chae Woo Ryu¹; Jinyeon Kim¹; Eun Soo Park³; Robert Ritchie¹; ¹Pusan National University; ²University of California, Berkeley; ³Seoul National University</td>
</tr>
</tbody>
</table>
NUCLEAR MATERIALS

Ceramic Materials for Nuclear Energy Research and Applications — Advanced Ceramics Concepts

Sponsored by: TMS Extraction and Processing Division, TMS Structural Materials Division, TMS Light Metals Division, TMS: Advanced Characterization, Testing, and Simulation Committee, TMS: Energy Committee, TMS: Nuclear Materials Committee

Program Organizers: Xian-Ming Bai, Virginia Polytechnic Institute and State University; Yongfeng Zhang, University of Wisconsin-Madison; Larry Aagesen, Idaho National Laboratory; Vincenzo Rondinella, Jrc-Ec

Thursday PM March 18, 2021

Session Chairs: Haiming Wen, Missouri University of Science and Technology; Xunxiang Hu, Oak Ridge National Laboratory

2:00 PM Invited
Development of Yttrium Hydride for High Temperature Moderator Application: Xunxiang Hu1; Kurt Terrani1; 1Oak Ridge National Laboratory

2:30 PM
Ionization Effects on Damage Accumulation Behavior in SiC: Lauren Nuckols1; Miguel Crespillo1; Yanwen Zhang2; William Weber3; 1University of Tennessee Knoxville; 2Oak Ridge National Laboratory

2:50 PM
Microstructural Characterization of Radiation Effects in 3D printed SiC: Timothy Locht1; Takaaki Koyanagi2; Chad Parish3; Thak Sang Byun4; Kurt Terrani1; 1Oak Ridge National Laboratory

3:10 PM Invited
Oxidation Behavior of TRISO Fuel Materials: Haiming Wen1; Adam Bratten2; Visharad Jalan3; 1Missouri University of Science and Technology

4:10 PM
Evolution of Ion Irradiated Nitride Ceramics Properties for Coated Particle Fuel Systems: Adrien Terricabras1; Alicia Raftery2; Andrew Nelson3; Steven Zinkle4; 1University of Tennessee; 2Oak Ridge National Laboratory

4:30 PM
On the Role of Neutron Irradiation Damages on Fission Products Transport in the SiC Layer of TRISO Fuel Particles: Subhashish Meher1; Isabella van Rooyen1; Chao Jiang1; 1Idaho National Laboratory

CHARACTERIZATION

Characterization of Materials through High Resolution Imaging — Algorithms for High Resolution Coherent Imaging of Materials

Sponsored by: TMS Structural Materials Division, TMS: Advanced Characterization, Testing, and Simulation Committee

Program Organizers: Richard Sandberg, Brigham Young University; Ross Harder, Argonne National Laboratory; Xianghui Xiao, Brookhaven National Laboratory; Brian Abbey, La Trobe University; Saryu Fensin, Los Alamos National Laboratory; Ana Diaz, Paul Scherrer Institut; Mathew Cherukara, Argonne National Laboratory

Thursday PM March 18, 2021

Session Chair: Mathew Cherukara, Argonne National Laboratory

2:00 PM Invited
Optimization Based Approach for 3D Alignment in X-ray Nanotomography: Kanupriya Pande1; 1Lawrence Berkeley National Laboratory

2:30 PM
Adaptive Machine Learning for 3D Bragg Coherent Diffraction Imaging Reconstructions: Alexander Scheinker1; Reeju Pokharel1; 1Los Alamos National Laboratory

2:50 PM Invited
Exploiting Machine Learning Techniques in X-ray Ptychography: Pablo Enfedaque1; 1LBNL

3:20 PM
Ptychographic Inversion with Deep Learning Network and Automatic Differentiation: Tao Zhou1; Mathew Cherukara1; Saugat Kandel1; Stephan Hruszkewycz2; Alexander Hexemer2; Ross Harder2; Pablo Enfedaque1; Martin Holt1; 1Argonne National Laboratory

3:40 PM
Image-based Simulation of Permeability and Image-to-Mesh Conversion of X-ray Tomographic Images of a Nickel Foam: S. Ali Shojaei1; Arsalan Zolfaghari2; 1Thermo Fisher Scientific

4:00 PM Invited
Using Phase Field Simulations to Train Convolutional Neural Networks for Segmentation of Experimental Materials Imaging Datasets: Tiberiu Stan1; Jiwon Yeom2; Seungbum Hong3; Peter Voorhees1; 1Northwestern University; 2Korea Advanced Institute of Science and Technology
CHARACTERIZATION


Sponsored by: TMS Extraction and Processing Division, TMS: Materials Characterization Committee

Program Organizers: Jian Li, CanmetMATERIALS; Mingming Zhang, ArcelorMittal Global R&D; Bowen Li, Michigan Technological University; Sergio Monteiro, Instituto Militar de Engenharia; Shadil Ikthiayes; Yunus Kalay, Middle East Technical University; Jann-Yang Hwang, Michigan Technological University; Juan Escobedo-Diaz, University of New South Wales; John Carpenter, Los Alamos National Laboratory; Andrew Brown, Army Research Laboratory; Rajiv Soman, Eurofins EAG Materials Science LLC; Alex Moser, US Naval Research Laboratory

Thursday PM  March 18, 2021

Session Chairs: Rajiv Soman, Eurofins EAG Materials Science LLC; Arnab Baksi, Merichem Company

2:00 PM
Structure and Magnetic Properties of Gas-atomized Maraging Steel Powders for Additive Manufacturing: Ganesh Varma Thotakura1; Alex Paul1; Ramasis Goswami2; Tanjore Jayaraman1; 1University of Michigan-Dearborn; 2Naval Research Laboratory

2:20 PM
Effects of Sinter Feed Size on Productivity and Quality of Iron Ore Sinter: Mingming Zhang1; Marcelo Andrade1; 1ArcelorMittal Global R&D

2:40 PM
Characterization of Brazilian Linz Donawitz-LD Steel Sludges: Mery Gomez-Marroquin1; Roberto de Avillez2; Sonia Letichevsky3; Dalia Carbonel-Ramos3; Antoni Quintanilla-Baluena3; Kenny Salazar-Yantas3; 1APMMM/UNI; 2DEQM PUC-Rio; 3FIA UNI; 3FIGMM UNI

3:00 PM
Manufacture of Porous Frit Vents using Space Holder Methodology for Radioisotopic Space Power Systems: Gareth Sheppard1; Karl Tassemburg1; Ramy Mesalam1; Bogdan Nenchev1; Joel Strickland1; Hugo Williams1; 1University of Leicester

ADDITIVE TECHNOLOGIES

Computational Techniques for Multi-Scale Modeling in Advanced Manufacturing — Multiscale Solid-state Models

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS Extraction and Processing Division, TMS: Computational Materials Science and Engineering Committee, TMS: Process Technology and Modeling Committee

Program Organizers: Adrian Sabau, Oak Ridge National Laboratory; Anthony Rollett, Carnegie Mellon University; Laurentiu Nestac, University of Alabama; Mei Li, Ford Motor Company; Alexandra Anderson, Gopher Resource; Srujan Rokkam, Advanced Cooling Technologies Inc

Thursday PM  March 18, 2021

Session Chair: Srujan Rokkam, Advanced Cooling Technologies Inc.

2:00 PM Invited
Multiscale Crystal Plasticity in Integrated Computational Materials Engineering: Deepak Pal1; Javed Akram1; Thaddeus Song1; Jobie Gerken1; Dave Conover1; 1Ansys

2:40 PM
Microstructure Based Modeling of Friction Stir Welded Joint between Dissimilar Metals Using Crystal Plasticity: Shank Kulkarni1; Kyoo Sil Choi1; Piyush Upadhyay1; Ayoub Soulami1; 1Pacific Northwest National Laboratory

3:05 PM
Modeling Material Behavior during Continuous Bending Under Tension for Inferring the Post-necking Strain Hardening Response of Ductile Sheet Metals: Application to Dual-phase Steels: Marko Knezevic1; Russell Marki1; 1University of New Hampshire

3:30 PM
Modeling the Role of Local Crystallographic Correlations in Microstructures of Ti-6Al-4V Using a Lamellar Visco-plastic Self-consistent Polycrystal Plasticity Formulation: Iftekhar Riyad1; Ricardo Lebensohn2; Brandon McWilliams2; Adam Pilchak3; Marko Knezevic1; 1University of New Hampshire; 2Los Alamos National Laboratory; 3CCDC Army Research Laboratory; 3Air Force Research Laboratory
**PHYSICAL METALLURGY**

**Computational Thermodynamics and Kinetics — Phonons, Magnons and Other Excitations**

*Sponsored by*: TMS Materials Processing and Manufacturing Division, TMS: Chemistry and Physics of Materials Committee, TMS: Computational Materials Science and Engineering Committee

**Program Organizers**: Nana Ofori-Opoku, Canadian Nuclear Laboratories; Eva Zarkadoula, Oak Ridge National Laboratory; Enrique Martinez Saez, Clemson University; Vahid Attari, Texas A&M University; Jorge Munoz, University of Texas at El Paso

**Thursday PM**  
**March 18, 2021**

**Session Chairs**: Chen Li, University of California Riverside; Huajing (Wilson) Song, Los Alamos National Laboratory; Sara Kadkhodaei, University of Illinois At Chicago; Jorge Munoz, University of Texas El Paso

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**2:00 PM Invited**

Phonons and Transition-induced Plasticity of bcc Refractory High-entropy Alloys from First Principles: *Yuji Ikeda*; Prashanth Srinivasan; Blazej Grabowski; Fritz Körmann; University of Stuttgart; TU Delft; Max-Planck-Institut für Eisenforschung GmbH, TU Delft

**2:30 PM**

Contributions of Atom Vibrations to the Heat of Fusion of Germanium: *Camille Berndt*; Claire Saunders; Stefan H. Lohaus; Douglas Abernathy; Brent Fultz; California Institute of Technology; Oak Ridge National Laboratory

**2:50 PM**

A Computational and Experimental Study of Phonon Anharmonicity and Thermal Expansion of Cuprous Oxide: *Claire Saunders*; Dennis Kim; Hillary Smith; Brent Fultz; California Institute of Technology; Massachusetts Institute of Technology; Swarthmore College

**3:10 PM Invited**

Development of New Ab-initio Non-adiabatic Excited-state Molecular Dynamics Method in NWChem: *Huajing (Wilson) Song*; Sean Fischer; Victor Freixas; Niranjan Govind; Sergei Tretiak; University of California Riverside; TU Delft; Max-Planck-Institut für Eisenforschung GmbH; TU Delft; Oak Ridge National Laboratory

**3:40 PM**

First Principle Studies of Charged Point Defect in Phosphor: *Biswas Rijal*; Anne Marie Tan; Christoph Freysoldt; Richard Hennig; University of Florida; Max Planck Institute

**4:00 PM**

Negative Grüneisen Parameters in Nonmagnetic bcc-based Intermetallic FeTi at High Pressure: *Bethuel Khamaola*; Jorge Munoz; University of Texas El Paso; University of Texas El Paso

**4:20 PM Invited**

Anomalous Magnon-phonon Dynamics in Antiferromagnets: *Chen Li*; University of California Riverside

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**CORROSION**

**Environmental Degradation of Additively Manufactured Alloys — Material Degradation in Irradiated Environments, Environmental Assisted Cracking**

*Sponsored by*: TMS Structural Materials Division, TMS: Corrosion and Environmental Effects Committee, TMS: Additive Manufacturing Committee

**Program Organizers**: Kinga Unocic, Oak Ridge National Laboratory; Sebastien Dryepondt, Oak Ridge National Laboratory; Michael Kirka, Oak Ridge National Laboratory

**Thursday PM**  
**March 18, 2021**

**Session Chairs**: Kinga Unocic, Oak Ridge National Laboratory; Sebastien Dryepondt, Oak Ridge National Laboratory; Michael Kirka, Oak Ridge National Laboratory

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**2:00 PM Invited**

Additively Manufactured 316L Stainless Steel for Nuclear Applications: *Gary Was*; Miao Song; University of Michigan

**2:30 PM**

Comparison of Oxidation Behavior of Ultrasonic Additively Manufactured and Conventional Zircaloy-4: *Cory Parker*; Kenneth Kane; Stephen Raiman; Bruce Pint; Caleb Massey; Andrew Nelson; Oak Ridge National Laboratory

**2:50 PM**

Performance of Additively Manufactured FeCrAl Alloy Accident Tolerant Fuel Cladding in Nuclear Power Reactor Environments: *Vipul Gupta*; Andrew Hoffman; Raul Rebak; GE Research

**3:10 PM**

Sensitization and Stress Corrosion Cracking of Alloy 800H by Laser Powder Bed Fusion: *Jingfan Yang*; Xiang Liu; Miao Song; Lingheng He; Xiaoyuan Lou; Auburn University; Idaho National Laboratory; University of Michigan

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**CORROSION**

**Environmentally Assisted Cracking: Theory and Practice — Corrosion and Fracture in Harsh Environments**

*Sponsored by*: TMS Structural Materials Division, TMS: Corrosion and Environmental Effects Committee

**Program Organizers**: Bai Cui, University of Nebraska-Lincoln; Raul Rebak, GE Global Research; Srujan Rokkam, Advanced Cooling Technologies Inc; Jenifer Locke, Ohio State University

**Thursday PM**  
**March 18, 2021**

**Session Chairs**: Nikhil Chawla, Purdue University; Brendy Troconis, University of Texas at San Antonio

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**2:00 PM Invited**

Spectroelectrochemical Evaluation of Carbon Steel in Slightly Sour Environments Under the Presence of H₂S/CO₂ and Triazine-Based H₂S Scavenger: *Vinicio Ynciarte*; Leonardo Cáseres; James Dante; Brendy Rincon Troconis; University of Texas at San Antonio; Luke Brewer, University of Alabama

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All times listed are in EDT time zone (UTC-4:00).

www.tms.org/TMS2021
Thursday PM  March 18, 2021

2:40 PM
A Multiphysics Model of Synergistic Environmental Exposure Assisted Damage of Composite Using Homogenization-based Degradation Variables: Zhiye Li; Michael Lepech; 1Stanford University

3:00 PM
Combined Ab-initio and Experimental Study of Hydrogen Sorption in Dual Phase Steels: Saurabh Sagor; Vera Popovich; Pascal Komsmeit; Poulumi Dey; 1Delft University of Technology; 2Research and Development, Forming Technology, Tata Steel Ijmuiden BV

3:20 PM
Fatigue Crack Propagation in AA7085-T7451 Exposed to Complex Atmospheric Environments: Brandon Free; Sarah Galyon Dormian; Jason Niebuhr; Jenifer Locke; 1The Ohio State University; 2SAFE Inc.

3:40 PM
The Effect of Applied Potential and Loading Rate on the Hydrogen Environment-assisted Cracking Behavior of AA7075-T6511: Zachary Harris; Alen Korjenic; John Scully; James Burns; 1University of Virginia

4:00 PM
Phase-field Modeling of Galvanic Corrosion in Magnesium-Aluminum Joints: Kubra Karayazig; Adam Powell; Qingli Ding; Brajendra Mishra; 1Worcester Polytechnic Institute

4:20 PM
Understanding Pitting Corrosion in a High-performance Aluminum Alloy by Four-dimensional (4D) X-ray Microtomography: Daniel Sinclair; Sridhar Niverty; Nihkilesh Chawla; 1Purdue University

4:40 PM
Formation of Ni-O-H-S Surface Phases on Cathodically Charged Ni: Lai Jiang; Stanislav Verkhootrov; Emile Schweikert; Michael Demkowicz; 1Texas A&M University

MATERIALS DESIGN

Fatigue in Materials: Fundamentals, Multiscale Characterizations and Computational Modeling — Data-Driven Investigations of Fatigue


Program Organizers: Garrett Pataky, Clemson University; Ashley Spear, University of Utah; Antonios Kontsos, Drexel University; Brian Wisner, Ohio University; Jean-Charles Stinville, University of California-Santa Barbara

Thursday PM  March 18, 2021

Session Chair: Ashley Spear, University of Utah

2:00 PM
Discovering the Structural Signature of Fatigue Crack Growth Rate Using Computer Vision and Machine Learning: Katelyn Jones; William Musinski; Adam Pilchak; Reji John; Paul Shade; Anthony Rollett; Elizabeth Holm; 1Carnegie Mellon University; 2Air Force Research Laboratory

2:20 PM
A Microstructural Model for Fatigue in NiTi Shape Memory Alloy Based on Information Fusion from Advanced Experiments and Simulation: Harshad Paranjape; Darren Pagaran; Sivorn Manchiraju; Peter Anderson; Craig Bonsignore; Justin Gilbert; Ic Ong; Lot Vien; Confluent Medical; 2Pennsylvania State University; 3Ansys, Inc.; 4The Ohio State University

2:40 PM
In-situ Diffraction and Cohesive-zone Studies of the Fatigue-crack-growth Behavior in the ZK60 Mg Alloy: Di Xie; Peter Liaw; Yang Ren; Yanfei Gao; 1University of Tennessee; 2Argonne National Laboratory

MATERIALS PROCESSING

Friction Stir Welding and Processing XI — Spot Technologies

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Shaping and Forming Committee

Program Organizers: Yuri Hovanski, Brigham Young University; Piyush Upadhyay, Pacific Northwest National Laboratory; Yutaka Sato, Tohoku University; Nilesh Kumar, University of Alabama, Tuscaloosa; Anton Naumov, Peter the Great St. Petersburg Polytechnic University

Thursday PM  March 18, 2021

2:00 PM
Advances in Refill Spot Welding Productivity: Yuri Hovanski; Andrew Curtis; Sarah Michaelis; Paul Blackhurst; Brigham Larsen; 1Brigham Young University

2:20 PM
Finite Element Analysis and Failure Mechanisms of Refill Friction Stir Spot Welding: Enkhsaikhan Boldsaikhan; Shintaro Fukada; Mitsuo Fujimoto; Kenichi Kamimuki; 1Wichita State University; 2Kawasaki Heavy Industries, Inc.

2:40 PM
Characterization of Intermetallics Formation in µFSSW of Dissimilar Al/Cu Alloy Sheets: David Yari; Logan Vahlstrom; 1San Jose State University

3:00 PM
Dissimilar Friction Stir Welding of Low Carbon Steel and Aluminum Alloy by Double Side Adjustable Tools: Xiaopei Wang; Yoshiaki Morisada; Hidetoshi Fujii; 1Osaka University

3:20 PM
Microstructural Characterization of Lap-jointed Ti-6Al-4V Plates by Pin-Less Friction Stir Spot Welding: Hyojin Park; Yong Chae Lim; Scott A Rose; Zhili Feng; Hahn Choo; 1University of Tennessee, Knoxville; 2Oak Ridge National Laboratory; 3Boeing

3:40 PM
Temperature Distribution during Friction Stir Spot Welding of Thin AA 6082-T6 and AA 5082-O Sheets: Mikhail Ozhegov; Fedor Isupov; Roman Smelianski; 1St. Petersburg Polytechnic University of Peter the Great

All times listed are in EDT time zone (UTC-4:00).

TMS2021 VIRTUAL FINAL TECHNICAL PROGRAM
NANOSTRUCTURED MATERIALS


Sponsored by: TMS Functional Materials Division, TMS: Nanomaterials Committee

Program Organizers: Jiyoung Chang, University of Utah; Michael Cai Wang, University of South Florida; Sarah Zhong, University of South Florida; Sun Choi, Korea Institute of Science and Technology; Pei Dong, George Mason University

Thursday PM  March 18, 2021

Session Chairs: Sarah Zhong, University of South Florida; Michael Wang, University of South Florida

2:00 PM  Invited
Direct Backbone Attachment of Polyesters on Grain Boundaries Enhances Chemical Stability and Suppressing Ion Migration in CH$_3$NH$_3$PbI$_3$ Hybrid Perovskite Solar Cells: Chang-Yong Nam$^1$; 1Brookhaven National Laboratory

2:25 PM
Antireflective Hybrid Nanocoatings Derived via Heated Liquid-phase Infiltration in Hierarchically Self-Assembled Block Copolymer Thin Film Templates: Ashwanth Subramanian$^1$; Nikhil Tiwale$^2$; Gregory Doerk$^3$; Kim Kisslinger$^2$; Chang-Yong Nam$^2$; 1Stony Brook University; 2Brookhaven National Laboratory

2:45 PM
Giant Low-temperature Anharmonicity in Silicon Nanocrystals: Shuonan Chen$^1$; Devin Coleman$^2$; Douglas Abernathy$^3$; Arnab Banerjee$^2$; Luke Daemen$^2$; Lorenzo Mangolini$^2$; Chen Li$^1$; 1University of California, Riverside; 2Oak Ridge National Laboratory

3:05 PM  Invited
Nanomaterials for Multispectral Adaptive Radiative Heating and Cooling: Po-Chun Hsu$^1$; 1Duke University

3:30 PM  Invited
Silicon Carbide Biotechnology: Carbon-based Neural Interfaces: Chenyin Feng$^1$; Mohamad Beygi$^2$; Christopher Frewin$^3$; Md Rubayat-E Tanjil$^4$; Rubayat-E Tanjil$^4$; Ashok Kumar$^2$; Michael Wang$^2$; Stephen Saddow$^2$; 1University of South Florida; 2USF ME

3:55 PM
Substituent Effects on Electronic Properties of Cy5: Density Functional and Time-Dependent Density Functional Calculations: Austin Biaggne$^1$; Lan Li$^1$; Bernard Yurke$^1$; 1Boise State University

ADVANCED MATERIALS

High Entropy Alloys IX: Alloy Development and Properties — Thermal and Other Properties

Sponsored by: TMS Functional Materials Division, TMS Structural Materials Division, TMS: Alloy Phases Committee, TMS: Mechanical Behavior of Materials Committee

Program Organizers: Peter Liaw, University of Tennessee; Michael Gao, National Energy Technology Laboratory; E-Wen Huang, National Chiao Tung University; Srivatsan Tirumalai, The University of Akron; Xie Xie, FCA US LLC; Gongyao Wang, Alcoa Technical Center

Thursday PM  March 18, 2021

Session Chairs: John Scully, University of Virginia; Gerald Frankel. The Ohio State University

2:00 PM  Invited
Controlling the Corrosion Resistance of Multi-principal Element Alloys: John Scully$^2$; Samuel Inman$^1$; Angela Gerard$^2$; Christopher Taylor$^2$; Wolfgang Windl$^3$; Daniel Schreiber$^3$; Pin Lu$^4$; James Saal$^5$; Gerald Frankel$^1$; 1University of Virginia; 2The Ohio State University; 3Pacific Northwest National Laboratory; 4Questek Innovations LLC; 5Citrine Informatics

2:25 PM
Tracer Diffusion in Single Crystalline CoCrFeNi and CoCrFeMnNi High-entropy Alloys: Kinetic Hints towards a Low-temperature Phase Instability of the Solid-solution?: Daniel Gaertner$^2$; Josua Kottke$^2$; Yury Chumlyakov$^2$; Fabian Hergenmüller$^2$; Gerhard Wilde$^2$; Sergiy Divinski$^2$; 1Institute of Materials Physics, University of Münster

2:45 PM
Electron and Phonon Thermal Conductivity in High Entropy Carbides with Variable Carbon Content: Patrick Hopkins$^2$; Christina Rost$^1$; Trent Borman$^2$; Mohammad Hossain$^2$; Mina Lim$^2$; Kathleen Quiambao-Tomko$^1$; John Tomko$^1$; Donald Brenner$^1$; Jon-Paul Maria$^2$; 1University of Virginia; 2James Madison University; 3Pennsylvania State University; 4North Carolina State University

3:05 PM
Hyperbaric Laser Chemical Vapor Deposition of High-strength Aluminium-Silicon Carbide Nanocomposite Fibers: James Maxwell$^1$; Avinash Baji$^1$; Ben Mahler$^1$; 1La Trobe University, EMC$^2$ Centre, Engineering Dept.
ADVANCED MATERIALS

High Entropy Alloys IX: Structures and Modeling — Structures and Characterization IV

Sponsored by: TMS Functional Materials Division, TMS Structural Materials Division, TMS: Alloy Phases Committee, TMS: Mechanical Behavior of Materials Committee

Program Organizers: Peter Liaw, University of Tennessee; Michael Gao, National Energy Technology Laboratory; E-Wen Huang, National Chiao Tung University; Srivatsan Tirumalai, The University of Akron; Xie Xie, FCA US LLC; Gongyao Wang, Alcoa Technical Center

Thursday PM March 18, 2021

Session Chairs: Eun Park, Seoul National University; Stefano Curtarolo, Duke University

2:00 PM Invited
Rational Use of Entropy Unavoidability in High-entropy Ceramics: Stefano Curtarolo1; 1Duke University

2:20 PM
Examination of the Bulk Metal-oxide Layer Interface of a Cr-Nb-Ta-V-W High Entropy Alloy at 700 and 800°C: Rebecca Romero; S.K. Varma1; Nanthakishore Makeswaran1; Ravisanakar Naraparaju1; C.V. Ramana1; 1The University of Texas at El Paso

2:40 PM
Ex-situ and In-situ Characterization of Early Stage Oxidation Mechanism of High Entropy Alloys: Bharat Gaonkar1; Sten Lambeets1; Matthew Otszta1; Daniel Perea1; Arun Devaraj1; 1Pacific Northwest National Laboratory

3:00 PM
On Sluggish Diffusion in Random, Equimolar FCC Alloys: Murray Dorr1; Michael Chandross3; 1Clemson University; 3Sandia National Laboratories

ADVANCED MATERIALS

Materials for High Temperature Applications; Next Generation Superalloys and Beyond — Superalloys and Beyond: Oxidation and Mechanical Behavior II

Sponsored by: TMS Structural Materials Division, TMS: Refractory Metals Committee

Program Organizers: Govindarajan Muralidharan, Oak Ridge National Laboratory; Martin Heilmair, KIT Karlsruhe; Benjamin Adam, Portland State University; Mario Bochichio, Pratt & Whitney; Katerina Christofidou, University of Sheffield; Eric Lass, University of Tennessee-Knoxville; Jeremy Rame, General Electric; Pierre Lietal; Safran; Akane Suzuki, GE Research; Michael Titus, Purdue University

Thursday PM March 18, 2021

2:00 PM Invited
Understanding the Oxidation Mechanisms of Complex Concentrated Refractory-based Alloys: Todd Butler1; Tinuade Dabokiu1; Joshua Gild1; Oleg Senkov1; 1Wright Patterson Air Force Base

2:30 PM Invited
Effect of Al Addition on the Oxidation Behavior of a Mo-Si-B Alloy: John Perepezko1; Longfei Lu1; 1University of Wisconsin-Madison

3:00 PM
Oxidation Behavior of Nb-Si Based Ultrahigh Temperature Alloy at 600-1350: Xiping Guo1; Xiaoyu Luo1; Yanyang Giao1; Ping Guan1; 1Northwestern Polytechnical University

3:20 PM
Oxidation of TiAl Alloys GE 4822 and TNM-B1 between 600°C and 900°C and Impact on Mechanical Properties: Mathias Galetz1; Lukas Mengis1; Anke Ulrich1; 1DEHEMA-Forschungsinstitut

3:40 PM
On the High-temperature Air Oxidation Behavior of Ti3Al0.6Ga0.4C2 MAX Phase Solid-solution in the 1000 to 1300°C Temperature Range: Tarek Elmeligy1; Enrica Epifano1; Maxim Sokol1; Michel Barsoum1; 1Drexel University, Department of Materials Science & Engineering; Philadelphia, PA, USA; 1Laboratoire d’Etudes des Microstructures, CNRS-ONERA, Boite Postale 72, 92322 Châtillon Cedex, France

ELECTRONIC MATERIALS


Sponsored by: TMS Functional Materials Division, TMS Structural Materials Division, TMS: Alloy Phases Committee

Program Organizers: Hiroshi Nishikawa, Osaka University; Shih-kang Lin, National Cheng Kung University; Chao-Hong Wang, National Chung Cheng University; Chih-Ming Chen, National Chung Hsing University; Jaeho Lee, Hongik University; Zhi-Quan Liu, Shenzhen Institutes of Advanced Technology; Ming-Tzer Lin, National Chung Hsing University; Dajian Li, Karlsruhe Institute of Technology; Yu Zhong, Worcester Polytechnic Institute; Yeewen Yen, National Taiwan University of Science and Technology; A.S. Md Abdul Haseeb, University of Malaya; Ligang Zhang, Central South University; Sehoo Yoo, KITECH; Vesa Vuorinen, Aalto University; Yu-chen Liu, National Cheng Kung University

Thursday PM March 18, 2021

Session Chairs: Yu-chen Liu, National Cheng Kung University; Zhi-Quan Liu, Shenzhen Institutes of Advanced Technology

2:00 PM Invited
Towards Predictive Solid-state Synthesis: Understanding Phase Evolution during the Formation of YBCO: Christopher Bartel1; 1University of California, Berkeley

2:30 PM
Machine Learning for Perovskite Phase Stability: Dane Morgan1; Wei Li1; Ryan Jacobs1; 1University of Wisconsin-Madison; 2Google

2:50 PM
Vertically Stacked 2H-1T Dual-phase TMD Microstructures during Lithium Intercalation: A First Principles Study: Shayani Parida1; Avanish Mishra1; Jie Chen1; Jin Wang1; Arthur Dobley3; Barry Carter1; Avinash Dongare1; 1University Of Connecticut; 2EaglePicher Technologies LLC; 3Sandia National Laboratories

3:10 PM
Study on the Phase Diagrams of Bi-Te-RE (Yb, La, Ce, Nd, Sm, Tb, Er) Systems: Ligang Zhang1; Mingyue Tan1; Cun Mao1; Libin Liu1; 1Central South University

3:30 PM
The Significance of Transport Electronic Entropy in VO2: Antoine Allanore1; 1Massachusetts Institute of Technology

All times listed are in EDT time zone (UTC-4:00).
TMS2021 VIRTUAL FINAL TECHNICAL PROGRAM
3:50 PM
Electric Current Effect on the High-strain-rate Deformation of AA7075-T6 Al-alloy: Yu-Ching Chen; Kuan-hsueh Lin; Yu-Chen Liu; Tong Chen; Ting-Ju Chen; Woei-Shyan Lee; Shih-Kang Lin; 1National Cheng Kung University

PHYSICAL METALLURGY

Phase Transformations and Microstructural Evolution — General Topic II

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Phase Transformations Committee

Program Organizers: Rongpei Shi, Lawrence Livermore National Laboratory; Yipeng Gao, Idaho National Laboratory; Fadi Abdeljawad, Clemson University; Bharat Gwalani, Pacific Northwest National Laboratory; Qi An, University of Nevada-Reno; Eric Lass, University of Tennessee-Knoxville; Huajing (Wilson) Song, Los Alamos National Laboratory

Thursday PM  March 18, 2021

Session Chair: Rongpei Shi, Lawrence Livermore National Laboratory

2:00 PM
Microstructural Evolution and Deformation Behavior during Uniaxial Compression of Al-Si Alloys: Tingkun Liu; Matthew Olszta; Bharat Gwalani; Changyong Park; Arun Devaraj; 1Pacific Northwest National Laboratory; 2Argonne National Laboratory

2:20 PM
Suppression of Samson Phase Formation in Al-Mg Alloys by Boron Addition: Ramasis Goswami; 1Naval Research Laboratory

2:40 PM
Transformations in Amorphous Environments near “Critical” Temperatures: Deep Choudhuri; 1New Mexico Institute of Mining and Technology

3:00 PM
Crystallographic Transitions in Compositionally Complex Alloy Thin Films: Daniel Goodelman; Andrea Hodge; 1University of Southern California

3:20 PM
Porous Graphite Fabricated by Liquid Metal Dealloying of Silicon Carbide: Gina Greenidge; Jonah Erlebacher; 1Johns Hopkins University

3:40 PM
Analysis of Dendrite Fragmentation from Microgravity Solidification Experiments: Zachary Thompson; Tiberiu Stan; Peter Voorhees; Nathalie Mangelinck-Noël; Henri Nguyen-Thi; 1Northwestern University; 2Aix Marseille Univ, Université de Toulon, CNRS, IM2NP, Marseille, France

NUCLEAR MATERIALS

Thermal Property Characterization, Modeling, and Theory in Extreme Environments — Structure-Thermal Property Relationships

Sponsored by: TMS Structural Materials Division, TMS: Nuclear Materials Committee

Program Organizers: Janelle Wharry, Purdue University; Mukesh Bachhav, Idaho National Laboratory; Marat Khafizov, Ohio State University; Eric Lass, University of Tennessee-Knoxville; Vikas Tomar, Purdue University; Tiankai Yao, Idaho National Laboratory; Cody Dennett, Idaho National Laboratory; Karim Ahmed, Texas A&M University

Thursday PM  March 18, 2021

Session Chairs: Marat Khafizov, Ohio State University; Tiankai Yao, Idaho National Laboratory

2:00 PM
Mesoscale Modeling of the Effective Thermal Conductivity of a UO2-Mo Composite Nuclear Fuel: Karim Ahmed; Fergany Badry; 1Texas A&M University

2:20 PM
Thermal and Mechanical Properties of Hafnon (HfSiO4), Theory and Experiments: Zhidong Ding; Mackenzie Ridley; Jeroen Deijkers; Naiming Liu; Md. Shaikhot Hoque; John Gaskins; Mona Zebardadi; Patrick Hopkins; Haydn Wadley; Elizabeth Opila; Keivan Esfarjani; 1University of Virginia

2:40 PM  Invited
First-principles Modeling of High Temperature Irradiation Resistant Thermocouple (HTIR-TC) Performance and Oxidation: Lan Li; Ember Silikorski; Richard Skifton; Brian Jaques; 1Boise State University; 2Idaho National Laboratory

3:10 PM
Multiphysics Mesoscale Modeling of Ablative Thermal Protection Systems: Marina Sessim; Linuyan Shi; Simon Phillpot; Michael Tonks; 1University of Florida

3:30 PM
An Experimentally Validated Mesoscale Model for the Effective Thermal Conductivity of U-Zr Fuels: Karim Ahmed; Fergany Badry; Sean McDeavitt; 1Texas A&M University
Batteries Made with Calcium Could Be Better for Electric Cars or Storing Renewable Energy: Colton Gerber; Michael Woodcox; Manuel SMEU; 1Binghamton University

A Flexible Aqueous Rechargeable Battery Operating Over an Extended Temperature Range: Yehong Chen; Ying Wang; 1LSU

Degradation Characterization in Low Cobalt Lithium-ion Intercalation Cathodes: Hernando Jesus Gonzalez Malabet; Austin Gabhart; Megan Flannagin; Alex L’Antigua; George Nelson; 1The University of Alabama in Huntsville

Using Distribution of Relaxation Times Analysis and Microstructural Characterization to Quantify the Effects of Nanoparticle Infiltrants on the Catalytic Activity of Solid Oxide Fuel Cell Anodes: Jillian Rix; Boshan Mo; Uday Pal; Srikanth Gopalan; Soumendra Basu; 1Boston University

Utilizing Advanced Manufacturing for the Development of Advanced In-pile Sensors and Instrumentation: Kiyo Fujimoto; Thomas Holschuh; Lance Hone; Michael McMurtrey; Patrick Moo; Troy Unruh; Dave Estrada; 1Idaho National Laboratory; 2Boise State University

Mechanical and Microstructural Properties of FeCrAl Accident Tolerant Fuels Cladding Subjected to Flow Boiling CHF Testing: Rajnikant Umretiya; Donghwai Lee; Mark Anderson; Raul Rebak; Jessika Rojas; 1Virginia Commonwealth University; 2University of Wisconsin-Madison; 3GE Global Research

Micro-structure Dependent Nano-scratch Behavior in Additively Manufactured Inconel 718: Mustafa Rifat; Saurabh Basu; 1Penn State University

Mechanical Behavior of Thermally Stable, Hierarchical Ni-Y Alloys: Shrutl Sharma; Samuel Moehring; Saurabh Sharma; Kiran Solanki; Pedro Peralta; 1Arizona State University

Prediction and Testing of Hot Cracking Susceptibility during Local Melting in Binary and Multi Component Aluminum Alloys: Shubhra Jain; 1Iowa State University

Solidification and Defects Structure Evolution in Metal Additive Manufacturing via Molecular Dynamics Simulations: Gurmeet Singh; Veera Sundararaghavan; 1University of Michigan

First Principles Study of Sigma Phase Destabilization in Compositionally-complex Stainless Steel Alloys: Anna Soper; Savannah Diaz; Holly Frank; Jonas Kaufman; Adam Shaw; Kevin Laws; Aurora Pribram-Jones; Lori Bassman; 1Harvey Mudd College; 2UC Santa Barbara; 3 California Institute of Technology; 4University of New South Wales; 5UC Merced

Utilizing CALPHAD Methods to Determine Phases in a Compositionally Complex Fe-Cr-based Alloy: Kaitlyn Paulsen; Alexandra Louimidis; Patrick Conway; Karen Privat; Kevin Laws; Lori Bassman; 1Harvey Mudd College; 2Jönköping University; 3University of New South Wales
ADVANCED MATERIALS

Advanced High Strength Steels V — Poster Session

Sponsored by: TMS Structural Materials Division, TMS: Steels Committee

Program Organizers: Ana Luiza Araujo, CBMM North America Inc.; Louis Hector, General Motors Global Technical Center; Igor Vieira, Nucor Steel; Lijia Zhao, ArcelorMittal USA; Krista Limmer, CDC Army Research Laboratory; Jonah Klemm-Toole, Colorado School of Mines; Sebastien Allain, Institut Jean Lamour; MingXin Huang, University of Hong Kong

Monday PM March 15, 2021

5:30-6:30 PM

Effect of Rolling Conditions on Microstructure and Mechanical Properties of Medium Mn Steel: Poornachandra Satyampet; Saurabh Kundu; Prita Pant; 1IIT Bombay; 2Tata Steel

ENERGY & ENVIRONMENT

Advanced Materials for Energy Conversion and Storage VII — Poster Session

Sponsored by: TMS Functional Materials Division, TMS: Energy Conversion and Storage Committee

Program Organizers: Jung Pyung Choi, Pacific Northwest National Laboratory; Soumendra Basu, Boston University; Amit Pandey, Lockheed Martin Space; Paul Ohodnicki, University of Pittsburgh; Kyle Brinkman, Clemson University; Partha Mukherjee, Purdue University; Surojit Gupta, University of North Dakota

Monday PM March 15, 2021

5:30-6:30 PM

Session Chairs: Soumendra Basu, Boston University; Jung Pyung Choi, Pacific Northwest National Laboratory

A First-principles Study of Silver/Lanthanum Strontium Ferrite Interfacial Adhesion: Jiyou Park; Yue Qi; 2Brown University

AgCl-decorated Ag Nanowire Catalysts to Maximize the Surface Effect in the Oxygen Reduction Reaction: Suyeon Choi; Youngtae Park1; Changsoo Lee2; Hyuck Mo Lee1; 1Korea Advanced Institute of Science and Technology. Korea; 2Korea Institute of Energy Research

Liquid Enhanced Ga-Sn Alloy Anode for RBMs: Jianwei Liu1; Chao Song; 1Yuan Yuan1; Dajian Li2; Fusheng Pan1; 2Chongqing University

Synthesis and Electrochemical Performance of Nano Spinel Lithium Manganese Oxide (LiMn2O4) Composite with Functionalized Carbon Nanostructures (CNTs, GNPs & Graphene) by Microwave-Assisted Chemical Coprecipitation Method: Hanan Tariq1; Abdul Shakoor1; 1Center for Advanced Materials, Qatar University

Temperature-induced Successive Martensitic and Intermartensitic Phase Transformations of Ni0.12Mn0.88Ga Heusler Alloy: Amila Madiligama1; Phina Ari-Gur1; Yang Ren2; Vladimir Shavrov3; Victor Koledov3; Yanling Ge4; James George5; 1Penn State DuBois; 2Argonne National Laboratory; 3Russian Academy of Sciences; 4Aalto University; 5Western Michigan University

MATERIALS PROCESSING

Advances in Powder and Ceramic Materials Science — Poster Session

Sponsored by: TMS Extraction and Processing Division, TMS Materials Processing and Manufacturing Division, TMS: Materials Characterization Committee, TMS: Powder Materials Committee

Program Organizers: Bowen Li, Michigan Technological University; Shefford Baker, Cornell University; Huazhang Zhai, Beijing Institute of Technology; Kathy Lu, Virginia Polytechnic Institute and State University; Rajiv Soman, Eurofins EAG Materials Science LLC; Faqin Dong, Southwest University of Science and Technology; Jinhong Li, China University of Geosciences (Beijing); Ruiqiang Wang, The University of Alabama; Eugene Olevsky, San Diego State University

Monday PM March 15, 2021

5:30-6:30 PM

Session Chair: Kathy Lu, Virginia Polytechnic Institute and State University

Apatite Formation Ability of Ca2MgSi2O7 Bioceramic: Fariborz Tavangarian1; Sorour Sadeghzade2; Caleb Zolko3; Rahmatollah Emadi4; 1Pennsylvania State University, Harrisburg; 2Isfahan University of Technology

Biodegradability and Bioactivity of Porous Hydroxyapatite-PCL-hardystonite for Using in Bone Tissue Engineering Application: Fariborz Tavangarian1; Sorour Sadeghzade2; Rahmatollah Emadi4; 1Pennsylvania State University, Harrisburg; 2Isfahan University of Technology

Synthesis of Willemite Bioceramic by Mechanochemical Procedure: Sorour Sadeghzade2; Rahmatollah Emadi4; Fariborz Tavangarian1; 1Pennsylvania State University, Harrisburg; 2Isfahan University of Technology
ELECTRONIC MATERIALS

Alloys and Compounds for Thermoelectric and Solar Cell Applications IX — Poster Session

Sponsored by: TMS Functional Materials Division, TMS Structural Materials Division, TMS: Alloy Phases Committee

Program Organizers: Hsin-Jay Wu. National Chiao Tung University; Sinv-wen Chen. National Tsing Hua University; Franck Gascoin, CNRS Crismat Unicaen; Philippe Jund, Montpellier University; Yoshisato Kimura, Tokyo Institute of Technology; Lan Li. Boise State University; Takao Mori. National Institute for Materials Science; Tiejun Zhu, Zhejiang University; Alexandra Zevalkink, Michigan State University; Wan-Ting Chiu. Tokyo Institute of Technology

Monday PM March 15, 2021
5:30-6:30 PM

A Synergistic Approach to Boost the Thermoelectric Performance and Reduce the Thermal Conductivity in n-type PbTe: Carrier Optimization and Phase Diagram Engineering: Ping-Yuan Deng; Kuang-Kuo Wang; Jia-Yu Du; Hsin-Jay Wu; National Chiao Tung University; National Sun Yat-sen University; National Tsing Hua University

Co-P Diffusion Barrier for Lead Telluride-based Thermoelectric Joints: Kai-Wen Cheng; Hsien-Chien Hsieh; Albert T. Wu; National Central University

Ni/Pb-Te and Ni/Se-Sn Interfacial Reactions and Their Related Phase Diagrams: Yohanes Hutabolan; Zhi-kai Hu; Xu-hui Chen; Sinv-wen Chen; National Chiao Tung University

Ultra-low Thermal Conductivity for High-Performance GeTe-based Thermoelectric Materials: Yi-Fen Tsao; Hsin-Jay Wu; National Chiao Tung University

Using Neutrons to Probe the Influence of Processing on Temperature-dependent Strain in PbTe: James Male; Riley Hanus; G Snyder; Raphael Hermann; Northwestern University; Oak Ridge National Laboratory

NUCLEAR MATERIALS

Characterization of Nuclear Materials and Fuels with Advanced X-ray and Neutron Techniques — Poster Session

Sponsored by: TMS Structural Materials Division, TMS: Advanced Characterization, Testing, and Simulation Committee, TMS: Nuclear Materials Committee

Program Organizers: Xuan Zhang. Argonne National Laboratory; Jonathan Almer, Argonne National Laboratory; Maria Okuniewski, Purdue University; Joshua Kane, Idaho National Laboratory; Donald Brown, Los Alamos National Laboratory; J. Kennedy, Idaho National Laboratory; Arthur Motta, Pennsylvania State University

Monday PM March 15, 2021
5:30-6:30 PM

Characterization of Microstructure, Texture, and Residual Stress in a Neutron Irradiated CANDU Pressure Tube: Abdulla Alawadi; Hamidreza Abdolvand; Michael Bach; Sterling St Lawrence; Western University; Canadian Nuclear Laboratories

Synchrotron Microdiffraction Study of Cracks and Indentation on UO2 Material: Kun Mo; Yinbin Mao; Ruqing Xu; Tiankai Yao; Jie Lian; Laura Jamison; Abdellatif Yacout; Argonne National Laboratory; Idaho National Laboratory; Rensselaer Polytechnic Institute

X-ray Based Nanodiffraction to Study Strain in Materials for Nuclear Energy: Ericmoore Jassou; Mehmet Topsakal; Xiaojing Huang; Khalid Hattar; Hanfei Yan; Yong Chu; Cheng Sun; Lingfeng He; Jian Gan; Lynne Ecker; Simerjeet Gill; Brookhaven National Laboratory; Sandia National Laboratories; Idaho National Laboratory

CORROSION

Coatings and Surface Engineering for Environmental Protection III — Poster Session

Sponsored by: TMS Structural Materials Division, TMS Materials Processing and Manufacturing Division, TMS: Surface Engineering Committee, TMS: Corrosion and Environmental Effects Committee

Program Organizers: Arif Mubarok, PPG; Tushar Borkar, Cleveland State University; Rajeev Gupta, North Carolina State University; Mary Lyn Lim, PPG Industries; Raul Rebak, GE Global Research; Brian Okerberg, PPG Industries

Monday PM March 15, 2021
5:30-6:30 PM

Effects of Processing Conditions on the Tribocorrosion Resistance of Zr-based Thin Film Metallic Glass Coatings: Wenbo Wang; Wenhun Cai; Virginia Polytechnic Institute and State University

Role of Surface Mechanical Attrition Processing Conditions on the Corrosion Behavior of Aluminum 7075 Alloys: Vitrant Beura; Kiran Solanki; Arizona State University
CHARACTERIZATION

Data Science and Analytics for Materials Imaging and Quantification — Poster Session


Program Organizers: Emine Gulsoy, Northwestern University; Charudatta Phatak, Argonne National Laboratory; Stephan Wagner-Conrad, Carl Zeiss Microscopy; Marcus Hanwell, Brookhaven National Laboratory; David Rowenhorst, Naval Research Laboratory; Tiberiu Stan, Northwestern University

Monday PM March 15, 2021
5:30-6:30 PM

High Dimensional Analysis of Abnormal Grain Growth under Dynamic Annealing Conditions: Matthew Higgins1; Jiwoong Kang2; Ning Lu2; He Liu3; Robert Suter2; Ashwin Shahani1; 1University of Michigan; 2Carnegie Mellon University

Quantitative EBSD Image Analysis and Prediction via Deep Learning: Yi Han1; Joey Griffiths2; Yuhui Zhu3; Hang Yu4; 1Virginia Tech

Understanding Powder Morphology and Its Effect on Flowability Through Machine Learning in Additive Manufacturing: Sujana Rao Yarasi1; Andrew Kitahara1; Anthony Rollett1; Elizabeth Holm1; 1Carnegie Mellon University

PHYSICAL METALLURGY

Computational Thermodynamics and Kinetics — Poster Session

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Chemistry and Physics of Materials Committee, TMS: Computational Materials Science and Engineering Committee

Program Organizers: Nana Ofori-Opoku, Canadian Nuclear Laboratories; Evad Zackadoxal, Oak Ridge National Laboratory; Enrique Martinez Saez, Clemson University; Vahid Attari, Texas A&M University; Jorge Munoz, University of Texas at El Paso

Monday PM March 15, 2021
5:30-6:30 PM

Session Chairs: Nana Ofori-Opoku, Canadian Nuclear Laboratories; Evad Zackadoxal, Oak Ridge National Laboratory; Jorge Munoz, University of Texas El Paso; Vahid Attari, Texas A&M University; Enrique Martinez Saez, Clemson University

Martensitic Transformation in Superlattices of Two Non-transforming Materials: Shivism Tripathi1; Michael Titus2; Alejandro Strachan3; 1Purdue University

Plutonium Phase Diagrams in the New Edition of the Plutonium Handbook: Experiments and Theory: Aurelien Perron1; Patrice Turchi2; Lawrence Livermore National Laboratory

MATERIALS PROCESSING

Deformation Induced Microstructural Modification — Poster Session

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Shaping and Forming Committee

Program Organizers: Arun Devaraj, Pacific Northwest National Laboratory; Suveen Mathaudhu, University of California-Riverside; Kester Clarke, Colorado School of Mines; Bharat Gwalani, Pacific Northwest National Laboratory; Daniel Coughlin, Los Alamos National Laboratory

Monday PM March 15, 2021
5:30-6:30 PM

Optimization of Continuous Casting Products and High Aluminium-Magnesium Alloys Utilization in Automotive Industry Applications: Gorkem Demir1; Asa Alumymun Sanayi ve Ticaret A.S

Synchrotron X-ray Probing Dynamic Structural Change of Materials under Shear Deformation by High-speed Rotational Diamond Anvil Cell: Tingkun Liu1; Bharat Gwalani2; Changyong Park3; Stas Sinogeikin4; Arun Devaraj5; Pacific Northwest National Laboratory; 4Argonne National Laboratory; 5DAC Tools, LLC

LIGHT METALS

Magnesium Technology 2021 — Poster Session

Sponsored by: TMS Light Metals Division, TMS: Magnesium Committee

Program Organizers: Victoria Miller, University of Florida; Petra Maier, University of Applied Sciences Stralsund; J. Brian Jordon, University of Alabama; Neale Neelameggham, IND LLC

Monday PM March 15, 2021
5:30-6:30 PM

Corrosion Behaviour of Shear Extruded Magnesium Alloy: Vikrant Beura1; Virend Joshi3; Kiran Solanki2; 1Arizona State University; 2Pacific Northwest National Laboratory

Corrosion Response of Friction Stir Processed EZ33 Mg Alloy: Vasanth Shunmugasamy1; Marwa Abdelgawad2; Eisha Khalid3; Bilal Mansoor1; 1Texas A&M University at Qatar

Effect of Annealing on Microstructure and Hardness of Mg-Al Alloy Plates Processed by Single-pass Differential Speed Rolling: Honglin Zhang1; ZhiGang Xu1; Sergey Yarmolenko2; QiuMing Wei3; Laszlo Kecskes1; Jagannathan Sankar2; 1North Carolina A&T State University; 2University of North Carolina at Charlotte; 3Johns Hopkins University

Eutectic Modification of Mg-Si in Mg-Si Alloys for Faster Hydrogen Absorption Kinetics: Manjun Kim1; Julio Piraquive1; Yahia Ali2; Stuart McDonald1; Trevor Abbott2; Kazuhiko Nogita3; 1University of Queensland; 2Magontec Ltd.

In situ Study of Mg-Zn Alloy Degradation Mechanisms towards Advancing In vitro Testing: Max Viklund1; Lars Wadsö2; Dmytro Orliv3; 1Lund University

Liquid Enhanced Ga-Sn Alloy Anode for RMBs: Jiawei Liu1; Chao Song1; Yuan Yuan2; Dajian Li3; Fusheng Pan4; 1Chongqing University
Mechanical and Microstructural Behavior of Rolled AZ31B Magnesium Alloy under Three Different Stress States: Luiz Carneiro1; Duke Culbertson2; Qin Yu1; Yanyao Jiang1; 1University of Nevada, Reno; 2Lawrence Berkeley National Laboratory

Optimization of Mechanical Properties in Magnesium Zinc Alloys: Christopher Hale1; 1North Carolina A&T University

Preparation of Thin-walled Magnesium AZ31 Alloy Tubes Using Friction Stir Extrusion: Vasanth Shunmugasamy1; Eisha Khalid1; Bikal Mansoor1; 1Texas A&M University; 2Texas A&M University at Qatar

Role of Temperature and Pre-strain in Fatigue Strength of WE43-T5 Magnesium Alloy: Marko Knezevic1; Saeede Ghorbanpour2; Brandon McWilliams3; 1University of New Hampshire; 2CCDC Army Research Laboratory

NUCLEAR MATERIALS

Mechanical Behavior of Nuclear Reactor Components — Poster Session

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS Structural Materials Division, TMS: Nanomechanical Materials Behavior Committee, TMS: Nuclear Materials Committee

Program Organizers: Clarissa Yablinsky, Los Alamos National Laboratory; Assel Atkalifyeva, University of Florida; Eda Aydogan, Middle East Technical University; Laurent Capolungo, Los Alamos National Laboratory; Khalid Hattar, Sandia National Laboratories; Kayla Yano, Pacific Northwest National Laboratory; Caleb Massey, Oak Ridge National Laboratory

Monday PM March 15, 2021
5:30-6:30 PM

Simulating the Effects of Neutron Irradiation on Zirconium Alloys: A Crystal Plasticity Finite Element Approach: Omid Sedaghat1; Hamidreza Abdolvand2; 1Western University

The Thermo-mechanical Fracture of Chromium-zirconium Systems: T. Hasan1; Mohammed Zikry2; 1North Carolina State University

MATERIALS DESIGN

Practical Tools for Integration and Analysis in Materials Engineering — Poster Session

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS Structural Materials Division, TMS: Titanium Committee, TMS: Computational Materials Science and Engineering Committee, TMS: Integrated Computational Materials Engineering Committee

Program Organizers: Adam Pilchak, US Air Force Research Laboratory; Michael Gram, Titanium Metals Corporation; William Joost; Raymundo Arroyave, Texas A&M University; Charles Ward, AFRL/RXM

Monday PM March 15, 2021
5:30-6:30 PM

An Automated Procedure for Reconstructing Deformation Twin Hierarchies in Heavily Twinned Microstructures Implemented Using MTEX: Daniel Savage1; Rodney McCabe2; Marko Knezevic3; 1University of New Hampshire/Los Alamos National Lab; 2Los Alamos National Laboratory; 3University of New Hampshire

Application of Prolate Spheroid Stereology to Microtexture Regions in Ti-6A1-4V: Jaylen James1; Adam Pilchak2; Sushant Jha3; Raymundo Arroyave4; Eric Payton5; 1Texas A&M University; 2AFRL; 3AFRL/UDRI

Crystal Plasticity Model for Single Crystal Ni-based Superalloys: Capturing Orientation and Temperature Dependence of Flow Stress: Sutapa Priya Gupta1; Curt Bronkhorst2; 1University of Wisconsin, Madison

MATERIALS PROCESSING

Rare Metal Extraction & Processing — Poster Session

Sponsored by: TMS Extraction and Processing Division, TMS: Hydrometallurgy and Electrometallurgy Committee

Program Organizers: Gisele Azimi, University of Toronto; Takanari Ouchi, The University of Tokyo; Kerstin Forsberg, KTH Royal Institute of Technology; Hojong Kim, Pennsylvania State University; Shafiq Alam, University of Saskatchewan; Alafaara Baba, University of Ilorin; Neale Neelameggham, IND LLC

Monday PM March 15, 2021
5:30-6:30 PM

Extraction of Zn, Ga, Ge and In from Zinc Plant Residues: Vivek Kashyap1; 1Colorado School of Mines

ENERGY & ENVIRONMENT

Recycling and Sustainability for Emerging Technologies and Strategic Materials — Poster Session

Sponsored by: TMS Extraction and Processing Division, TMS Light Metals Division, TMS: Recycling and Environmental Technologies Committee

Program Organizers: John Howarter, Purdue University; Mingming Zhang, ArcelorMittal Global R&D; Elsa Olivetti, Massachusetts Institute of Technology; Hong Peng, University of Queensland

Monday PM March 15, 2021
5:30-6:30 PM

Computational Modeling of Current Density Distribution and Secondary Resistances for Aluminum Electrorefining in Ionic Liquids: Md Khalid Nahian1; Yuxiang Peng2; Laurentiu Nastac3; Ramana Reddy3; 1The University of Alabama; 2University of Alabama

Conductivity of AlCl3-BMIC Ionic liquid Mixtures Containing TiCl4 at Different Temperatures and Molar Ratios: Md Khalid Nahian1; Aninda Naifs Ahmed2; Pravin S. Shinde3; Ramana G. Reddy3; 1The University of Alabama
LIGHT METALS

TMS-DGM Symposium: A Joint US-European Symposium on Linking Basic Science to Advances in Manufacturing of Lightweight Metals — Poster Session

Sponsored by: Deutsche Gesellschaft für Materialkunde e.V. (DGM): German Materials Society, TMS Materials Processing and Manufacturing Division, TMS: Shaping and Forming Committee

Program Organizers: William Joost; Norbert Hort, Helmholtz-Zentrum Geesthacht

Monday PM
March 15, 2021
5:30-6:30 PM

The Microstructure, Morphology and Mechanical Properties of Rapidly Solidified Al-10wt%Si-0.4wt%Sc Alloy: Akanksha Sahoo1; Abdoul Aziz Bogno2; Hani Henein1; 1University of Alberta

NANOSTRUCTURED MATERIALS

100 Years and Still Cracking: A Griffith Fracture Symposium — Poster Session

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Nanomechanical Materials Behavior Committee

Program Organizers: Megan Cordill, Erich Schmid Institute of Materials Science; William Gerberich, University of Minnesota; David Bahr, Purdue University; Christopher Schuh, Massachusetts Institute of Technology; Daniel Kienar, Montanuniversität Leoben; Neville Moody; Nathan Mara, University of Minnesota; Erica Lilleodden, Helmholtz-Zentrum Geesthacht

Tuesday PM
March 16, 2021
5:30-6:30 PM

Session Chair: Megan Cordill, Erich Schmid Institute

Crack Driving Force Expressions Using Compliance Approach in Clamped Beam Bending Geometry: Tejas Chaudhari1; Ashwini Mishra1; Hrushikesh Sahasrabuddhe1; Nagamani Jaya Balila1; 1IIT Bombay

EAM Potential for Liquid Metal Induced Fracture: Antoine Clement1; Thierry Auger1; 1CNRS / PIMM

NUCLEAR MATERIALS

Accelerated Discovery and Qualification of Nuclear Materials for Energy Applications — Poster Session

Sponsored by: TMS Structural Materials Division, TMS Materials Processing and Manufacturing Division, TMS: Integrated Computational Materials Engineering Committee, TMS: Nuclear Materials Committee, TMS: Additive Manufacturing Committee

Program Organizers: Yongfeng Zhang, University of Wisconsin-Madison; Adrien Couet, University of Wisconsin-Madison; Michael Tonks, University of Florida; Jeffery Aguilar, Idaho National Laboratory; Andrea Jokisaari, Idaho National Laboratory; Karim Ahmed, Texas A&M University

Tuesday PM
March 16, 2021
5:30-6:30 PM

Anisotropic Biaxial Creep Behavior of Textured Nb-modified Zircaloy Cladding: Mahmood Hawary1; K. Murty2; 1North Carolina State University

Defect Cluster Mobilities and Preferred Configurations in \^{\text{945}}-zirconium: A Comparison of Two Interatomic Potentials: Jose March-Rico1; Brian Wirth1; 1University of Tennessee Knoxville

Helium Effect on Cavity Swelling in Dual-ion Irradiated Fe and Fe-Cr Alloys: Yan-Ru Lin1; Anuradha Bhattacharya2; Da Chen1; Ji-Jung Kai1; Jean Henry1; Steven Zinkle1; 1University of Tennessee; 2Oak Ridge National Laboratory; 3City University of Hong Kong; 4CEA

Manufacturing Process Optimization of High-density LEU Targets for Mo-99 Production: Kinam Kim1; Tae Won Cho2; Sunghwan Kim3; Kyoung Lee1; Yong Jin Jeong1; 1Korea Atomic Energy Research Institute

Mesoscale Modeling of the Effect of Interfaces on Segregation of Point Defects and Solutes and the Patterning of Extended Defects: Karim Ahmed1; Abdurrahman Ozturk1; Merve Gencturk1; Lin Shao1; 1Texas A&M University

Modeling and Analysis of the Effects of the Microstructure on U-10Mo Fuel Thickness Variation during Hot Rolling: Lei Li1; Vineet Joshi1; Ayoub Soulami1; 1Battle Pacific Northwest National Lab

SPECIAL TOPICS

Acta Materialia Awards Poster Session — Poster Session

Program Organizer: Carolyn Hansson, University of Waterloo

Tuesday PM
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5:30-6:30 PM

Atom Locations of Minor Dopants and Their Role in Stabilizing the Hexagonal \^{\text{1951}}-Cu_Sn, Intermetallic Compound: Wenhui Yang1; Xuan Quy Tran1; Tomokazu Yamamoto1; Kazuhiro Nogita1; Syo Matsumura1; 1Kyushu University; 2The University of Queensland

Atomistic Simulation of the Formation and Fracture of Oxide Bifilms in Cast Aluminum: Jialin Liu1; Gigui Wang3; Yue Qi1; 1Michigan State University; 2General Motors

Bioinspired Mechanically Active Adhesives for the Repair of Heart Bleeds: Jingjing Wu1; 1Massachusetts Institute of Technology
Concentration-dependent Atomic Mobilities in FCC CoCrFeMnNi High-entropy Alloys: Daniel Gaertner1; 1Institute of Materials Physics, University of Münster

Demonstrating the Potential of Accurate Absolute Cross-grain Stress and Orientation Correlation Using Electron Backscatter Diffraction: Tijmen Vermeij1; Johan Hoefnagels1; 1Eindhoven University of Technology

Flash Sintering of Gadolinium-doped Ceria: Tarini Prasad Mishra1; Rubens Roberto Ingraci Neto1; Martin Bram1; Olivier Guillot1; Rishi Raj1; 1Forschungszentrum Jülich GmbH; 1Los Alamos National Laboratory; 1University of Colorado Boulder

Microstructural Optimization through Heat Treatment for Enhancing the Fracture Toughness and Fatigue Crack Growth Resistance of Selective Laser Melted Ti-6Al-4V Alloy: Punit Kumar1; Upadrashta Ramamurthy1; 1Nanyang Teehcnological University

Orientation-designed Large Single-crystal Cu-Al-Mn Alloys by Abnormal Grain Growth and Their Enhanced Functional Properties: Sheng Xu1; Xiao Xu1; Toshihiro Omori1; Ryosuke Kainuma1; 1Tohoku University

Titania Coated Mesoporous sSilica Particles for Sustainable Water Purification: Ogbugu Kalu1; 1University of New Brunswick

Unravelling the Role of Zinc in Magnesium Corrosion at the Nanometer Scale: Martina Chihova1; 1ETH Zurich

Additive Manufacturing Fatigue and Fracture V: Processing—Structure—Property Investigations and Application to Qualification — Poster Session

Sponsored by: TMS Structural Materials Division, TMS: Additive Manufacturing Committee, TMS: Mechanical Behavior of Materials Committee

Program Organizers: Nik Hrabe, National Institute of Standards and Technology; John Lewandowski, Case Western Reserve University; Steve and Technology; John Lewandowski, Case Western Reserve

Additive Manufacturing for Energy Applications III — Poster Session

Sponsored by: TMS Structural Materials Division, TMS: Additive Manufacturing Committee, TMS: Nuclear Materials Committee

Program Organizers: Isabella Van Rooyen, Idaho National Laboratory; Indrajit Chari1; University of Idaho; Subhashish Meher, Idaho National Laboratory; Michael Kirka, Oak Ridge National Laboratory; Kumar Sridharan, University of Wisconsin-Madison; Xiaoyuan Lou, Auburn University

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Session Chair: Michael Kirka, Oak Ridge National Laboratory

Effect of Laser Power, Laser Spot Size and Hatch Spacing on Mechanical and Microstructural Properties of 316L Stainless Steel Processed via Selective Laser Melting: Taban Larimian1; Tushar Borkar1; Manigandan Kannan2; Dariusz Grzesiak3; Bandar AlMangour4; 1Cleveland State University; 2University of Akron; 3West Pomeranian University of Technology; 4Saudi Arabia Basic Industries Corporation

Effect of Thickness on Ultrasonic Fatigue Behavior of 316L Stainless Steel Made by Powder Bed Fusion Additive Manufacturing: Megan Trombley1; Qianying Shi1; John Allison1; 1University of Michigan

Quantifying Surface Roughness in Additive Manufactured Ti-6Al-4V Using In-situ X-ray Imaging: Alisha Bhatt1; Chu Lun Alex Leung1; Gowtham Soundarapandian1; Sebastian Marussi1; Saurabh Shah1; Robert Atwood2; Manish Tiwari3; Peter Lee4; 1University College of London; 2TWI Ltd; 3Diamond Light Source Ltd

Ultrasonic Nondestructive Characterization of Hybrid Additively Manufactured 420 Stainless Steel: Luz Sotelo1; Cody Pratt1; Hailtham Hadidi1; Michael Sealy3; Joseph Turner4; 1University of Nebraska Lincoln

Variation and Impact of Surface Roughness on Fatigue in Laser Powder Bed Fusion: Rachel Evans1; Joy Gockel1; Luke Sheridan1; 1Wright State University

Additive Manufacturing of Nuclear Spacer Grids using Inconel 718 Alloy: Observed Distortion and Proposed Distortion Control Measures for Thin Walled Structures: Syed Zia Uddin1; Jack Beuth1; Qu He2; 1Carnegie Mellon University

Development of Additive Manufacturing Processes for Embedding Thermocouples during Directed Energy Deposition: Matthew McCoy1; Kyu Cho1; John Shelton1; Piyush Sabharwall1; Isabella Van Rooyen1; 1Northern Illinois University

Effect of Cold Rolling on the Microstructure and the Mechanical Properties of 316L Stainless Steel Parts Produced by Laser Powder Bed Fusion (LPBF): Louis Lemarques1; Pierre-François Giroux1; Hicham Maskrot1; Bassem Barkia1; Olivier Hercher1; Frédéric Bondigel1; Philippe Castany1; 1Université Paris-Saclay, CEA; 1Université de Rennes, INSA Rennes

Experimental Fabrication of Porous Additive Manufactured Material: Luis Nunez1; Isabella Van Rooyen; 1Northern Illinois University; 2Idaho National Laboratory

Numerical Study to Predict the Effect of Surface Roughness on the Thermal and Hydraulic Performance of Additively Manufactured Heat Exchangers: Jose Gonzalez1; Kyu Cho1; John Shelton1; Piyush Sabharwall1; Isabella Van Rooyen1; 1Northern Illinois University

On the In-situ Formation of Nano Oxides during Laser Powder Bed Fusion as a Function of Steel Chemistry and Atmospheric Oxygen Level: Houssang Yin1; Pu Deng2; Miao Song2; Mallikarjun Karadge2; Xiaojuan Lou1; 1Auburn University; 2University of Michigan-Ann Arbor; 1GE Research

Process-induced History Effects on the Creep Behavior of Additively Manufactured IN718 Alloys: Saurabh Sharma1; Kiran Solanki1; 1Arizona State University
**ADDITIVE TECHNOLOGIES**

**Additive Manufacturing of Metals: Applications of Solidification Fundamentals — Poster Session**

*Sponsored by:* TMS Materials Processing and Manufacturing Division, TMS: Additive Manufacturing Committee, TMS: Solidification Committee

**Program Organizers:** Alex Plotkowski, Oak Ridge National Laboratory; Lang Yuan, University of South Carolina; Kevin Chaput, Northrop Grumman; Mohsen Asle Zaeem, Colorado School of Mines; Wenda Tan, University of Utah; Lianyi Chen, University of Wisconsin-Madison

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Analytical Predictions and Experimental Results of the Inherent Spatial Variation of Thermokinetics and Corresponding Grain Growth during SLM Process: Dr. Francisco Jimenez1; Dr. John Goff2; 1University of Cincinnati; 2Argonne National Laboratory

Investigating the Fundamental Role of Wall Materials in Laser Powder Bed Fusion: Dr. Jing Zhu1; Dr. Scott Moore1; 1University of New Mexico

Continuity of Eutectic Microstructures Across Melt Pool Boundaries in Laser Powder Bed Fusion: Jonathan Shelton1; James Fitz-Gerald1; Jerrold Floro1; 1University of Virginia

Creating Periodic Surface Structures Using Multiple Laser Beams: Wenyuan Hou1; Craig Arnold2; 1Princeton University; 2Lawrence Livermore National Laboratory

Energy Density on Melt Pool Dynamics and Solidification Microstructures in Laser Powder Bed Fusion Additive Manufacturing: Tianyu Zhang1; Christopher Carter1; Lang Yuan1; 1University of South Carolina

In situ X-ray Observation and Quantification of Keyhole-induced Porosity during Laser Additive Manufacturing: Yize Huang1; Chu Lun Alex Leung1; Samuel J. Clark1; Siu Lun Yeung2; Yunhui Chen2; Lorna Sinclair1; Sebastian Marussi1; Kamel Fezzaa1; Jeyarajan Thiagalingam1; Peter D. Lee1; 1University of Central Florida; 2Electro Optical Systems GmbH

Influence of Processing Parameters and Geometry Effects on Residual Stress Development in Laser Powder Bed Fusion: Evgenii Borisov1; Kirill Starikov1; Anatoly Popovich1; V. A. Popovich2; 1Peter the Great St. Petersburg Polytechnic University; 2Delft University of Technology

On Mesoscopic Surface Formation in Metal Laser Powder Bed Fusion Process: Shanshan Zhang1; Subin Shrestha1; Kevin Chou2; 1University of Louisville; 2University of North Texas

Using Dimensionless Numbers to Describe Process Boundaries in Laser Powder Bed Fusion: Theresa Hanemann1; Christoph Seyfert1; Armin Witte1; Peter Hofelder1; Astrid Rota1; Martin Heilmayer2; 1EOS Electro Optical Systems GmbH; 2Karlsruhe Institute of Technology

Wire Arc Additive Manufacturing of Nano-treated High Strength Aluminium Alloys: Maximilian Lasse1; Maximilian Sokoluk1; Yitian Chi1; Xiaochun Li1; 1SciFacturing Lab

**ADDITIVE TECHNOLOGIES**

**Additive Manufacturing: Materials Design and Alloy Development III -- Super Materials and Extreme Environments — Poster Session**

*Sponsored by:* TMS Materials Processing and Manufacturing Division, TMS: Additive Manufacturing Committee

**Program Organizers:** Behrang Poorganji, University of Waterloo; Hunter Martin, HRL Laboratories LLC; James Saal, Citrine Informatics; Orlando Rios, Oak Ridge National Laboratory; Atieh Moridi, Cornell University; Jiadong Gong, Questek Innovations LLC

Comprehensive Study on Creep Performance of Selective Laser Melted Inconel 718 through Post Heat Treatment and Microstructure-based Modelling: Shun Wu1; 1Monash University

Design and Development of Multi-Microlattice Structures for Improved Mechanical Behavior: Bikram Sahariah1; Akshay Namdeo2; Prasenjit Khanikar3; 1Indian Institute of Technology Guwahati; 2National University of Singapore; 3Indian Institute of Technology Guwahati

Influence of Heat Treatments on the Dynamic Behavior of an Additively Manufactured IN718 Alloy: Saurabh Sharma1; Kiran Solanki1; 1Arizona State University

Mechanical Performance of Additively Manufactured Metallic Tetrahedral Microlattice Structure: Akshay Namdeo1; Bikram Sahariah1; Prasenjit Khanikar3; 1Indian Institute of Technology Guwahati; 3Indian Institute of Technology Guwahati

Synchrotron Imaging of the Influence of Oxidation with Powder Age on Cracking Phenomena during Laser Powder Bed Fusion of CM247: David Rees1; Chu Lun Alex Leung2; Goutham Soundarapandiyam2; Sebastian Marussi2; Saurabh Shah2; Robert Atwood3; Ben Saunders4; Gavin Baxter4; Peter Lee5; 1University College London; 2Colorado University; 3Diamond Light Source Ltd.; 4Rolls-Royce plc.

**POSTERS**

**www.tms.org/TMS2021**

All times listed are in EDT time zone (UTC-4:00).
ADDITIVE TECHNOLOGIES

Additive Manufacturing: Solid-State Phase Transformations and Microstructural Evolution — Poster Session

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS; Additive Manufacturing Committee, TMS; Phase Transformations Committee, TMS; Shaping and Forming Committee

Program Organizers: Biji-Na Kim, Carpenter Additive; Andrew Weessman, University of Arizona; Chantal Sudbrack, National Energy Technology Laboratory; Eric Less, University of Tennessee-Knoxville; Katerina Christofidou, University of Sheffield; Peeyush Nandwana, Oak Ridge National Laboratory; Rajarshi Banerjee, University of North Texas; Whitney Poling, General Motors Corporation; Yousub Lee, Oak Ridge National Laboratory

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A Comparison of the Microstructure in Blown Powder Deposition Inconel 718 for Various Heat Treatments: Giancarlo Puerto1; Chris Hilt2; Judy Schneider1; 1University of Alabama in Huntsville; 2NASA Space Flight Center

Constituent Phases and Microstructure of Cu-10Sn Alloy Produced by Laser Powder Bed Fusion: Le Zhou1; Binghao Lu1; Holden Hyer1; Abhishek Mehta1; Sun Hong Park2; Yongho Sohn2; 1Marquette University; 2University of Central Florida; 3POSCO Technical Research Laboratories

Effect of Hot Isostatic Pressing Conditions on Microstructure Evolution and Hardness of Laser Powder Bed Fusion Processed Alloy 718: Hamza Faghiha1; Runbo Jiang1; Joseph Pauza2; Magnus Ahlfors3; Chad Beamer4; Anthony Rollett5; 1Illinois Institute of Technology; 2Carnegie Mellon University; 3Quintus Technologies

In Situ Observation of Phase Evolution in Ti-6Al-4V upon Laser Processing with Synchrotron X-ray Diffraction Analysis: Seunghiee Oh1; Rachel Lim1; Joseph Aroh2; Joseph Pauza2; Andrew Chang2; Benjamin Gould3; Niranjan Parab3; Joel Bernier3; Tao Sun4; Robert Suter1; Anthony Rollett5; 1Carnegie Mellon University; 2Argonne National Laboratory; 3Lawrence Livermore National Laboratory; 4University of Virginia

Microstructure-defect Printability in Laser Powder Deposition of Ni-based Superalloys: Xueqin Huang1; 1Texas A&M University

Microstructure Evolution in Laser Deposited AISI 420 Stainless Steel: Effect of Post-processing Heat Treatment: Madhavan Radhakrishnan1; Md Mehadi Hassan1; David Otazu2; Thomas Lienert2; Osman Anderoglu3; 1University of New Mexico; 2Optomec Inc

Tailoring Microstructure of Selective Laser Melted TiAl-alloy with In-situ Heat Treatment via Multiple Laser Exposure: Igor Polozov1; Artem Kanyakov2; Analogy Popovich3; V. A. Popovich3; 1Peter the Great St. Petersburg Polytechnic University; 2Delft University Of Technology

Well-aligned nanoprecipitates in Nickel alloy produced by direct metal laser sintering: Bo Yang1; Zhongxia Shang2; Jie Ding3; Jack Lopez2; William Jarosinski1; Tianyi Sun1; Yifan Zhang1; Nicholas Richter1; Hailan Wang1; Xinghang Zhang1; 1School of Materials Engineering, Purdue University; 2Praxair Surface Technologies Inc.

CHARACTERIZATION

Advanced Characterization Techniques for Quantifying and Modeling Deformation — Poster Session

Sponsored by: TMS Extraction and Processing Division, TMS Materials Processing and Manufacturing Division, TMS Structural Materials Division, TMS: Advanced Characterization, Testing, and Simulation Committee, TMS: Materials Characterization Committee

Program Organizers: Rodney McCabe, Los Alamos National Laboratory; Marko Knezevic, University of New Hampshire; Irene Beyerlein, University of California-Santa Barbara; Wolfgang Pantleon, Technical University of Denmark; C. Tasan, Massachusetts Institute of Technology; Arul Kumar Mariyappan, Los Alamos National Laboratory; Olivia Underwood, Sandia National Laboratories

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Magnetic Anisotropy and Stacking Faults in Ag/Plt/Co/Pt Multilayer Thin Films: Yukun Liu1; Michael Kitcher1; Marc De Graef2; Vincent Sokalski3; 1Carnegie Mellon University

MATERIALS DESIGN

AI/Data Informatics: Applications and Uncertainty Quantification at Atomistics and Mesoscales — Poster Session I

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Computational Materials Science and Engineering Committee

Program Organizers: Kamal Choudhary, National Institute of Standards and Technology; Garvit Agarwal, Argonne National Laboratory; Wei Chen, Illinois Institute of Technology; Mitchell Wood, Sandia National Laboratories; Vahid Attari, Texas A&M University; Oliver Johnson, Brigham Young University; Richard Henig, University of Florida

Tuesday PM March 16, 2021
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A Machine Learning Investigation of Crystallographic Parameters for Abnormal Grain Growth: Meihong Lyu1; Joseph Pauza2; Ryan Cohn1; Elizabeth Holm1; 1Carnegie Mellon University

A Sensitivity Analysis of Microstructure-Based Model for U-10Mo Hot Rolling and Annealing: Yucheng Fu1; William E Frazier III2; Kyoo Sil Choi3; Lei Li4; Zhijie Xu5; Vineet V Joshi6; Ayoub Soulami7; 1PNNL

Machine Learning Approach of Molecular Dynamics Simulations for Body-Centered Cubic Zirconium: Vanessa Meraz1; Bethuel Khamala1; Armando Garcia1; Adrian De La Rocha2; Jorge Munoz2; Tess Smidt3; Wibe de Jong4; 1The University of Texas at El Paso; 2Lawrence Berkeley National Laboratory

Microstructure-driven Parameter Calibration for Mesoscale Simulation: Theron Rodgers1; Dan Bolintineanu2; Daniel Moser3; Rejju Pokharel4; 1Sandia National Laboratories; 2Los Alamos National Laboratory

Mining Structure-property Linkages in Nonporous Materials Using Interpretative Deep Learning Approach: Haomin Liu1; Niaz Abdolrahimi1; 1University of Rochester
Defect and Phase Transformation Pathway Engineering for Desired Microstructures — Poster Session

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Phase Transformations Committee

Program Organizers: Yufeng Zheng, University of Nevada-Reno; Rongpei Shi, Lawrence Livermore National Laboratory; Yipeng Gao, Idaho National Laboratory; Timofey Frolov, Lawrence Livermore National Laboratory; Stoichko Antonov, Max-Planck-Institut für Eisenforschung GmbH; Jessica Krogstad, University of Illinois at Urbana-Champaign; Bin Li, University of Nevada, Reno

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Anisotropic Thermal Lattice Expansion and Crystallographic Structure of Strontium Aluminide within Al-10Sr Alloy as Measured by In-situ Neutron Diffraction: Klaus-Dieter Liss1; Stefanus Harjo2; Takuro Kawasaki2; Kazuya Aizawa2; Pingguang Xu3; 1Guangdong Technion - Israel Institute of Technology (GTIIT); 2J-PARC Center, Japan Atomic Energy Agency; 3Materials Sciences Research Center, Japan Atomic Energy Agency

Deformation Induced Precipitation (DIP): A Cohesive Processing Strategy to Strengthen Magnesium Alloys: Suhas Esvarappa Prameela1; Peng Yi1; Laszlo Kecskes1; Michael Falk1; Timothy Weihs1; 1Johns Hopkins University

The Effects of Defect Structure on Transformation Properties in NiTi Alloys for Phase Change Thermal Management Applications: Asher Lef1; Adam Wilson1; Darin Sharar1; 1CCDC Army Research Laboratory

Environmentally Assisted Cracking: Theory and Practice — Poster Session

Sponsored by: TMS Structural Materials Division, TMS: Corrosion and Environmental Effects Committee

Program Organizers: Bai Cui, University of Nebraska-Lincoln; Raul Rebak, GE Global Research; Srujan Rokkam, Advanced Cooling Technologies Inc; Jenifer Locke, Ohio State University

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Session Chair: Srujan Rokkam, Advanced Cooling Technologies

Extraction of Zinc from Zinc Hypoxide in the Process of Ammonia Leaching: Linfei Zhao1; Hui Li2; Jinglong Liang3; 1North China University of Science and Technology

The Impact of Laser Shock Peening Parameters on the Ability to Mitigate Stress Corrosion Cracking in Al-Mg Alloys: Eric Dau1; William Goluboffske2; Matthew McMahon2; 1Vision Point Systems; 2Naval Surface Warfare Center, Carderock Division

Fatigue in Materials: Fundamentals, Multiscale Characterizations and Computational Modeling — Poster Session


Program Organizers: Garrett Patak, Clemson University; Ashley Spear, University of Utah; Antonios Kontsos, Drexel University; Brian Wisner, Ohio University; Jean-Charles Stinville, University of California-Santa Barbara

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Micro-scale Characterization of Life-limiting Areas in Additive Manufactured Parts: Connor Varney1; Paul Rottmann1; 1University of Kentucky

The Effect of Corrosion Location Relative to Local Stresses on the Fatigue Life of Geometrically-complex, Galvanically Corroded AA7075-T6: Carly Coche1; James Burns1; 1University of Virginia

Frontiers in Solidification Science VIII — Poster Session

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Chemistry and Physics of Materials Committee, TMS: Phase Transformations Committee, TMS: Solidification Committee, TMS: Computational Materials Science and Engineering Committee

Program Organizers: Damien Tourret, IMDEA Materials; Amy Clarke, Colorado School of Mines; Ulrike Hecht, Access e.V.; Nana Ofori-Opoku, Canadian Nuclear Laboratories; Melis Serefoglu, Koç University; Tiberiu Stan, Northwestern University

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Session Chairs: Amy Clarke, Colorado School of Mines; Ulrike Hecht, Access e.V.; Nana Ofori-Opoku, Canadian Nuclear Laboratories; Melis Serefoglu, Koç University; Tiberiu Stan, Northwestern University; Damien Tourret, IMDEA Materials

Data-assimilation for Dendritic Solidification Using Phase-field Simulation Based on Limited Observation Data: Yuki Imai1; Shinji Sakane1; Tomohiro Takaki2; 1Kyoto Institute of Technology

Electronic-structure Calculations of Local Orders in Liquid Metals: Byeongchan Lee1; Geun Woo Lee2; 1Kyung Hee University; 2Korea Research Institute of Science and Standards

Multi-phase-field Lattice Boltzmann Modeling and Simulations for Semi-solid Deformation: Namito Yamanaka1; Shinji Sakane1; Tomohiro Takaki2; 1Kyoto Institute of Technology
Heterostructured and Gradient Materials (HGM IV): Tailoring Heterogeneity for Superior Properties — Poster Session

**Sponsored by:** TMS Structural Materials Division, TMS: Mechanical Behavior of Materials Committee

**Program Organizers:** Yuntian Zhu, City University of Hong Kong; Kei Ameyama, Ritsumeikan University; Irene Beyerlein, University of California-Santa Barbara; Yves Brechet, Grenoble Institute of Technology; Huajian Gao, Nanyang Technological University; Hyoeng Seop Kim, Pohang University of Science and Technology; Ke Lu, Institute of Metal Research; Xiaolei Wu, Chinese Academy of Sciences

**Tuesday PM**  March 16, 2021

5:30-6:30 PM

**Effect of Layer Spacing and Elastic-plastic Mismatch on Fracture Toughness of Ti-TiN Multilayers:** Ashwini Mishra1; Hariprasad Gopalan2; Marcus Hans3; Christoph Kirchlechner3; Jochen Schneider3; Gerhard Dehm4; Nagamani Ballai1; Indian Institute of Technology Bombay; 2Max-Planck-Institut für Eisenforschung GmbH; 3RWTH Aachen University; 4Karlsruhe Institute of Technology

**Evolution of Diffusion Joint of Al-steel Clad Strip during Heat Treatment:** Barbara Kriviska1; Michaela Šlapáková1; Rostislav Králik1; Lucia Bajtsova1; Miroslav Cleslar1; Mykhailo Stolbchenko2; Olexandr Grydin3; Mirko Schaper1; 1Charles University; 2Paderborn University

**Hierarchical Morphologies in Co-sputtered Deposited Immiscible Alloy Thin Films:** Max Powers1; 1University of Michigan

**Origin of Enhanced Ductility in Laser Solidified Heterogeneous Hypereutectic Al-20Si Alloy:** Slip Interactions between Soft Al Matrix and Hard Si Fibers?: Hua-Hsun Lien1; 1University of Nebraska-Lincoln

**Work Hardening of Gradient FeCrAl Alloy:** An In-situ Micropillar Compression Study: Tianyi Sun1; Zhongxia Shang1; Jaehun Cho2; Jie Ding3; Yifan Zhang2; Tongjun Niu1; Bo Yang3; Dongyue Xie1; Jian Wang1; Haiyan Wang2; Xinghang Zhang3; 1Purdue University; 2Purdue University, School of Materials Engineering; 3North China University of Science and Technology

**NANOSTRUCTURED MATERIALS**

**Materials and Chemistry for Molten Salt Systems — Poster Session**

**Sponsored by:** TMS Structural Materials Division, TMS: Corrosion and Environmental Effects Committee

**Program Organizers:** Stephen Raiman, Texas A&M University; Kumar Sridharan, University of Wisconsin-Madison; Nathaniel Hoyt, Argonne National Laboratory; Jinsuo Zhang, Virginia Polytechnic Institute and State University; Michael Short, Massachusetts Institute of Technology; Raluca Scarlat, University of California-Berkeley

**Tuesday PM**  March 16, 2021

5:30-6:30 PM

**A High-temperature Thermodynamic Reference Electrode Enclosed in an Alumina Tube:** Mingyang Zhang1; Jinsuo Zhang1; 1Virginia Tech

**An Update on the Round Robin for Molten Salt Chemical and Thermal Properties Characterization:** Raluca Scarlat1; Theodore Bessmann2; Jake McMurray3; 1University of California, Berkeley; 2University of South Carolina; 3Oak Ridge National Laboratory

**Cost-effective, Reliable Containment of High-temperature Molten Chlorides for Heat Transfer and Thermal Energy Storage:** Liangjuan Gao1; Elizabeth Laskowski2; Kenneth McGowan3; Robert Cullen4; Mario Caccia1; Kenneth Sandhage3; 1Purdue University

**Development and Demonstration of a Novel Spectroelectrochemical Cell for Molten Salts:** Dimitris Killinger1; Supathom Phongikaroon2; 1Virginia Commonwealth University

**Electron Energy Loss Spectroscopy Characterization of Molten Salt Corrosion Damage in Pure Ni and Model Ni-20Cr Binary Alloy:** Kaustubh Bawane1; Panayotis Manganaris2; Yachun Wang3; Jagadeesh Sure4; Arthur Ronne5; Xiaoyang Liu6; Phillip Halstenberg7; Simerjeet Gill8; Kotaro Sasaki9; Yu-chen Karen Chen-Wiegart8; Shannon Maharir9; Simon Pimbllot10; James Wishart10; Lingfeng He1; 1Idaho National Laboratory; 2Brookhaven National Laboratory; 3Stony Brook University; 4Oak Ridge National Laboratory

**Fast and Accurate High-dimensional Neural Network Interatomic Potentials for Lithium-based Fluoride Salts:** Stephen Lam1; Qing-Jie Li2; Ronald Ballinger; Charles Forsberg3; Ju Li4; 1University of Massachusetts - Lowell; 2Massachusetts Institute of Technology

**Fluoride Salt Purification Using Bifluoride Salt for Hydrogen Fluoride-generation:** Ronald Laehn1; Grigorios Itkos2; Saeed Bagherzadeh2; Mario Caccia1; Kenneth Sandhage3; 1Purdue University

**Investigating Test Parameters for Isothermal Salt Compatibility Experiments:** Cory Parker1; Dino Sulejmanovic2; James Kurtley3; Stephen Raiman1; Bruce Pint4; 1Oak Ridge National Laboratory

**MATERIALS PROCESSING**

**High Temperature Electrochemistry IV — Poster Session**

**Sponsored by:** TMS Extraction and Processing Division, TMS: Hydrometallurgy and Electrometallurgy Committee

**Program Organizers:** Prabhat Tripathy, Batelle Energy Alliance (Idaho National Laboratory); Guy Fredrickson, Idaho National Laboratory

**Tuesday PM**  March 16, 2021

5:30-6:30 PM

**Investigation on Preparation of Fe-Al Alloys by Direct Reduction of Fe2O3-Al2O3 Powder in CaCl2-NaCl Molten Salt System:** Jirui Liu1; Hui Li2; Jinglong Liang3; 1North China University of Science and Technology

**NUCLEAR MATERIALS**
Performance of Corrosion Resistant Claddings on 316H Stainless Steel in Molten Fluoride Salt: Matthew Weinstein1; Will Doniger2; Cody Falconer3; Chuan Zhang4; Cem Topbas5; Kumar Sridharan6; Adrien Couet7; 1University Of Wisconsin Madison; 2Computherm, LLC; 3Electric Power Research Institute

Prediction of Actinide Salt Compounds Using Density-Functional Theory and the Universal Structure Predictor: Evolutionary Xtallography (USXPE) Algorithm: Matthew Christian1; Theodore Besmann2; 1University of South Carolina

Purification of Molten NaCl-CaCl2 Using Anhydrous HCl: D. Hamilton1; 1University of Utah

Relevance and Methods of Fluoroadicity Quantification: Haley Williams1; Nicholas Winner1; Raluca O. Scarlat1; 1University of California - Berkeley

Short- and Medium-range Structure of Molten Fluorides with Cr Solutes: Nicholas Winner1; Haley Williams1; Raluca Scarlat1; Mark Asta1; 1University of California Berkeley

Testing Setup to Analyze Particulates in 316 Stainless Steel Molten Salt Systems: Reuben Howe1; Josh Dowell2; Timothy Head3; 1ACU NEXT Lab

Yellowjacket: A New MOOSE-based Corrosion Modelling Application for Molten Salt Reactors: Parikshit Bajpai1; Chaitanya Bhave1; Max Poschmann1; David Andrs1; Michael Tonks1; Markus Piro1; 1Ontario Tech University; 2University of Florida; 3University Of Wisconsin Madison; 4Idaho National Laboratory

Influence of Surface Treatment on Physical and Chemical Behavior of Polytetrafluoroethylene: Karollyne Monsore1; Géssica Nicolau1; Anderson Oliveira1; Suzane Oliveira1; Ricardo Weber1; Sergio Monteiro2; 1Instituto Militar de Engenharia; 2Military Institute of Engineering

Influence of Weathering on the Mechanical Performance of an Aramid Fabric: Anderson Oliveira da Silva1; Ricardo Weber1; Rodrigo Nascimento1; Sergio Monteiro2; 1Military Institute of Engineering

Physical and Morphological Analysis of Concrete Produced with Expanded Clay: Luana Demothenes1; Julio Jorge Braga de Carvalho Nunes1; Lisley Madeira Coelho1; Sergio Neves Monteiro1; Ana Maria Abreu Jorge Teixeira1; 1Instituto Militar de Engenharia

Structural Characterization of Caranán Fiber (Mauritia Aramata): Andressa Souza1; Rai Junio1; Lucas Neuboa1; Raphael Reis1; Luana Demothenes1; Sergio Monteiro1; Luiz Nascimento1; 1IME

The Influence of Ultraviolet (UV) Radiation on the Surface of Coconut Fiber: Géssica Nicolau1; Ricardo Weber1; Sergio Monteiro2; Anderson Oliveira da Silva1; Karellyne Monsore1; Filipé Araújo1; 1Instituto Militar de Engenharia

Thermal Behavior of Epoxy Matrix Composite Reinforced with Caranán Fibers: Andressa Souza1; Rai Junio1; Lucas Neuboa1; Fernanda da Luz1; Sergio Monteiro2; Lucio Nascimento1; 1Instituto Militar de Engenharia; 2Instituto Militar de Engenharia

Weibull Analysis of the Mechanical Properties of the Epoxy Composite Reinforced with Guaruman Fibers: Raphael Reis1; Larissa Nunes1; Sergio Monteiro2; Lucio Nascimento1; 1Military Institute of Engineering

MATERIALS PROCESSING

Materials Engineering -- From Ideas to Practice: An EPD Symposium in Honor of Jiann-Yang Hwang — Poster Session

Sponsored by: TMS Extraction and Processing Division, TMS: Materials Characterization Committee, TMS: Pyrometallurgy Committee

Program Organizers: Bowen Li1; Michigan Technological University; Baojun Zhao1; University of Queensand; Jian Li2; CanmetMATERIALS; Sergio Monteiro1; Instituto Militar de Engenharia; Zhiwei Peng1; Central South University; Dean Gregurek1; RHI Magnesita; Hao Zhang2; Central South University; Yong Shi1; FuTianBao Environment Protection Technology Company Ltd.; Shaida Ikhmayes1

Tuesday PM March 16, 2021
5:30-6:30 PM

Session Chairs: Zack Li1; XL Technologies, Inc; Zhiwei Peng1; Central South University

Ballistic Evaluation of the Multilayer Armor System Reinforced by Guaruman Fiber: Raphael Reis1; Larissa Nunes1; Sergio Monteiro1; Lucio Nascimento1; 1Military Institute of Engineering

Determination of the Elasticity Modulus of a PC/rGO Nanocomposite via Impulse Excitation Technique - Sonelastic: Anderson Oliveira da Silva1; Ricardo Weber2; Sergio Monteiro1; Karollyne Monsore1; 1Military Institute of Engineering

Evaluation of Ballistic Performance of Composite Reinforced with Sisal Fabric after UV Radiation Exposure: Michelle Oliveira1; Lucio Nascimento1; Sergio Monteiro2; 1Instituto Militar de Engenharia

ADDITIVE TECHNOLOGIES

Additive Manufacturing of Functional, Energy, and Magnetic Materials — Poster Session

Sponsored by: TMS Functional Materials Division, TMS: Additive Manufacturing Committee, TMS: Magnetic Materials Committee

Program Organizers: Markus Chmielus1; University of Pittsburgh; Sneha Prabha Narra1; Worcester Polytechnic Institute; Mohammad Elahinia1; University of Toledo; Reginald Hamilton1; Pennsylvania State University; Iver Anderson1; Iowa State University Ames Laboratory

Wednesday PM March 17, 2021
5:30-6:30 PM

Additive Manufacturing of Soft Magnets for Electrical Machines—Prospects and Challenges: tej Lamichhane1; Latha Sethuraman1; Adrian Dalagan1; Haibo Wang1; Jonathan Keller1; M. Paranthaman1; 1Oak Ridge National Laboratory; 2National Renewable Energy Laboratory

Effect of Processing Parameters on Thermal Cyclic Stability of Nitinol Alloys Manufactured by Selective Laser Melting: Jianing Zhu1; Evgenii Borovyi1; Johan Billeveld1; Eduard Faber1; Marcel Hermans1; Vera Popovich1; 1Delft University of Technology; 2Peter the Great Saint-Petersburg Polytechnic University

Modeling of Selective Laser Melting of NITI Shape Memory Alloy: Laser Single Track and Melt Pool Dimension Prediction: Hossein Abedi1; Reza Javanbakht1; Mohammadreza Nematoollahi1; Keyvan Safaei1; Ala Qattawi1; Mohammad Elahinia1; 1The University of Toledo
**POSTERS**

**ADVANCED MATERIALS**

**Advanced Functional and Structural Thin Films and Coatings — Poster Session**

**Sponsored by:** TMS Functional Materials Division, TMS: Thin Films and Interfaces Committee

**Program Organizers:** Adele Carrado, IPCMS - CNRS; Ramana Chintalapalle, University of Texas at El Paso; Gerald Ferblantier, Icube Laboratory - Strasbourg University; Nancy Michael, University of Texas at Arlington; Karine Mougin, Is2m Cnrs; Heinz Paikowski, Clausthal University of Technology; Nuggehalli Ravindra, New Jersey Institute of Technology; Vikas Tomar, Purdue University

**Wednesday PM**

**5:30-6:30 PM**

**Session Chair:** Ramana Chintalapalle, UTEP EL PASO

A Study on PMMA-copolymers Grafted onto Ti Using Advanced Chemistry Approach: Flavien Mouillard, Patrick Masson; Genevieve Pourray; Adele Carrado; 1IPCMS - CNRS

Atomic Layer Deposition & Atomic Layer Etching – An Overview of Selective Processes: Oktay Gokce; Nuggehalli Ravindra; Samihah Hossain; 1New Jersey Institute of Technology

Calcium-phosphate Plasma Electrolytic Oxidation (PEO) Coatings on AZ31 Mg Alloy: Effects of Different Tricalcium Phosphate (TCP) Concentrations: Navid Attarzadeh; Amir Hossein Kazemi; Maryam Molaei; Arash Fattah-alhosseini; 1University of Texas at El Paso; 2Bu-Al Sina University

Solving Stochastic Inverse Problems for Structure-Property Linkages Using Data-Consistent Inversion: Anh Tran; Tim Wildey; 1Sandia National Laboratories

**MATERIALS DESIGN**

**AI/Data Informatics: Applications and Uncertainty Quantification at Atomistics and Mesoscales — Poster Session II**

**Sponsored by:** TMS Materials Processing and Manufacturing Division, TMS: Computational Materials Science and Engineering Committee

**Program Organizers:** Kamal Choudhary, National Institute of Standards and Technology; Garvit Agarwal, Argonne National Laboratory; Wei Chen, Illinois Institute of Technology; Mitchell Wood, Sandia National Laboratories; Vahid Attari, Texas A&M University; Oliver Johnson, Brigham Young University; Richard Hennig, University of Florida

**Wednesday PM**

**5:30-6:30 PM**

Multi-fidelity Machine-learning with Uncertainty Quantification and Bayesian Optimization for Materials Design: Application to Random Alloys: Julien Tranchida; Anh Tran; Timothy Wildey; Aidan Thompson; 1Sandia National Laboratories

Parsimonious Neural Networks Learn Classical Mechanics and an Accurate Time Integrator: Saaketh Desai; Alejandro Strachan; 1Purdue University

Quantifying RAMPAGE Interatomic Potentials for Metal Alloys: Elan Weiss; Arun Hegde; Cosmin Safta; Habib Najm; David Riegner; Logan Ward; Wolfgang Windl; 1The Ohio State University; 2Sandia National Laboratories

Solving Stochastic Inverse Problems for Structure-Property Linkages Using Data-Consistent Inversion: Anh Tran; Tim Wildey; 1Sandia National Laboratories

Use of Atomatic based Informatics to Model Ionic Bombardment to Synthesize Boron Carbides: Kwabena Asante Boahen; Nirmal Baisnab; Paul Rutis; Michelle Paquette; Ridwan Sakidja; 1Missouri State University; 2University of Missouri, Columbia; 3University of Missouri, Kansas City

**MATERIALS PROCESSING**

**Advances in Surface Engineering III — Poster Session**

**Sponsored by:** TMS Materials Processing and Manufacturing Division, TMS: Surface Engineering Committee

**Program Organizers:** Tushar Borkar, Cleveland State University; Arif Mubarok, PPG; Rajeev Gupta, North Carolina State University; Sandip Harimkar, Oklahoma State University; Bharat Jasti, South Dakota School of Mines & Tech

**Wednesday PM**

**5:30-6:30 PM**

Damage Tolerance of TiC-laden Tribaloy T400 Suspension-powder Plasma-sprayed Composite Biocompatible Coating: Moumita Mistrri; Shrivanjali Joshi; Kantesha Balani; Kamal Kar; 1Indian Institute of Technology Kanpur; 2University West

**MATERIALS DESIGN**

**AI/Data informatics: Design of Structural Materials — Poster Session**

**Sponsored by:** TMS Materials Processing and Manufacturing Division, TMS Structural Materials Division, TMS: Mechanical Behavior of Materials Committee, TMS: Computational Materials Science and Engineering Committee, TMS: Integrated Computational Materials Engineering Committee

**Program Organizers:** Jennifer Carter, Case Western Reserve University; Armit Verma, Carnegie Mellon University; Natasha Vermaak, Lehigh University; Jonathan Zimmerman, Sandia National Laboratories; Darren Pagan, Pennsylvania State University; Chris Haines, Ccdc Army Research Laboratory; Judith Brown, Sandia National Laboratories

**Wednesday PM**

**5:30-6:30 PM**

Discovery of Optimized -phase Free Ti-based Alloys Using CALPHAD and Artificial Intelligence Approach: George Dulikravich; Rajesh Jha; 1Florida International University

**All times listed are in EDT time zone (UTC-4:00).**

**TMS2021 VIRTUAL FINAL TECHNICAL PROGRAM**
Evaluating Uncertainty in Clustering of Nanoindentation Mapping Data: Bernard Becker; Eric Hintsala; Benjamin Stadnick; Douglas Stauffer; Ude Hangen; Bruker Nano Surfaces Division

Fast and High-throughput Synthesis of Film and Bulk High-entropy Alloys: Yu Zou; University of Toronto

High-throughput Calculation to Predict the Eutectic Point in Quaternary System: Jun Lu; Yu Zhong; Worcester Polytechnic Institute

MATERIALS DESIGN

Algorithm Development in Materials Science and Engineering — Poster Session

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Computational Materials Science and Engineering Committee, TMS: Integrated Computational Materials Engineering Committee, TMS: Phase Transformations Committee, TMS Solidification Committee

Program Organizers: Mohsen Asle Zaeem, Colorado School of Mines; Mikhail Mendeleev, KBR; Bryan Wong, University of California, Riverside; Ebrahim Asadi, University of Memphis; Garritt Tucker, Colorado School of Mines; Charudatta Phatak, Argonne National Laboratory; Bryce Meredig, Citrine Informatics

Wednesday PM March 17, 2021
5:30-6:30 PM
Session Chair: Mohsen Asle Zaeem, Colorado School of Mines

Model and Improved Dynamic Programming Algorithm for Optimization of Unplanned Slab Allocation in the Steel Plant: Yongzhou Wang; Zhong Zheng; Cheng Wang; Xiaoqiang Gao; Chongqing University

BIOMATERIALS

Biological Materials Science — Poster Session

Sponsored by: TMS Functional Materials Division, TMS Structural Materials Division, TMS: Biomaterials Committee

Program Organizers: David Restrepo, University of Texas at San Antonio; Steven Naleway, University of Utah; Jing Du, Pennsylvania State University; Ning Zhang, University of Alabama

Wednesday PM March 17, 2021
5:30-6:30 PM
Session Chairs: David Restrepo, The University of Texas at San Antonio; Jing Du, Penn State University

A Novel Cardiac Patch for Treating Myocardial Infarction: Juan Sebastian Rincon Tabares; Juan Camilo Velasquez; Hayden Bilbo; Hai-Chao Han; David Restrepo; The University of Texas at San Antonio

Bone-Mimetic 8-TNTZ Alloy for Osteointegration and Antibacterial Property: A Rat Animal Model: Ya-Ching Yu; Shih-Jie Lin; Tai-Jen Yen; National Tsing Hua University; New Taipei Municipal TuCheng Hospital, Chang Gung Memorial Hospital, Taiwan

Strain Field Mining of Steady-state Tearing Fields in Thin Film, Heterogeneous Fiber Networks: Sarah Paluszkiewicz; Christopher Muhlstein; Georgia Institute of Technology

NUCLEAR MATERIALS

Ceramic Materials for Nuclear Energy Research and Applications — Poster Session

Sponsored by: TMS Extraction and Processing Division, TMS Structural Materials Division, TMS Light Metals Division, TMS: Advanced Characterization, Testing, and Simulation Committee, TMS: Energy Committee, TMS: Nuclear Materials Committee

Program Organizers: Xian-Ming Bai, Virginia Polytechnic Institute and State University; Yongfeng Zhang, University of Wisconsin-Madison; Larry Aagesen, Idaho National Laboratory; Vincenzo Rondinella, Jrc-Ec

Wednesday PM March 17, 2021
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Session Chair: Yongfeng Zhang, University of Wisconsin-Madison

A Model of Grain Boundary Energy Anisotropy in Uranium Dioxide Nuclear Fuel: Dallin Fisher; Evan Hansen; Yongfeng Zhang; Sean Masengale; Axel Seoane; Timothy Harbison; Brigham Young University-Idaho; University of Wisconsin-Madison; Virginia Tech

Development of Hydrothermal Corrosion Barrier Coatings for High-density Nuclear Fuels: John Lacy; Hwasung Yeom; Kyle Quillin; Kathryn Metzger; Edward Lahoda; Kumar Sridharan; University of Wisconsin - Madison; Westinghouse Electric Company

Hydrothermal Corrosion Study of Additive Manufactured SiC Fibers: Arun Kumar Seshadri; Akshay Dave; Bren Phillips; Koroush Shirvan; Shay Harrison; Joseph Pegna; Massachusetts Institute of Technology; Free Form Fibers

CHARACTERIZATION

Characterization of Minerals, Metals and Materials 2021 — Poster Session

Sponsored by: TMS Extraction and Processing Division, TMS: Materials Characterization Committee

Program Organizers: Jian Li, CanmetMATERIALS; Mingming Zhang, ArcelorMittal Global R&D; Bowen Li, Michigan Technological University; Sergio Monteiro, Instituto Militar de Engenharia; Shadia Ikramyales; Yunus Kalay, Middle East Technical University; Juan Escobedo-Diaz, University of New South Wales; John Carpenter, Los Alamos National Laboratory; Andrew Brown, Army Research Laboratory; Rajiv Soman, Eurofins EAG Materials Science LLC; Alex Moser, US Naval Research Laboratory

Wednesday PM March 17, 2021
5:30-6:30 PM
Session Chairs: Rajiv Soman, Eurofins EAG Materials Science LLC; Yunus Kalay, Middle East Technical University

Analysis of Potential Applications of Kamafugite Rocks in Fertilizer: Rodrigo Motta; Edison Mattiello; Fabiane Ballotin; Patricia Matias; Gustavo Lima; Leonardo Pedrotti; Jeffrey Martins; Luiz Silveira; Federal University of Viçosa; Terra Brasil Minerals
Application of Desulphurization Residue in Cementitious Mortars:
Ariana Azeredo1; Afonso Azevedo2; Markusuel Marvila1; Lucas Reis1; José Alexandre Linhares Junior1; Carlos Maurício Vieira3; Jonas Alexandre1; Sergio Monteiro1; 1Universidade Estadual do Norte Fluminense Darcy Ribeiro; 2IME

Ballistic Behavior of Epoxide Matrix Composites Reinforced with Graphene Oxide Functionalized Curauá Fibers: Ulisses Costa1; Lucio Nascimento1; Wendell Almeida Bezerra1; Sergio Monteiro1; 1Military Institute of Engineering

Ballistic Behavior of Epoxy Matrix Composites Reinforced with Hemp Fabric Against .22 Ammunition: Matheus Ribeiro1; 1Military Institute of Engineering

Characterization of Epoxy Matrix Composites Reinforced with Graphene Oxide Functionalized Curauá Fibers: Ulisses Costa1; Lucio Nascimento1; Wendell Almeida Bezerra1; Sergio Monteiro1; 1Military Institute of Engineering

Characterization of Piassava Fiber Collected as Industrial Waste: Juliana Carvalho1; Pio Aurélio Filho1; 1Federal University of Ouro Preto

Comparative Analysis of Mechanical Resistance and Corrosion of the Welded Region of Stainless Steel Lean Duplex 2102 and Stainless Steel Duplex 2205: Rômulo Candido1; Niander Ferreira1; Victor Souza1; Daniel Gallo1; Afonso Azevedo1; Centro Universitário Redentor

Comparison Between Red Ceramic Parts With and Without Ornamental Stone Waste Under Wetting and Drying Cycles: Mateus Moraes1; Gustavo Xavier1; Afonso Azevedo2; Jonas Alexandre1; Markusuel Marvila1; Sergio Monteiro1; Josinaldo Dias1; 1IME; 2Fluminense Federal University; 3UNB

Compressive Properties of Additively Manufactured Titanium Carbide: Heet Amin1; Jianshen Wang1; Daniel East2; Ali Ameri1; Hongxu Wang3; Evgeny Morozov4; Juan Escobedo-Diaz1; 1University of New South Wales; 2CSIRO Manufacturing

Correlation between Density and Diameter Variation of Carnauba Fibers: Raí Junio1; Lucio Nascimento1; Lucas Neuba1; Andressa Souza1; Luana Demoesthenes1; Sergio Monteiro1; 1Military Institute of Engineering; 2Instituto Militar de Engenharia

Critical Length and Interfacial Strength of Sedge Fiber Embedded in Epoxy Matrix: Lucas Neuba1; Andressa Souza1; Raí Junio1; Matheus Ribeiro1; Raphael Reis1; Sergio Neves1; 1Military Institute of Engineering (IME)

Density Weibull Analysis of tucum fiber with Different Diameters: Michelle Oliveira1; Fabio Garcia Filho1; Fernanda da Luz1; Sergio Monteiro1; 1Instituto Militar de Engenharia

Development of Artificial Stone with Industrial Solid Waste from Fluorescent Lamps in a Polymer Matrix: Vítor Souza1; Elaine Aparecida Costa1; Carlos Maurício Vieira3; Sérgio Neves Monteiro2; Geovana Carla Delaqua1; Daniele Tavares Campos1; 1Universidade Estadual do Norte Fluminense Darcy Ribeiro; 2Instituto Militar de Engenharia; 3Instituto Federal do Espírito Santo

Dynamic Behavior of a High Hardness Ballistic Steel: Suzane Oliveira1; Karolyline Monsores1; Anderson Silva1; Géssica Nicolau1; Ricardo Weber1; Andersan Paula1; Sergio Monteiro1; 1IME

Ecological Mortars with Blast Slag Residue Application: José Alexandre Linhares Junior1; Markusuel Marvila1; Afonso Azevedo2; Lucas Reis1; Ariana Azeredo1; Carlos Maurício Vieira3; Sergio Monteiro1; 1Universidade Estadual do Norte Fluminense Darcy Ribeiro; 2IME

Effect of Flying Ash as an Additive or Substitute for Portland Cement on Compression Strength in Concrete Blocks (Vibro-compacted): Hugo García-Ortiz1; Aislín M. Teja-Ruiz1; Miguel Pérez-Labra1; Martin Reyes-Pérez1; Edgar Cardoso-Legorreta1; Felipe Legorreta-García1; Francisco Barrientos-Hernández1; Julio Cesar Jáurez1; 1Universidad Autónoma del Estado de Hidalgo

Effect of the Incorporation of Bauxite and Iron Ore Tailings on the Properties of Clay Bricks: Beatriz Mendes1; Leonardo Pedroti1; Blanca Bonomo1; Anna Carolina Luccas1; Livia Silva1; Márcia Lopes1; Gustavo Lima1; 1Universidade Federal de Vicosa

Evaluation of Different Methods of Surface Treatment of Natural Açai Fiber Added in Cementitious Composites: Afonso Azevedo1; Markusuel Marvila1; Euzébio Zanelato1; Thaury Lima1; Danane Cecchin1; Jessica Souza1; Marcio Barbosa1; Sergio Monteiro1; Higor Azevedo2; Jonas Alexandre3; Gustavo Xavier4; 1Fluminense Federal University; 2IME; 3UNB; 4IME

Evaluation of Full Bedding Concrete Blocks Prisms with Different Laying Mortar Strength: Thaury Lima1; Afonso Azevedo2; Markusuel Marvila1; Euzébio Zanelato1; Jonas Alexandre3; Sergio Monteiro1; 1IME; 2Fluminense Federal University; 3IME

Evaluation of Izod Impact Energy of Epoxy Matrix Composites Reinforced with Hemp Fabric: Matheus Ribeiro1; 1Military Institute of Engineering

Evaluation of Izod Impact Properties of the Epoxy Matrix Composite Reinforced with Curauá Fibers Functionalized with Graphen Oxide: Ulisses Costa1; Lucio Nascimento1; Wendell Almeida Bezerra1; Sergio Monteiro1; 1Military Institute of Engineering

Evaluation of Mechanical Behavior in Traction of Epoxy-Caranan Composites: Andressa Souza1; Rai Junio1; Lucas Neuba1; Michelle Oliveira1; Sergio Monteiro1; Lucio Nascimento1; 1IME; 2Fluminense Federal University; 3IME

Evaluation of Tensile Strength and Elastic Modulus of the Epoxy Matrix Composite Reinforced with Hemp Fabric for Engineering Applications: Matheus Ribeiro1; 1Military Institute of Engineering

Evaluation of the Correlation between the Diameters of the Sedge Fibers and a Morphological Characterization: Lucas Neuba1; Andressa Souza1; Rai Junio1; Matheus Ribeiro1; Raphael Reis1; Sergio Neves1; 1Military Institute of Engineering (IME)

Evaluation of the Mechanical Behavior of Epoxy Matrix-hybrid Natural Faric Composite: Accelerated Aging by UV Radiation: Clara Caminha1; Michelle Oliveira1; Lucio Nascimento1; Sergio Monteiro1; 1Instituto Militar de Engenharia

Evaluation of Thermal Healing in Pervious Concrete Pavers Produced with Reactive Powders Concrete: Wellington Fernandes1; Leonardo Pedroti1; Maurício Felisberto1; Guilherme Botelho1; Gustavo Lima1; Beatriz Mendes1; Heraldo Pitanga1; André Oliveira1; 1Federal University of Vicos
Incorporation of Porcelain Residue Powder and Mineral Wastes in Epoxy Matrix for Artificial Stone Purchase: Elaine Costa¹; Vítor Souza²; Ruben Rodriguez¹; Gabriela Barreto¹; Sérgio Monteiro¹; Carlos Mauricio Vieira¹; ¹Universidade Estadual do Norte Fluminense

Influence of Modifier Admixture Based on Las in Cement Pastes: Ana Carolina Martins¹; Matheus Duarte¹; José Maria Carvalho¹; André Oliveira: Gabriell Arruda¹; Leonardo Pedroti¹; ¹Universidade Federal de Viçosa

Influence of the Ceramic Block Sorptivity on the Adherence of Rendering Mortars: Ezeubio Zanelato¹; Afonso Azevedo²; Markssuel Marvila³; Thuyan Lima⁴; Jonas Alexandre⁵; Sergio Monteiro⁵; Gustavo Xavier⁵; Carlos Vieira⁵; ¹IFF; ²UFMG; ³UCAM; ⁴IME

Influence of the Granulometry of the Granite Residue on the Sorptivity of Ceramic Blocks: Ezeubio Zanelato¹; Afonso Azevedo²; Markssuel Marvila³; Thuyan Lima⁴; Jonas Alexandre⁵; Pedro Rocha⁵; Sergio Monteiro⁵; Carlos Vieira⁵; ¹IFF; ²UFMG; ³UCAM; ⁴IME

Influence of the Incorporation of Granite Waste on the Weathering Resistance of Soil Pigment-based Paints: Márcia Lopes¹; Leonardo Pedroti¹; Gustavo de Lima¹; José Carlos Ribeiro¹; Gustavo Nalon¹; Beatriz Mendes¹; André Oliveira Junior¹; ¹Federal University of Viçosa

Influence of the Mixing Processes of the Constituents of Incorporated Geopolymer Materials with Glass Waste: Lucas Reis¹; Afonso Azevedo²; Markssuel Marvila³; Ariana Azeredo³; José Alexandre Linhares Junior³; Niander Cerqueira³; Sergio Monteiro³; Carlos Maurício Vieira³; ¹UFF; ²Fluminense Federal University; ³Federal University of Viçosa

In-situ Investigation of Iron Ore Stock Pile during Its Stacking and Reclaiming Process: Wen Pan¹; Shaoguo Chen¹; Yapeng Zhang¹; Zhipei Kong¹; Dongming Wang¹; ¹Beijing Key Lab of Green Recyclable Process for Iron & Steel Production Technology; ²Shougang Jingtang United Iron & Steel Co.Ltd.

Life Cycle Assessment Applied to Red Ceramic Bricks Production: Josinaldo Dias¹; Gustavo Xavier¹; Afonso Azevedo²; Jonas Alexandre²; Carlos Mauricio Vieira²; Henry Colorado²; ¹UFF; ²Fluminense Federal University; ³Universidad Autónoma de San Luis Potosí

Mechanical Properties Evaluation of Epoxy Matrix Composites for Different Conditions of Volumetric Fraction of Sedge Fibers: Lucus Neuba¹; Andressa Souza¹; Rai Junio¹; Luana Demosthenes¹; Ulisses Costa¹; Sergio Neves¹; ¹Military Institute of Engineering (IME)

PCM Encapsulation for Incorporation in Construction Materials: Gustavo Lima¹; Matheus Oliveira¹; Luis Gustavo Nascimento¹; Evandro Martins¹; JoyceCarlo¹; Leonardo Pedroti¹; Nathália Albuini-Oliveira¹; Márícia Lopes¹; ¹Federal University of Viçosa

Physical, Chemical and Mechanical Characterization of AISI 316 Austenitic Stainless Steel: Leonardo Pinheiro¹; Niander Cerqueira¹; Victor Souza¹; Daniel Gallo¹; Afonso Azevedo¹; ¹UnireDentor; ¹UFF

Research Progress of Aging Effects on Fiber Reinforced Polymer Composites: A Brief Review: Michelle Oliveira¹; Fernanda Da Luz²; Sergio Monteiro²; ¹Instituto Militar de Engenharia

Statistical Analysis of Iozd Impact Resistance of an Epoxy Matrix Reinforced with Sedge Fibers: Lucas Neuba¹; Andressa Souza¹; Rai Junio¹; Matheus Ribeiro¹; Michelle Oliveira¹; Sergio Neves¹; ¹Military Institute of Engineering (IME)

Study of Face Shell Bedding Concrete Blocks Prisms with Different Laying Mortar Strength: Thuyan Lima¹; Afonso Azevedo²; Markssuel Marvila³; Ezeubio Zanelato³; Ana Luiza Paes³; Jonas Alexandre³; Sergio Neves Monteiro³; ¹UFMT; ²Fluminense Federal University

Study of Pathologies in Alkaline Activated Materials Based on Slag: Markssuel Marvila¹; Afonso Azevedo²; Ezeubio Zanelato³; Thuyan Lima³; Geovana Delaqua³; Carlos Mauricio Vieira³; Leonardo Pedroti³; Sergio Monteiro³; ¹Universidade Estadual do Norte Fluminense Darcy Ribeiro

Study of the Feasibility of Incorporation Clay From Campos Dos Goytacazes - RJ, in Mortar Applied on Walls and Ceilings: Larissa Granato¹; Gustavo Xavier¹; Henry Colorado²; Afonso Azevedo²; Jonas Alexandre²; Carlos Mauricio Vieira²; Markssuel Marvila²; ¹UFMT; ²Universidad Autónoma de Antioquia; ³Fluminense Federal University

Surface Characterization of Concentrated Jamesonite, in the Collectorless Flotation, in Acid, Neutral and Alkaline Medium: Jazmin Terrazas Medina¹; Martin Reyes Perez²; Elia Guadalupe Palacios Beas³; Mizraim Uriel Flores Guerrero³; Iván Alejandro Reyes Dominguez³; Ailson Michelle Teja Ruiz³; Miguel Pérez Labra³; Francisco Raúl Barrientos Hernández³; ¹Universidad Autónoma del Estado de Hidalgo; ²Universidad Autónoma del Estado de Hidalgo; ³Instituto Politécnico Nacional; ⁴Universidad Tecnológica de Tulancingo. Área de Electromecánica Industrial; ⁵Universidad Autónoma de San Luis Potosí

Synergy between Cu and Cr on Localized Corrosion of the Low Alloy Steels: Kwee Gao¹; Luchun Yan¹; Xiaolu Pang¹; Zhiming Guo¹; Yanjng Su¹; Lijie Qiao¹; ¹University of Science and Technology, Beijing

Synthesis and Characterization of Iron Oxide Nanoparticles for Application in the Removal of Heavy Metals from the Aqueous Medium: Arantza Córdoa López¹; Karen Rivera¹; Diana Serna¹; Laura García¹; Pedro Ramírez¹; Mizraim Flores¹; ¹Universidad Tecnológica de Tulancingo

Synthesis and Characterization of ZnO Nanoparticles Obtained from the Extract of Schinus Molle: Estrella Palacios¹; Karime Cardenas¹; Jenny Domínguez¹; Mizrám Flores¹; Laura García¹; Pedro Ramírez¹; ¹Universidad Tecnológica de Tulancingo

S/TEM Characterization of Interdendritic Phases in Ni-30Cr Weld Metal 52Xl: Cheng-Han Li¹; Carolín Fink¹; John Lippold¹; Joerg Jinschek¹; ¹The Ohio State University

The Simpex-Lattice Method Application to Optimize the Design of Soil-Slag-Fly Ash Mixtures: Mateus Henrique Rodrigues¹; Leonardo Pedroti¹; Taciano Silva¹; Heraldo Pitanga¹; Klaus Henrique Rodrigues¹; Emerson Lopes¹; ¹Federal University of Viçosa

Thermal Analysis by Differential Scanning Calorimetry of Sedge Fibers and Epoxy Matrix Composites Reinforced with Sedge Fibers: Lucas Neuba¹; Sergio Neves¹; ¹Military Institute of Engineering (IME)

Technical, Environmental and Economic Advantages in the Use of Rubber Asphalt: Mariah Soares¹; Niander Cerqueira¹; Felipe Almeida¹; Afonso Azevedo¹; Markssuel Marvila¹; ¹Centro Universitário Redentor; ¹UFF

Thermal Analysis of Sedge Fibers and Epoxy Matrix Composites Reinforced with Sedge Fibers: Lucas Neuba¹; Michelle Oliveira¹; Sergio Neves¹; ¹Military Institute of Engineering (IME)

Thermal Stability of Plain Arapaima Scales and Scales-reinforced Epoxy Matrix Composites: Wendell Bruno Almeida Bezerra¹; Ulisses Oliveira Costa¹; Michelle Souza Oliveira¹; Fernanda Santos da Luz¹; Luana Cristine da Cruz Demosthenes¹; Sergio Neves Monteiro¹; ¹Instituto Militar de Engenharia

All times listed are in EDT time zone (UTC-4:00).

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Thermochemical Characterization of the Carnauba Fibers: Rai Junio1; Lucio Nascimento1; Lucas Neuba1; Andressa Souza1; Sergio Monteiro1; 1Military Institute of Engineering; 2Instituto Militar de Engenharia

Thermogravimetric Characterization of Epoxy Matrix Composite Reinforced with Hemp Fabric for Engineering Applications: Matheus Ribeiro1; 1Military Institute of Engineering

Use of Glass Waste as a Geopolymerization Reaction Activator for Ceramic Materials: Afonso Azevedo1; Markssuel Marvila1; Euzébio Zanelato1; Thuany Lima1; Geovana Delaquia1; Sergio Monteiro1; Carlos Mauricio Vieira1; Leonardo Pedroti1; 1Fluminense Federal University; 2UFV; 3IME

Variation of the Silica Module for Dosing Activated Alkali Mortars: Markssuel Marvila1; Afonso Azevedo1; Euzébio Zanelato1; Thuany Lima1; Sergio Monteiro1; Carlos Mauricio Vieira1; Jonas Alexandre1; Gustavo Xavier1; 1Universidade Estadual do Norte Fluminense Darcy Ribeiro; 2IME

Weibull Analysis of the Tensile Strength for Different Diameters of Cyperus Malaccensis Sedge Fibers: Matheus Ribeiro1; Andressa Souza1; Rai1; Matheus Ribeiro1; Ulisses Costa1; Sergio Neves1; 1Military Institute of Engineering (IME)

Characterization of the Palm Fiber: A Natural Fiber from the Amazon: Edwillson Gonçalves de Oliveira Filho1; Roberto Tetsuo Fujiyama1; Jean da Silva Rodrigues1; Sergio Neves Monteiro1; Alisson Rios da Silva1; Verônica Scarpini Candido1; 1Universidade Federal do Pará; 2Federal Institute of Pará; 3IME; 4University of Technology, Beijing

Evaluation of the Use of Lignocellulosic Fibers in Replacement of Synthetic Fiber in Polymer Hybrid Composites: Luciano Monteiro Almeida1; Roberto Tetsuo Fujiyama1; Sérgio Neves Monteiro1; Alisson Rios da Silva1; Verônica Scarpini Candido1; 1Universidade Federal do Pará; 2IME

Advanced Cooling Technologies Inc

Company; Alexandra Anderson, Gopher Resource; Srujan Rokkam, Laurentiu Nastac, University of Alabama; Mei Li, Ford Motor Laboratory; Anthony Rollett, Carnegie Mellon University; Adrian Sabau, Oak Ridge National Laboratory; Anthony Rollett, Carnegie Mellon University; Laurens Van Depoele, University of Michigan; Meili Cheng, Ford Motor Company; Alexandra Anderson, Gopher Resource; Srujan Rokkam, Advanced Cooling Technologies Inc

ADVANCED MATERIALS

High Entropy Alloys IX: Alloy Development and Properties — Poster Session

Sponsored by: TMS Functional Materials Division, TMS Structural Materials Division, TMS: Alloy Phases Committee, TMS: Mechanical Behavior of Materials Committee

Program Organizers: Peter Law, University of Tennessee; Michael Gao, National Energy Technology Laboratory; E-Wen Huang, National Chiao Tung University; Srivatsan Tirumalai, The University of Akron; Xie Xie, FCA US LLC; Gongyao Wang, Alcoa Technical Center

Wednesday PM March 17, 2021

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Atom-by-atom Understanding of Atom Probe Tomography of HEAs: Jiayuwen Qi1; Christian Oberdorfer1; Emmanuelle Marquis2; Wolfgang Windl1; 1The Ohio State University; 2University of Michigan

Computation of Thermodynamics and Stability of FeNiCoCr(Mn/Pr) High Entropy Alloys: Competition between Equiatomic and Non-equiatomic: Tran Nguyen-Dung1; Ying Chen1; 1Tohoku University

Fusion Plasma Relevant Erosion of Reduced Activation High Entropy Alloy-based Plasma-facing Material: Owais Ahmed Waseem1; Kevin Woller1; Faris S畏edan1; Ho Jin Ryu1; 1Massachusetts Institute of Technology; 2Korea Advanced Institute of Science and Technology

High Throughput In Situ Micro-mechanical Testing of Multi-Principal Element Alloy Thin Films to Enable Rapid Combinatorial Qualification: Robert Quammen1; Paul F. Rottmann1; 1University of Kentucky

Thermal and Corrosion Behaviour of Laser-Deposited High Entropy Alloys: Modupeola Dada1; Patricia Popoola1; Ntombizodwa Mathe2; Sisa Pityana2; Samson Adeosun3; Olufemi Aramide1; 1Shwane University of Technology; 2Council for Scientific and Industrial Research; 3University of Lagos, Akoka

Metallurgical Characterization of Three High Entropy Alloys, FeNiCoCr(Mn/Pr): Fujiyama1; Roberto Tetsuo Fujiyama1; Sergio Monteiro2; Carlos Mauricio Vieira1; Jonas Alexandre1; Gustavo Xavier1; 1Universidade Estadual do Norte Fluminense Darcy Ribeiro; 2IME

Properties — Poster Session

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS Extraction and Processing Division, TMS: Process Technology and Modeling Committee

Program Organizers: Adrian Sabau, Oak Ridge National Laboratory; Anthony Rollett, Carnegie Mellon University; Laurens Van Depoele, University of Michigan; Meili Cheng, Ford Motor Company; Alexandra Anderson, Gopher Resource; Srujan Rokkam, Advanced Cooling Technologies Inc

Wednesday PM March 17, 2021

5:30–6:30 PM

A Parametric Study of Grain Size and Its Volume Fraction Effect on Heterogeneous Materials Mechanical Properties: Khaled Adam1; Tarek Belgasam1; 1Washington State University

Effect of Nozzle Injection Mode on Initial Transfer Behavior of Round Bloom: Pu Wang1; liang Li1; Datong Zhao1; Weidong Liu1; Songwei Wang1; Haiyan Tang1; Jiaquan Zhang1; 1University of Science & Technology Beijing; 2Shanxi Taihang Stainless Steel Co., Ltd.
ADVANCED MATERIALS

Materials for High Temperature Applications: Next Generation Superalloys and Beyond — Poster Session

Sponsored by: TMS Structural Materials Division, TMS: Refractory Metals Committee

Program Organizers: Govindarajan Muralidharan, Oak Ridge National Laboratory; Martin Heilmaier, KIT Karlsruhe; Benjamin Adam, Portland State University; Mario Boachieio, Pratt & Whitney; Katerina Christoffidou, University of Sheffield; Eric Lass, University of Tennessee-Knoxville; Jeremy Rame, Safran Aircraft Engines; Pierre Sallot, Safran; Akane Suzuki, GE Research; Michael Titus, Purdue University

Wednesday PM  March 17, 2021
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Creep Deformation Behavior of Ni - 33 Co Alloy: Divya Sri Bandla1; Atul Chokshi1; 1Indian Institute of Science Bangalore
On the Quantitative Characterization of Weld Microstructures: Noah Kohlhorst1; Govindarajan Muralidharan2; Roger Miller2; Ji-Cheng Zhao3; 1Ohio State University; 2Oak Ridge National Laboratory (ORNL); 3University of Maryland, Department of Materials Science and Engineering
Reference-free Potential Development for Metal-rich Carbides: Tyler McGilvry-James1; Bikash Timalsina1; Nirmal Baishnab1; Puja Adhikari1; Saro San1; Andrew Duff6; Wai-Yim Ching3; Ridwan Sakidja1; 'Missouri State University; ’University of Missouri-Columbia; ’University of Missouri-Kansas City; ’Daresbury Laboratory

MATERIALS PROCESSING

Materials Processing Fundamentals — Poster Session

Sponsored by: TMS Extraction and Processing Division, TMS: Process Technology and Modeling Committee

Program Organizers: Jonghyun Lee, Iowa State University; Samuel Wagstaff, Oculatus; Alexandre Anderson, Gopher Resource; Fiseha Tesfaye, Abo Akademi University; Guillaume Lambotte, Boston Metal; Antoine Allanore, Massachusetts Institute of Technology

Wednesday PM  March 17, 2021
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Containerless Materials Processing for Materials Science on Earth and in Space: Jonghyun Lee1; Sai Katamreddy1; Yong Chan Cho1; Soohyeong Lee2; Geun Woo Lee3; 1Iowa State University; 2Korea Research Institute of Standards and Science
Effect of Nitrogen on Weldability and the Microstructure in Laser Beam Welding of Duplex Stainless Steel: Yunxing Xia1; Kenshiro Amatsu1; Fumikazu Miyasaka2; Hiroaki Mori3; 1Osaka University

PHYSICAL METALLURGY

Phase Transformations and Microstructural Evolution — Poster Session

Sponsored by: TMS Materials Processing and Manufacturing Division, TMS: Phase Transformations Committee

Program Organizers: Rongpei Shi, Lawrence Livermore National Laboratory; Yipeng Gao, Idaho National Laboratory; Fadi Abdeljawad, Clemson University; Bharat Gwalani, Pacific Northwest National Laboratory; Qi An, University of Nevada-Reno; Eric Lass, University of Tennessee-Knoxville; Huaqing (Wilson) Song, Los Alamos National Laboratory

Wednesday PM  March 17, 2021
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Dilatometric Analysis of Tempering Kinetics in a Cr–Mo–V Medium Carbon Steel: Eliuth Barrera-Villatoro1; Octavio Vázquez-Gómez1; Alexis Gallegos-Pérez2; Héctor Vergara-Hernández2; Edgar López-Martínez2; Pedro Garnica-González2; ’Tecnológico Nacional de México / I.T. Morelia; ’Universidad del Istmo
Exploring Non-conventional Microstructural Evolution in Titanium Alloys by Advanced Characterization and Machine Learning: Dian Li1; Xing Zhang2; Yiliang Liao2; Yufeng Zheng1; ’University of Nevada, Reno; ’Iowa State University
Thermal and Mechanical Characterization of the Non-isothermal Tempering of an Experimental Medium-carbon Steel: Perla Díaz-Villaseñor1; Octavio Vázquez-Gómez1; Héctor Vergara-Hernández2; Alexis Gallegos-Pérez2; Edgar López-Martínez2; Bernardo Campillo2; ’Tecnológico Nacional de México / I.T. Morelia; ’Universidad del Istmo; ’Universidad Nacional Autónoma de México
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