

TMS

AIM

First World Congress on
**ARTIFICIAL INTELLIGENCE IN
MATERIALS & MANUFACTURING 2022**



**TECHNICAL
PROGRAM**



APRIL 3-6, 2022

**Omni William Penn Hotel
Pittsburgh, Pennsylvania, USA**



TMS

AIM 2022 is sponsored by the TMS Materials Innovation Committee, Computational Materials Science and Engineering Committee, and the Artificial Intelligence Subcommittee.

www.tms.org/AIM2022

Monday Plenary

Monday AM
April 4, 2022 Room: William Penn Ballroom
Location: Omni William Penn Hotel

Session Chair: Adam Kopper, Mercury Marine

8:30 AM Introductory Comments

8:35 AM Plenary

Industry 4.0 - Creating the Foundation for Machine Learning in Production Manufacturing: *David Blondheim*¹; ¹Mercury Marine

9:20 AM Question and Answer Period

9:30 AM Break

AI-Assisted Development of New Materials/Alloys I

Monday AM Room: William Penn Ballroom
April 4, 2022 Location: Omni William Penn Hotel

Session Chair: Alex Kitt, EWI

10:00 AM Invited

3rd Wave AI to Accelerate Materials Discovery: *Andrew Detor*¹; Kareem Aggour¹; Aida Amroussia¹; Scott Weaver¹; Abha Moitra¹; Alfredo Gabaldon¹; Paul Cuddihy¹; Sharad Dixit¹; ¹Ge Research

10:30 AM

Discovery of New Periodic Inorganic Crystals Via GANs: *Taylor Sparks*¹; Michael Alverson¹; ¹University of Utah

10:50 AM

Finding Superhard Materials Through Machine Learning: *Jakoah Brgoch*¹; ¹University of Houston

11:10 AM

Integrating Data-Driven and Experimental Techniques for the Design and Development of New Corrosion-Resistant Coating Alloys for Lightweight Automotive Steels: *Rohit Bardapurkar*¹; John Speer¹; Sridhar Seetharaman²; ¹Colorado School of Mines; ²ASU Ira A. Fulton Schools of Engineering

Computer Vision for Materials and Manufacturing R&D I

Monday AM Room: 3' Rivers
April 4, 2022 Location: Omni William Penn Hotel

Session Chair: Joshua Stuckner, NASA Glenn Research Center

10:00 AM

Feature Anomaly Detection System (FADS) for Intelligent Manufacturing: *Anthony Garland*¹; Kevin Potter¹; Matthew Smith¹; ¹Sandia National Labs

10:20 AM

An Exploratory Analysis of Low and High Temperature Tempered Steel Micrographs Using Machine Learning: *Nicholas Amano*¹; Nan Gao¹; Elizabeth Holm¹; ¹Carnegie Mellon University

10:40 AM

Orientation Imaging Microscopy Grain Reconstruction Using Deep Learning: *Patxi Fernandez-Zelaia*¹; Andrés Márquez Rossy¹; Quinn Campbell¹; Andrzej Nycz¹; Christopher Ledford¹; Michael Kirka¹; ¹Oak Ridge National Laboratory

Machine Learning/Deep Learning in Materials and Manufacturing I

Monday AM Room: Riverboat
April 4, 2022 Location: Omni William Penn Hotel

Session Chair: Aagam Shah, University of Illinois at Urbana-Champaign

10:00 AM Invited

Machine Learning Regression Models of Crystalline Materials Properties: Comparing Approaches and Results in Prediction Intervals Determination: *Francesca Tavazza*¹; Kamal Choudhary¹; Brian DeCost¹; ¹National Institute of Standards and Technology

10:30 AM

Accelerating Phase-Field Predictions Via History-Dependent Neural Networks Learning Microstructural Evolution in a Latent Space: *Remi Dingreville*¹; Chongze Hu²; Shawn Martin¹; ¹Sandia National Laboratories

10:50 AM

Semi-supervised Dynamic Sampling for 3D Electron Backscatter Diffraction: *Zachary Varley*¹; Gregory Rohrer¹; Marc De Graef¹; ¹Carnegie Mellon University

11:10 AM

A Graph Based Workflow for Extracting Grain-Scale Toughness from Meso-Scale Experiments.: *Stylianos Tsopanidis*¹; Shmuel Osovski¹; ¹Technion Israel Institute of Technology/Faculty of Mechanical Engineering

Artificial Intelligence in Specific Manufacturing Processes I

Monday PM Room: William Penn Ballroom
April 4, 2022 Location: Omni William Penn Hotel

Session Chair: TBD

1:30 PM

Machine-Learning-Guided Automated Training for Adaptive Printing: Automating Intuition for Unintuitive Toolpaths and Geometries: *Erick Braham*¹; Marshall Johnson²; James Hardin¹; Surya Kaladindi²; ¹Air Force Research Lab; ²Georgia Institute of Technology

1:50 PM

Teaching Printers How to Print: from Closed-Loop Control to Integrating AI and Cloud Computing into Additive Manufacture: *James Hardin*¹; J. Dan Berrigan¹; ¹Air Force Research Lab / RXMS

2:10 PM

Defect Minimization in Additive Manufacturing Through a Customized High-Throughput Experimental Methodology and Machine Learning Approach: *Baldur Steingrímsson*¹; *Benjamin Adam*; Michael Gao²; Graham Tewksbury³; E-Wen Huang⁴; Peter Liaw⁵; ¹Imagars LLC; ²National Energy Technology Laboratory; ³Oregon State University; ⁴National Yang Ming Chiao Tung University; ⁵University of Tennessee

2:30 PM Break

3:00 PM

Machine Learning-Based Thermal Analysis for Laser-Based Powder-Bed Fusion Additive Manufacturing: *Raeita Mehraban Teymour*¹; Ardalan Sofi¹; Chinnapat Panwisawas²; Bahram Ravani¹; ¹University of California, Davis; ²University of Leicester

3:20 PM

High-Throughput Development of MPEAs by Combined Approach of Additive Manufacturing and Machine Learning Methods: *Phalgun Nelaturu*¹; Jason Hattrick-Simpers²; Michael Moorehead¹; Santanu Chaudhuri³; Adrien Couet¹; Dan Thoma¹; ¹University of Wisconsin; ²University of Toronto; ³Argonne National Laboratory

3:40 PM

Accelerating the Growth of Metal-Organic Framework Thin Films Guided by Pool-based Active Learning: *Roberto Javier Herrera del Valle*¹; Luke Huelsenbeck¹; Sangeun Jung¹; Gaurav Giri¹; Prasanna Balachandran¹; ¹University of Virginia

Computer Vision for Materials and Manufacturing R&D II

Monday PM
April 4, 2022

Room: 3rd Rivers
Location: Omni William Penn Hotel

Session Chair: TBD

1:30 PM

Use of Computer Vision to Characterize Non-Metallic Inclusions in Steel: Nan Gao¹; Mohammad Abdulsalam¹; Elizabeth Holm¹; *Bryan Webler*¹; ¹Carnegie Mellon University

1:50 PM

Classification of Material Defects in Ni-Base Superalloys Using Deep Learning: *Yann Schöbel*¹; Simon Pfingstl²; Markus Kolb¹; Marco Hüller¹; ¹MTU Aero Engines AG; ²Technical University of Munich

2:10 PM

Comparing Transfer Learning to Feature Optimization in Microstructure Classification: Debanshu Banerjee¹; *Taylor Sparks*²; ¹Jadavpur University; ²University of Utah

2:30 PM Break

3:00 PM

Efficient Microstructure Image Segmentation Using Deep Learning with Low-Cost Data Annotations: *Bo Lei*¹; Elizabeth Holm¹; ¹Carnegie Mellon University

3:20 PM

Microscopy Segmentation Models with Transfer Learning from a Large Microscopy Dataset: *Joshua Stuckner*; ¹NASA Glenn Research Center

3:40 PM

Automated Defect Identification in Electroluminescence Images of Solar Modules: *Xin Chen*¹; Todd Karin¹; Anubhav Jain¹; ¹Lawrence Berkeley National Laboratory

4:00 PM

AMPIS: Automated Materials Particle Instance Segmentation: *Ryan Cohn*¹; Elizabeth Holm¹; ¹Carnegie Mellon University

Machine Learning/Deep Learning in Materials and Manufacturing II

Monday PM
April 4, 2022

Room: Riverboat
Location: Omni William Penn Hotel

Session Chair: Francesca Tavazza, National Institute of Standards and Technology

1:30 PM Invited

Interpretable Machine Learning-Assisted Phase Classification for High Entropy Alloys: *Kyungtae Lee*¹; Mukil Ayyasamy¹; Paige Delsa²; Timothy Hartnett¹; Prasanna Balachandran¹; ¹University of Virginia; ²Louisiana School for Math, Science, and the Arts

2:00 PM

Convolutional Neural Networks for Image Classification in Metal Selective Laser Melting Additive Manufacturing: Rodolfo Ledesma¹; *Andy Ramlatchan*; ¹NASA Langley Research Center

2:20 PM

Microstructural Classification of Bainite Subclasses in Low-Carbon Multi-Phase Steels Using Supervised Machine Learning: *Martin Mueller*¹; Dominik Britz²; Thorsten Staudt³; Frank Muecklich¹; ¹Saarland University; ²Material Engineering Center Saarland; ³Aktiengesellschaft der Dillinger Hüttenwerke

2:40 PM Break

3:10 PM

Predictive Synthesis of Quantum Materials with Offline Reinforcement Learning: Pankaj Rajak¹; *Aravind Krishnamoorthy*; Aiichiro Nakano¹; Rajiv Kalia¹; Priya Vashistha¹; ¹University of Southern California

3:30 PM

Data-Driven Reduced-Order Multiscale Materials Modeling Under Inhomogeneous Porosity Distributions: *Shiguang Deng*¹; Carl Soderhjelm¹; Diran Apelian¹; Ramin Bostanabad¹; ¹University of California Irvine

3:50 PM

Using Uncertainty in Machine Learning to Inform Decision Making on Structural Characterization of Materials: *Austin McDannald*¹; Brian DeCost¹; A. Gilad Kusne^{1,2}; ¹National Institute of Standards and Technology; ²University of Maryland

4:10 PM

Data-Driven Modelling of Graphene Synthesis: *Aagam Shah*¹; Mitisha Surana¹; Jad Yaacoub¹; Elif Ertekin¹; Sameh Tawfik¹; ¹University of Illinois at Urbana-Champaign

4:30 PM

Deep Learning Surrogate Models for Multiscale Simulation of Advanced Materials: *Cornwell Cornwell*¹; Flavio Souza¹; ¹Siemens Digital Industries Software

Panel Discussion

Tuesday AM
April 5, 2022

Room: William Penn Ballroom
Location: Omni William Penn Hotel

Session Chair: James Warren, National Institute of Standards and Technology

8:30 AM

Challenges and Opportunities in the Application of AI to Materials R&D: *James Warren*¹; Taylor Sparks²; Adam Kopper³; Elizabeth Holm⁴; Benji Maruyama⁵; ¹National Institute of Standards and Technology; ²University of Utah; ³Mercury Marine; ⁴Carnegie Mellon University; ⁵The Air Force Research Lab;

9:20 AM Question and Answer Period

9:30 AM Break

Autonomous Materials Research

Tuesday AM
April 5, 2022

Room: William Penn Ballroom
Location: Omni William Penn Hotel

Session Chair: Howard Jores, National Institute of Standards and Technology

10:00 AM Invited

Employing Artificial Intelligence to Accelerate Development and Implementation of Materials and Manufacturing Innovations: *Elizabeth Holm*¹; *George Spanos*²; ¹Carnegie Mellon University; ²TMS

10:30 AM

Autonomous Corrosion Resistant Coatings Development Using a Scanning Droplet Cell: *Howard Jores*¹; *Jason Hattrick-Simpers*²; *Najlaa Hassan*³; *Trevor Braun*¹; *Justin Gorham*¹; *Brian DeCost*¹; ¹NIST; ²University of Toronto; ³University of Wisconsin

10:50 AM

Automating the Discovery of New Halide Perovskites with RAPID and ESCALATE: *Joshua Schrier*¹; ¹Fordham University

11:10 AM

The nSoft Autonomous Formulation Laboratory: X-Ray and Neutron Scattering for Industrial Formulation Discovery: *Peter Beaucauge*¹; *Tyler Martin*¹; ¹National Institute of Standards and Technology

11:30 AM

Unsupervised Topological Learning Approach for Crystal Nucleation in Pure Metals and Alloys: *Sebastien Becker*¹; *Emilie Devijver*¹; *Rémi Molinier*²; *Philippe Jarry*¹; *Noel Jakse*¹; ¹Université Grenoble-Alpes

11:50 AM

Machine Learning-Guided Materials Discovery Enabled by Automated Experimentation: *Olexandr Isayev*¹; ¹Carnegie Mellon University

Human-AI Collaboration for Materials and Manufacturing Problems

Tuesday AM
April 5, 2022

Room: 3' Rivers
Location: Omni William Penn Hotel

Session Chair: Anesia Auguste, UES, INC

10:00 AM Invited

Teaching Tools to be Teammates: Digital Manufacturing Research at AFRL: *Sean Donegan*¹; *James Hardin*¹; *Andrew Gillman*¹; *Ezra Ameperosa*¹; *Dan Berrigan*¹; ¹Air Force Research Laboratory

10:30 AM

Human-Robot Collaboration for the Application of Speckle Patterns Through Learning from Demonstration Techniques: *Anesia Auguste*¹; *Jennifer Ruddock*¹; *Erick Braham*²; *Ezra Ameperosa*²; *James Hardin*²; *Andrew Gillman*²; ¹UES, inc; ²Air Force Research Laboratory

10:50 AM

Developing Autonomous Spray Processes with Deep Reinforcement Learning Guided by Human Demonstration: *Ezra Ameperosa*¹; *Anesia Auguste*²; *Jennifer Ruddock*²; *Erick Braham*¹; *James Hardin*¹; *Andrew Gillman*¹; ¹Air Force Research Lab; ²UES, Inc.

11:10 AM

Experimental Validation of Materials Discovered by Autonomous Intelligent Agents: *Richard Padbury*¹; ¹Lucideon

11:30 AM

Teaching the Machine: Characterizing Speckle Patterns for Virtual Demonstrations: *Jennifer Ruddock*¹; ¹UES, Inc

11:50 AM

Profit-Driven Methodology for Servo Press Motion Selection Under Material Variability: *Luke Mohr*¹; *Nozomu Okuda*¹; *Alex Kitt*¹; *Hyunok Kim*¹; ¹EWI

Machine Learning/Deep Learning in Materials and Manufacturing III

Tuesday AM
April 5, 2022

Room: Riverboat
Location: Omni William Penn Hotel

Session Chair: TBD

10:00 AM Invited

Enabling Rapid Validation and Dynamic Standardisation of Advanced Manufactured Parts: *Gareth Tear*; *Jose Videira*¹; *James Bird*¹; ¹Synbiosys

10:30 AM

Property Optimization of Multifunctional Materials with Complex Parameter Spaces: *Kevin Ferguson*; *Ayesha Abdullah*¹; *Eric Harper*²; *Levent Kara*¹; *Michael Bockstaller*¹; *Larry Drummy*²; ¹Carnegie Mellon University; ²Air Force Research Laboratory

10:50 AM

Data Driven Microstructure Evolution: Adjusting Growth Speed and Anisotropy: *Joseph Melville*¹; *Amanda Krause*¹; *Joel Harley*¹; *Weishi Yan*¹; *Lin Yang*¹; *Michael Tonks*¹; ¹University of Florida

11:10 AM

Plastic Deformation Reconstruction Based on Acoustic Emission Measurements: *Junjie Yang*¹; *Yejun Gu*¹; *Daniel Magagnosc*²; *Tamer Zaki*¹; *Jaafar El-Awady*¹; ¹Johns Hopkins University; ²Army Research Laboratory

11:30 AM

Analysis of High-Speed Impact Behaviour of Al 2024 Alloy Using Machine Learning Techniques: *Navya Gara*¹; *Siri S*¹; *Velmurugan R*¹; *Jayaganthan R*¹; ¹IIT Madras

11:50 AM

Uncovering Atomic Structure-Property Relationships Driving Segregation Energy Behavior: *Jacob Tavenner*¹; *Ankit Gupta*¹; *Garritt Tucker*¹; ¹Colorado School of Mines

AI-Assisted Development of New Materials/Alloys II

Tuesday PM
April 5, 2022

Room: William Penn Ballroom
Location: Omni William Penn Hotel

Session Chair: Andrew Detor, GE Research

1:30 PM Invited

Optimizing Fractional Composition to Achieve Extraordinary Properties: *Andrew Falkowski*¹; *Steven Kauwe*¹; *Taylor Sparks*¹; ¹University of Utah

2:00 PM

Predictive Modeling of Creep Elongation and Reduction in Area in High Temperature Alloys Using Machine Learning: *Madison Wenzlick*¹; *Osman Mamun*²; *Ram Devanathan*²; *Kelly Rose*³; *Jeffrey Hawk*³; ¹National Energy Technology Laboratory; NETL Support Contractor; ²Pacific Northwest National Laboratory; ³National Energy Technology Laboratory

2:20 PM

Machine Learning Enabled Model to Predict Mechanical Properties of Refractory Alloys: *Trupti Mohanty*¹; K. S. Ravi Chandran¹; Taylor D Sparks¹; ¹University of Utah

2:40 PM Break

3:10 PM

Machine Learning Guided Prediction of Thermal Properties of Rare-Earth Disilicates and Monosilicates: *Mukil Ayyasamy*¹; ¹University of Virginia

3:30 PM

Machine Learning Enabled Directed Energy Deposition of Functionally Graded Materials: *Alex Kitt*¹; Lee Kerwin¹; Anindya Bhaduri²; Luke Mohr¹; Chen Shen²; Siyeong Ju²; Hyeyun Song¹; Shenyan Huang²; Arushi Dhakad¹; Sathyanarayanan. Raghavan²; Marissa Brennan²; Lang Yuan³; Changjie Sun²; ¹EWI; ²GE Global Research; ³University of South Carolina

Artificial Intelligence in Specific Manufacturing Processes II

Tuesday PM
April 5, 2022

Room: 3rd Rivers
Location: Omni William Penn Hotel

Session Chair: James Hardin, Air Force Research Lab/RXMS

1:30 PM Invited

Effects of Complex Die Cast Manufacturing Systems and the Critical Error Threshold on Applications of Machine Learning in Production: *David Blondheim*¹; ¹Mercury Marine

2:00 PM

MAKSAT : AI for Mining and Manufacturing Sector: *Areena Khan*¹; Mahika Agrawal¹; Sneha Tiwari¹; ¹VIT Bhopal

2:20 PM

Automated Probabilistic Finite Element Model Calibration Tool Based on Uncertainty Quantification and Machine Learning: *Joshua Fody*¹; Patrick Leser¹; Sneha Narra²; ¹NASA Langley Research Center; ²Carnegie Mellon University

2:40 PM Break

Machine Learning/Deep Learning in Materials and Manufacturing IV

Tuesday PM
April 5, 2022

Room: Riverboat
Location: Omni William Penn Hotel

Session Chair: TBD

1:30 PM Invited

Atomistic Line Graph Neural Network for Improved Materials Property Predictions: *Kamal Choudhary*¹; Brian DeCost¹; ¹National Institute of Standards and Technology

2:00 PM

Hybrid Approach Combining Machine Learning and Finite Element Simulation for Process and Material Optimization: *Pierre-Yves Lavertu*; Emilie Storms¹; ¹e-Xstream Engineering, part of Hexagon

2:20 PM

Efficient, Interpretable Atomistic Graph Neural Network Representation for Angle-Dependent Properties and its Application to Optical Spectroscopy Prediction: *Tim Hsu*¹; Nathan Keilbart¹; Stephen Weitzner¹; James Chapman¹; Tuan Anh Pham¹; Roger Qiu¹; Xiao Chen¹; Brandon Wood¹; ¹Lawrence Livermore National Laboratory

2:40 PM Break

3:10 PM

Multi-scale Structure-Property Relationships in Low Carbon Steels: *Johan Westraadt*¹; Lindsay Westraadt¹; ¹Nelson Mandela University

3:30 PM

Qualitative Assessment of Degradation and Ageing Behaviour of Epoxy-Al Nanocomposites Through Machine Learning Assisted With LIBS.: *Sneha Jayaganthan*¹; Naresh Chillu²; Sarathi Ramanujam²; *Jayaganthan Rengaswamy*²; ¹IIT Goa; ²IIT Madras

3:50 PM

Research Acceleration via Machine Learning for Characterization of Growing Dendritic Crystals from In Situ X-Ray Videos of Alloy Solidification: *Jonathan Mullen*¹; Mert Celikin¹; Pádraig Cunningham¹; David Browne¹; ¹University College Dublin

Wednesday Plenary

Wednesday AM
April 6, 2022

Room: William Penn Ballroom
Location: Omni William Penn Hotel

Session Chair: Taylor Sparks, University of Utah

8:00 AM Plenary

Generating Realistic Material Microstructures Using Conditional GANs for Advanced Manufacturing: *Scott Howland*¹; Kevin Loew¹; Henry Kvinge¹; Xiaolong Ma¹; Joshua Silverstein¹; Nicole Overman¹; Md. Reza E Rabby¹; Scott Taysom¹; Tianhao Wang¹; WoongJo Choi¹; Scott Whalen¹; Keerti Kappagantula¹; Luke Gosink¹; *Tegan Emerson*; ¹Pacific Northwest National Laboratory

8:45 AM Break

AI-Assisted Development of New Materials/Alloys III

Wednesday AM
April 6, 2022

Room: William Penn Ballroom
Location: Omni William Penn Hotel

Session Chair: Madison Wenzlick, National Energy Technology Laboratory

9:00 AM Invited

Gaussian Process as a Flexible Machine Learning Toolbox with Uncertainty Quantification for Solving Inverse Problems in Process-Structure-Property Relationship: *Anh Tran*¹; Tim Wildey¹; ¹Sandia National Laboratories

9:30 AM

Machine-Learning Force-Field to Develop and Optimize Multi-Component Alloys: *Anup Pandey*¹; ¹Los Alamos National Laboratory

9:50 AM

Designing Thin Film Microstructures Using Genetic Algorithm Guided Time-Varying Processing Protocols: *Saaketh Desai*¹; Remi Dingreville¹; ¹Center for Integrated Nanotechnologies, Sandia National Laboratories, Albuquerque, NM, USA

10:10 AM Break

10:40 AM

Gaussian Process Regression Modelling of Superalloy Microstructure: *Patrick Taylor*¹; Gareth Conduit¹; ¹University of Cambridge

11:00 AM

Experimental Validation of Materials Discovered by Autonomous Intelligent Agents: *Carolyn Grimley*; Joseph Montoya¹; Muratahan Aykol¹; Jens Hummelshøj²; Richard Padbury²; ¹Toyota Research Institute; ²Lucideon

11:20 AM

Physics-Constrained, Inverse Design of High-Temperature, High-Strength, Creep-Resistant Printable Al Alloys Using Machine Learning Methods: *S. Mohadeseh Taheri-Mousavi*¹; Florian Hengsbach²; Mirko Schaper²; Greg B. Olson¹; A. John Hart¹; ¹MIT; ²Paderborn University

Machine Learning/Deep Learning in Materials and Manufacturing V

Wednesday AM
April 6, 2022

Room: Riverboat
Location: Omni William Penn Hotel

Session Chair: Elizabeth Holm, Carnegie Mellon University

9:00 AM Invited

Addressing Annotated Data Scarcity and Materials Diversity with Advanced Deep Learning Architectures: *Ali Riza Durmaz*¹; Aurèle Goetz¹; Edward Kreutzarek¹; Martin Müller²; Chris Ebert¹; ¹Fraunhofer Iwm; ²Saarland University

9:30 AM

Prediction of Anisotropic Plastic Flow from Indentation Responses Via Neural Networks Combined with Finite Element Analysis: *Kyeongjae Jeong*¹; Kyungyul Lee¹; Siwhan Lee¹; Jinwook Jung¹; Hyukjae Lee¹; Nojun Kwak¹; Dongil Kwon¹; Heung Nam Han¹; ¹Seoul National University

9:50 AM

Combining Organic and Inorganic Descriptors for Predictions of Solubility and Volatility Across Vast Chemical Space: *Anand Chandrasekaran*¹; Simon D. Elliot¹; Asela Chandrasinghe¹; Yuling An¹; H. Shaun Kwak¹; Mathew D. Halls¹; ¹Schrodinger Inc

10:10 AM Break

10:40 AM

Nanoindentation Mapping Defects Filtration for Heterogeneous Materials Using Generative Adversarial Networks (GAN's): *Giuseppe Bianco Atria*¹; Ambreen Nisar¹; Cheng Zhang¹; Benjamin Boest¹; Arvind Agarwal¹; ¹Florida International University

11:00 AM

Supervised Machine Learning for Collision Weld Process Optimization: *Blake Barnett*¹; Glenn Daehn¹; ¹Ohio State University

11:20 AM

Interpretation of Convolutional Neural Networks for Predicting Volume Requirements in Studies of Microstructurally Small Cracks: *Karen Demille*¹; Ashley Spear¹; ¹University Of Utah

Machine Learning/Deep Learning in Materials and Manufacturing VI

Wednesday AM
April 6, 2022

Room: 3' Rivers
Location: Omni William Penn Hotel

Session Chair: Katelyn Jones, Carnegie Mellon University

9:00 AM Invited

Combining Multimodal Data of Fatigue Fracture Surfaces for Analysis in a CNN: *Katelyn Jones*¹; Anthony Rollett¹; Elizabeth Holm¹; ¹Carnegie Mellon University

9:30 AM

Machine Learning Based Prediction of Corrosion Behavior in Additively Manufactured Titanium Alloy: *Nithin Konda*¹; Mythreyi OV¹; Jayaganthan R¹; ¹Indian Institute of Technology Madras

9:50 AM

Machine Learning Based Prediction of Fatigue Crack Growth Rate in Additively Manufactured Ti6Al4V Alloy: *Jayaganthan Rengaswamy*¹; Nithin Konda¹; ¹IIT Madras

10:10 AM Break

10:40 AM

Latent Variable Rietveld Model for High Throughput Quantitative X-ray Diffraction Analysis: *Brian DeCost*¹; Austin McDannald¹; Howie Jorress¹; Jason Hattrick-Simpers²; ¹National Institute of Standards and Technology; ²University of Toronto

11:00 AM

Neural Message Passing for Prediction of Abnormal Grain Growth in Monte Carlo Simulations of Materials Processing: *Ryan Cohn*¹; Elizabeth Holm¹; ¹Carnegie Mellon University

11:20 AM

Automated and Intelligent Analysis of Extended X-Ray Absorption Fine Structure (EXAFS) and X-Ray Photoelectron Spectroscopy (XPS): *Miu Lun Lau*¹; Jeff Terry²; Min Long¹; ¹Boise State University; ²Illinois Institute of Technology

Poster Session

Monday PM
April 4, 2022

Room: Sternwheeler
Location: Omni William Penn Hotel

Deep Learning Based Clustering Technique to Identify and Generation of RVE Models in Duplex Structure Stainless Steels: *Israr Ibrahim*¹; *Ramana Pidaparti*¹; ¹University of Georgia

Neuromorphic Utilization of NVM Devices Using GeTe: *Chaeho Lim*¹; ¹Sungkyunkwan University

Prediction of Stress-Strain Curve of High-Entropy Alloys and 3D Printed Steels Using Machine Learning: *Shalini Priya*¹; Nitish Bibhanshu¹; ¹Indian Institute of Technology Patna

Modeling and Simulation of Additively Manufactured Lattice Structures to Support Component Qualification: *Andrew Swanson*¹; ¹Sandia National Laboratories

Computer Vision and Machine Learning Methods to Characterize Recycled Powders for Additive Manufacturing: *Nathan Love*¹; Srujana Yarasi¹; Andrew Kitahara¹; Elizabeth Holm¹; ¹Carnegie Mellon University

Optimization of the Additive Manufacturing Process for Refractory Metals Using Numerical Simulations and Machine Learning: *Adrian Dalagan*¹; Damilola Lawal¹; Kyle Snyder²; Prasanna Balachandran¹; Richard Martukanitz¹; ¹University of Virginia; ²Commonwealth Center for Advanced Manufacturing

Automating Solid-Liquid Interface Identification in Additive Manufacturing Simulator Experiments: *Gus Becker*¹; ¹Colorado School of Mines

Productivity Enhancement of Photolithography by Big Data Learning: *Juyoung Jung*¹; Hee Joon Jung²; ByoungDeog Choi¹; ¹Sungkyunkwan University; ²Northwestern University

Modeling a Monte Carlo Potts Solidification Model Using a Generative Adversarial Network: *Gregory Wong*¹; Anthony Rollett; Gregory Rohrer; ¹Carnegie Mellon University

Effect of Interlayer Delay Time on the Melt Pool Dimensions in Direct Energy Deposition Process using Machine Learning Techniques: *Rajib Halder*¹; Anthony Rollett; Amit Verma; Zhening Yang; Ali Guzel¹; Anthony Rollett; ¹Carnegie Mellon University

On-Demand Oral Presentations

Monday AM
April 11, 2022

Room: On-Demand Session Room
Location: Omni William Penn Hotel

A Walk Through Material Microstructures: Using Deep Learning and Geometry to Better Visualize Large Collections of Material Microstructure Images: Jordan Weaver¹; Henry Kvinge²; ¹University of Washington; ²Pacific Northwest National Laboratory

Development of Recipe Optimization Method for Additive Manufacturing Process Parameter Determination: Steven Osma¹; Jue Wang²; Kousuke Kuwabara²; Hyakka Nakada³; Shinji Matsushita¹; Hirotsugu Kawanaka¹; Minseok Park¹; Yusuke Yasuda¹; ¹Hitachi Limited; ²Hitachi Metals Limited; ³Recruit Company Limited

Machine Learning Guided Design of Aluminium Alloys: Ninad Bhat¹; Amanda Barnard¹; Nick Birbilis¹; ¹The Australian National University

Additive Manufacturing of Aluminium: Alloy Design and Machine Learning Assisted Process Optimisation: Xiaopeng Li¹; Qian Liu¹; Jay Kruzic¹; ¹University of New South Wales

A Semi-Supervised Approach to Characterizing Multiple Morphological Features in Microstructure Images: Arun Sathanur¹; William Frazier¹; Jing Wang¹; Ram Devanathan¹; ¹Pacific Northwest National Laboratory

Methods of Surface Inspection for Plane Metal with the Use of CV: Maxim Shamshin¹; ¹United Metallurgical Company (OMK)

Automated Microstructure Property Multi-Classification of Ni-Based Superalloys Using Deep Learning: Irina Roslyakova¹; Uchechukwu Nwachukwu¹; Abdulmonem Obaied¹; Oliver Horst¹; David Bürger¹; Muhammad Adil Ali¹; Ingo Steinbach¹; ¹ICAMS, Ruhr-University Bochum

Bayesian Deep Learning Methods for Microstructural Feature Characterization of LiAlO₂ Pellets: Karl Pazdernik²; Alexander Hagen¹; Marjolein Oostrom¹; Nicole LaHaye¹; ¹Pacific Northwest National Laboratory

Machine Learning from Large and Sparse Data for Novel Materials Discovery: Fadwa El-Mellouhi¹; ¹Qatar Environment and Energy Research Institute, Hamad Bin Khalifa University

AI/ML for Intelligent Design and Processing of Metal Castings: Jiten Shah¹; ¹PPDA LLC

DeepTemp: Predicting Material Processing Conditions with Artificial Intelligence: Colby Wight¹; Sarah Akers¹; WoongJo Choi¹; Tegan Emerson¹; Luke Gosink¹; Elizabeth Jurrus¹; Keerti Kappagantula¹; Xiaolong Ma¹; Scott Whalen¹; Reza Rabby¹; Tianhao Wang¹; Timothy Roosendaal¹; Nicole Overman¹; Henry Kvinge¹; ¹Pacific Northwest National Lab

xT SAAM – An Industrial Small Data AI Platform(Design-Expert is Trying to Simplify Classical DoE. Making it a Bit Easier to Use): Varun Gopi¹; Matthias Kaiser¹; ¹Exponential Technologies LTD.

Data-Driven Learning of Constitutive Laws and Material Parameter: from Molecular Dynamics to Continuum Models: Marta D'Elia¹; ¹Sandia National Laboratories

Artificial Materials Intelligence (AMI) of Creep Indicator Model (CIM) in Single Crystal Super Alloys: Irina Roslyakova¹; Yuxun Jiang¹; Abdulmonem Obaied¹; Uchechukwu Nwachukwu¹; Muhammad Adil Ali¹; Ingo Steinbach¹; ¹ICAMS, Ruhr-University Bochum

Predicting Multicomponent Alloy Properties with Neural Network Surrogate Models: Jong Youl Choi¹; Massimiliano Lupo Pasini¹; Ying Yang¹; Jian Peng¹; Dongwon Shin¹; Sam Reeve¹; Paul Laiu¹; ¹Oak Ridge National Laboratory

Assessing the Robustness of an EBSD-Data-Based U-Net Model to Classify Phase Transformation Products in Steels: Tomas Martinez Ostornujof¹; Simon Breumier²; Nathalie Gey¹; Mathieu Salib³; Lionel Germain¹; ¹Université de Lorraine, CNRS; ²Institut de Recherche Technologique Matériaux, Métallurgie et Procédés; ³ArcelorMittal Maizieres, Research and Development

Nanoindentation Load-Displacement Analysis Using a Genetic Algorithm: Abe Burleigh¹; Andy Lau²; Jeff Terry¹; ¹Illinois Institute of Technology; ²Boise State University

Correlation Between Additive Manufacturing Process Parameters and Microstructural Descriptors Via Automatic Feature Engineering: Mohamed Heddar¹; Mehdi Brahim²; Nedjoua Matougui¹; ¹ENSMM - Annaba; ²USTHB

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