

**FEBRUARY 2020** 

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A study organized by The Minerals, Metals and Materials Society on behalf of the U.S. National Science Foundation (DMR #1840716).

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# JOM

5700 Corporate Drive Suite 750 Pittsburgh, PA 15237 USA

Phone: 1-724-776-9000 Web: jom.tms.org E-Mail: jom@tms.org

#### **Publisher for TMS** James J. Robinson,

Executive Director

#### **Operations Management** Matt Baker,

Department Head, Content JOM: The Journal

#### Justin Scott,

Principal Editor; Department Head, Research, Engagement, Data, and Information

Maureen Byko, *Editor* 

Kelly Markel, Publications Coordinator

Edward D. Herderick, Industrial Editor

#### **JOM: The Magazine**

Lynne Robinson, Department Head, Strategic Communications and Outreach

Kaitlin Calva, Magazine Managing Editor

Cheryl M. Geier, Senior Graphic Designer

#### **Contributing Writers**

Ashley-Anne Bohnert, Outreach and External Communications Lead

Ann Ritchie, Technical Communications Specialist

Kelly Zappas, Membership News and Communications Lead

#### **Graphics Support**

David Rasel, Media Manager

Bob Demmler, Graphic Designer

#### Advertising

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#### **About the Cover**

"Liquid-Metal-Mediated Recrystallization of Zinc Under Ambient Conditions" by J.E. Norkett and V.M. Miller explored the interaction between liquid eutectic gallium, indium, and solid zinc. The cover image shows discoid single crystals of zinc that nucleated and grew in the liquid eGaIn and remained on the surface after the liquid was fully absorbed.



#### February 2020 Guest Editors

7th European Conference on Renewable Energy Systems Invited Shadia Ikhmayies, AI Isra University H. Hilal Kurt, Gazi University

#### Advances in Surface Engineering: Part II

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#### **Cleaner Manufacturing of Critical Metals**

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#### Recycling Methods for Industrial Metals and Minerals: Part I

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#### About JOM:

The scope of *JOM* (ISSN 1047-4838) encompasses publicizing news about TMS and its members and stakeholder communities while publishing meaningful peer-reviewed materials science and engineering content. That content includes groundbreaking laboratory discoveries, the effective transition of science into technology, innovative industrial and manufacturing developments, resource and supply chain issues, improvement and innovation in processing and fabrication, and life-cycle and sustainability practices. In fulfilling this scope, *JOM* strives to balance the interests of the laboratory and the marketplace by reporting academic, industrial, and government-sponsored work from around the world.

#### About TMS:

The Minerals, Metals & Materials Society (TMS) is a professional organization that encompasses the entire range of materials and engineering, from minerals processing and primary metals production to basic research and the advanced applications of materials.

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Most TMS awards have a nomination or application deadline of **April 1**. Visit awards.tms.org and view the individual award pages for more details.

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# in the final analysis

"History will be kind to me for I intend to write it."

-Winston Churchill

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Each year, I prepare a report for the TMS Board of Directors that presents highlights from the previous year's inventory of activities. Naturally, I'm happy when the history is a good one (the Board references it in developing my performance review). Do I ever try to leverage my role as historian to cook the narrative and benefit myself? I sincerely hope not as I like to think that I have a compulsion for ethics, rigor, and accuracy in myself and others. That disposition greatly overwhelms any impulses that might otherwise lead to glossing over or camouflaging a disappointing outcome. I'd rather just own any mistake, learn from it, and move on.

Of course, I especially enjoy learning from successes, and I'm pleased to report that TMS can inventory several notable ones from 2019. I offer the following for your consideration:

- 1. The TMS Annual Meeting & Exhibition is a (the?) preferred destination for the international materials community. From TMS2015 to TMS2020, the number of abstracts submitted has grown 17%, with more than 5,100 abstracts being proposed for TMS2020. Even allowing for rejections and cancellations, that's still a heck of a lot of podium time and poster presentations. At TMS2020, we'll be accommodating an expansion of posters with a tuned-up poster forum featuring electronic presentations.
- **2.** *Our friend* JOM *is increasingly the place to publish.* There is a lot of competition in the journal community, with Journal Citation Reports tracking 293 scholarly materials science journals and 76 in metallurgy. *JOM* ranks 142 and 17, respectively, with *JOM's* Impact Factor having grown from 1.757 to 2.305 over five years. From 2015–2019, the number of papers published annually has grown from 447 to 667—a roughly 50% increase, but you knew based on how the journal dents your mailbox monthly.
- **3.** *TMS takes conduct and harassment very seriously.* At TMS2019, the Board of Directors adopted a Meetings Code of Conduct and an updated Anti-harassment Policy. Over the course of the year, the Board carefully researched, deliberated upon, and acted on three separate situations triggered by these policies. The Board's decision-making, while difficult, stayed true to our goal of making TMS events both welcoming and inclusive.
- 4. TMS is committed to the TMS Aspires strategic plan. For example, our goal of being "the society that envisions, defines, and enables the future" saw the Society issue three well-received studies over the course of 2019: Verification and Validation of Computational Models Associated with the Mechanics of Materials, Metamorphic Manufacturing: Shaping the Future of On-Demand Components, and Creating the Next-Generation Materials Genome Initiative Workforce.
- **5.** *TMS is acutely mission-oriented but dollars are an important enabler.* We are projecting TMS's revenue to grow from \$7.2M in 2016 to \$9.2M in 2020, an almost 28% increase. Likewise, our operating reserves project to grow from roughly \$4.7M to \$6.1M over the same period. Operating reserves protect us in the event of a rainy day and are leveraged to develop new initiatives. Members can be assured that the Society's finances are managed responsibly.

I could also mention that membership increased and that the TMS Foundation had a strong year, but I don't yet have the final numbers to toot about just yet. We also just debuted new recurrent meetings on High Entropy Alloys and Materials in Nuclear Energy Systems (with the American Nuclear Society). Those are strong pillars for the future.

Oh yes, MS&T19 outperformed expectations in Portland, Oregon, and the unified partnership is very enthusiastic to conduct the event in Pittsburgh later this year. We have a record number of symposia submitted for MS&T20, and I suspect that it is going to be one of the success stories that I feature in next year's report—if you help us make that happen.

James J. Robinson Executive Director

<u> @JJRofTMS</u>

"Do I ever try to leverage my role as historian to cook the narrative and benefit myself?"



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# News and Updates on Four TMS Publications

#### member news

Share the good news about your professional accomplishments! Contact Kaitlin Calva, JOM Magazine Managing Editor, at kcalva@tms.org. Please note that only news submitted by current TMS members will be considered.

# *Journal of Sustainable Metallurgy* Accepted into Science Citation Index

In October 2019, TMS learned that the *Journal of Sustainable Metallurgy (JSM)* has been accepted into the Science Citation Index and will receive its first Impact Factor in 2020. Beginning with Volume 3 (2017), the journal will be indexed in the Science Citation Index Expanded; the Journal Citation Reports/Science Edition; and the Current Contents®/Engineering Computing and Technology.

"We are delighted to learn that *JSM* has been accepted into the Science Citation Index and will secure an Impact Factor in 2020. This is great news for both the journal and our broader professional community," said co-editors-in-chief Bart Blanpain, KU Leuven, Shin-ya Kitamura, Tohoku University, and Uday Pal, Boston University, in a joint statement to *JOM*. "On behalf of the journal, we would like to thank the editorial board, authors, and staff for their outstanding contributions, without which this would not be possible."

Launched in 2015, *JSM* is a quarterly publication dedicated to presenting metallurgical processes and related research aimed at improving the sustainability of metal-producing industries, with a particular emphasis on materials recovery, reuse, and recycling.

"This news comes at a crucial moment of our planet as we are in the midst of an environmental crisis," Blanpain, Kitamura, and Pal continued. "More than ever, we need engineers and scientists to effectively manage our resources, make proper materials and process selection choices, develop and choose appropriate energy sources, and pick the right end-of-life option, thus ensuring a sustainable future. The increasing visibility and reputation of our journal will attract many more excellent papers that advance fundamental understanding of sustainable metallurgy and provide innovative solutions to better our planet for generations to come."

TMS members can read current and archived issues of *JSM* for free by logging in to the TMS Journals web page at www.tms.org/Journals, which also includes a link to the journal's submission site. (Editor's note: Kitamura retired as editor-inchief on January 1, 2020.)

**3DMS Topical Collections Now Available** 

Three TMS journals—Integrating Materials and Manufacturing Innovation (IMMI), JOM, and Metallurgical and Materials Transactions A (MMTA)—have published coordinated topical collections on 3D materials science (3DMS). The articles appear in the January 2020 issues of JOM and MMTA and were published throughout 2019 in IMMI.

George Spanos, director of New Initiatives, Science, and Engineering at

TMS, explained the impact of this timely collection. "A robust thematic group of 3DMS coordinated publications have not been released since the 2006–2008 timeframe (e.g., in *JOM* and *Scripta Metallurgica* in 2006, and in *MRS Bulletin* in 2008)," he said. "Concomitantly, as evidenced by the four prior iterations of the biannual TMS International Congress on 3D Materials Science, as well as the program being developed for its fifth News and Updates on Four TMS Publications

iteration, 3DMS 2020, there have been incredible strides made in this field since 2012, when the first 3DMS congress was held."

"Finally," Spanos continued, "2020 marks the ten-year anniversary of the completion of the Dynamic 3D (D3D) Digital Structures program developed and supported by the U.S Office of Naval Research (ONR) and the U.S. Defense Advanced Research Projects Agency (DARPA); this program in many ways provided the foundation for great strides that have been made in 3DMS."

Once logged in to at www.tms.org, TMS members can access these articles and stay up-to-date on this rapidly changing field using the following instructions for each journal:

• *IMMI*: From the journal page on SpringerLink (link.springer.com/ journal/40192), choose the Browse Volumes & Issues button. Select the Topical Collections tab and then choose "3D Materials Science 2019" from the list.

- *JOM*: From the January 2020 page on SpringerLink (link.springer.com/ journal/11837/72/1), select articles from the "3D Materials Science" topic.
- *MMTA*: From the journal page on SpringerLink (link.springer.com/ journal/11661), choose the Browse Volumes & Issues button. Select the Topical Collections tab and then choose "3D Materials Science" from the list.

Special thanks are in order for the guest editors of these topical collections. For *IMMI*: Alexis Lewis, National Science Foundation, and Henry Proudhon, Mines Paristech Centre des Matériaux. For *JOM*: Matthew Miller, Cornell University, and Philip Withers, The Henry Royce Institute for Advanced Materials. And for *MMTA*: David Rowenhorst, Naval Research Laboratory, and Henning Poulsen, Technical University of Denmark.

#### **TMS Welcomes New Members**

The TMS Board of Directors approved professional membership for the following individuals at its December 2019 meeting. Please join us in congratulating and welcoming them to all the privileges and benefits of TMS membership.

Aanvik, Morten; Alcoa, Norway

- Abnisa, Faisal; King Abdulaziz University, Saudi Arabia
- Aboulkhair, Nesma T.; University of Nottingham, United Kingdom
- Achuthan, Ajit; Clarkson University, United States

Adjanor, Viho Ananiluic; United Kingdom

- Afonso, Conrado R.M.; Dema/Ufscar, Brazil
- Agiannitis, Panos; Bridgnorth Aluminium, United Kingdom

Ahrenkiel, Phil; South Dakota School of Mines & Technology, United States

Akagwu, Illeigo; United Kingdom

- Al Ghaferi, Amal; Khalifa University, United Arab Emirates
- Allan, Shawn M.; Lithoz America LLC, United States
- Anwer, Zahid; Wah Industries Limited, Pakistan

Arneberg, Aleksander; Alcoa Norway, Norway

- Arnold, Marisa; National Energy Technology Laboratory, United States
- Asadi, Mahyar; Applus Canada (Skc Engineering), Canada
- Atalla, Ashraf; Meggitt/Oeco, United States
- Avraham, Shaul; Israel
- Azakli, Yunus; University of Sheffield, United Kingdom
- Balla, Vamsi Krishna; University of Louisville, United States
- Balogh, Levente; Queen's University, Canada
- Baniasadi, Mahmoud; Georgia Southern University, United States
- Baokuan, Li; Northeastern University, China
- Barbic, Rok; Consarc, United States
- Barker, Michael H.; Netherlands
- Benito, David; Alcoa Spain, Spain











#### News and Updates on Four TMS Publications

Bentzen, Nicole; Blue Origin, United States

Bignell, Ian George; Australia

- Binns, Wilfred Jeff; Nuclear Waste Management Organization, Canada
- Blacklock, Jenifer; Colorado School of Mines, United States
- Blichfeld, Anders B.; Norwegian University of Science and Technology, Norway
- Borofka, Janine Carol; JLG, United States
- Brady, Noel; Paulo, United States
- Bronder, Giel; Aluminium & Chemie Rotterdam B.V., Netherlands
- Brown-Tseng, Elizabeth; PPG, United States
- Brumbach, Michael; Sandia National Laboratories, United States
- Bulling, Florian; FEM Research Institute for Precious Metals and Metals Chemistry, Germany
- Byun, Jongmin; Seoul National University of Science and Technology, South Korea
- Caballero, Oscar; Precisioin Casting Bilbao SAU, Spain
- Cahoon, James; University of North Carolina at Chapel Hill, United States
- Caldeira, Antony; R&D Carbon Ltd., Switzerland

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\* Please note that membership grade recommendations are based on a review of credentials provided by the individuals. These credentials are taken on the honor system and not independently verified except by exception.

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Do you have business or industry news of interest to the minerals, metals, and materials community? Submit your announcement or press release to Kaitlin Calva, JOM Magazine Managing Editor, at kcalva@tms.org for consideration.

## In Case You Missed It: Business News from the Field

#### GM, LG Chem Partner in New Battery Plant

Warren, Michigan, USA: General Motors Company (GM) and South Korea's LG Chem Ltd. are investing \$2.3 billion in a 50-50 joint venture to build one of the world's largest electric vehicle battery plants. The plant will have an initial capacity of more than 30 gigawatt hours annually. LG Chem has long provided lithium-ion and electronics supplies to the automaker, who aims to introduce 20 new electric vehicles by 2023. Construction on the plant, which will be located in Lordstown, Ohio and employ more than 1,100 people, is scheduled to begin in mid-2020.

#### Matilda Minerals to Mine Mutamba

London, United Kingdom: Matilda Minerals, a subsidiary of Savannah Resources PLC, won mining licenses for parts of the Mutamba Heavy Mineral Sands project, awarded by the Mozambique Minister of Mineral Resources and Energy. Mutamba is considered one of the most attractive undeveloped mineral sands deposits in the world. The license is valid until April 2044, with the option to extend for an additional 25 years. The project is operated under a joint venture between Savannah and Rio Tinto.



*Montreal, Quebec, Canada:* Apple Inc. purchased the first-ever commercial batch of carbon-free aluminum from Elysis LP, a Montreal-based joint venture between Alcoa Corporation and Rio Tinto. The batch was created through a new smelting technology that emits oxygen, eliminates direct greenhouse gas emissions, and is expected to have lower operating costs than traditional aluminum smelting. (Photo courtesy of Elysis.)

#### New Technique Welds Ceramic Materials San Diego, California, USA:

Researchers have successfully demonstrated a way to reliably weld ceramic materials at room temperature for the first time. The team, led by the University of California, San Diego and the University of California, Riverside and funded by the Defense Advanced Research Projects Agency (DARPA), devised a technique using ultrafast pulsed lasers and nonlinear optics. The ability to weld at room temperature would make possible future applications of ceramics in consumer electronics and medical devices.

#### Lynas to Build Australian Rare-Earths Plant

*Kuantan, Malyasia:* Lynas Corporation, an Australian rare-earths mining firm, selected Kalgoorlie, Australia, for a new initial ore processing plant that will extract low-level radioactivity from materials to be shipped to Malaysia. Located in Western Australia, Kalgoorlie's Goldfields region is known for its mining and processing industries. Lynas is the only major producer of rare-earth metals outside of China. The new cracking and leaching plant is part of a growth plan for Lynas to boost production by 2025.

#### Cleveland-Cliffs Acquired AK Steel

*Cleveland, Ohio, USA:* Cleveland-Cliffs Inc., a major producer of iron-ore pellets, bought AK Steel Holding Corp. for a \$1.1 billion stock swap. Cleveland-Cliffs agreed to trade 0.4 shares, worth \$3.36 per share, for each share of AK Steel, worth \$8.41 per share. The agreement, which is expected to close in the first half of 2020, positions the iron-ore miner to become a vertically integrated steel company serving both the blast furnace and electric arc furnace segments. The new, expanded organization will be led by Lourenco Gonclaves, chair of the board, president, and CEO of Cleveland-Cliffs. JOM, Vol. 72, No. 2, 2020 https://doi.org/10.1007/s11837-019-03992-w © 2020 The Minerals, Metals & Materials Society

# A MARK OF EXCELLENCE: THE 2020 TMS AWARD RECIPIENTS

#### **ASHLEY-ANNE BOHNERT**

Greatness deserves recognition, and TMS awards play a critical role in providing that mark of distinction for members of the minerals, metals, and materials community. TMS awards span the the full spectrum of career stages by recognizing both the promise of an exceptional career and outstanding contributions to the field over a lifetime. While these awards are a mark of well-deserved recognition for honorees, they also help advance the entire professional community by growing individual careers, creating knowledge sharing opportunities, and spurring others on to similar greatness.

TMS

The society-level awards highlighted in this article will be conferred during the TMS–AIME Awards Ceremony on Wednesday, February 26, 2020, at the TMS 2020 Annual Meeting & Exhibition (TMS2020), which will be held from February 23–27 in San Diego, California. All annual meeting registrants are invited to attend the prestigious ceremony in support of the 2020 award recipients. Most division-level awards will be presented during recognition programs scheduled throughout TMS2020, many of which are also open to all attendees. Visit www.tms.org/TMS2020 for additional information or to access a schedule of events.

# TMS AWARD NOMINATIONS DUE APRIL 1

Do you have a colleague who deserves to be honored with an award from TMS? Perhaps they have made a significant impact on their field or been of great service to their community or to TMS? Give their greatness the recognition it deserves by nominating them for a 2021 TMS award.

## The nomination deadline for most 2021 TMS awards is April 1, 2020.

Visit **awards.tms.org** to explore the many honors and awards available through TMS and to learn more about the nomination process. For additional information, contact Deborah Hixon, TMS Awards Program Administrator, at hixon@tms.org.

#### BOHNERT

#### **SOCIETY AWARDS**

#### **2020 TMS FELLOWS**

The class of Fellow is TMS's highest honor. To be inducted, a candidate must be recognized as the leading authority and contributor to the practice of metallurgy, materials science, and technology, with strong consideration given for outstanding service to the Society.



Mark Asta Professor, University of California, Berkeley

**Citation:** For seminal contributions in the materials theory of alloys and interfaces.



Rodney Boyer Retired, RBTi Consulting Citation: For exemplary and sustained leadership in the growth of understanding and application of Ti alloys in commercial aircraft. For exceptional service to our profession. "I am extremely pleased and proud to receive the TMS Fellow award.

Because it is restricted to a limited number of people, it is that much more of an honor. I was very fortunate to have world famous titanium mentors in the early days of my career, people like Jim Williams, Martin Blackburn, Gerd Lütjering, and Harry Rosenberg. They gave me the technical background that aided my understanding of titanium metallurgy and processing that enabled my contributions."



#### Marc De Graef

**Professor, Carnegie Mellon University Citation:** For pioneering scientific and educational contributions to the quantitative characterization of magnetic materials and 3D material microstructures.

"My involvement with TMS began about 26 years ago. Throughout the

years I have worked with TMS staff and other members in the area of IT (in particular on the first conference management system) and later on the Board of Directors. TMS is my home society and I value the opportunities it offers all of us through the annual meetings and other specialty conferences. I am humbled by the honor bestowed on me by my colleagues, and I look forward to many more years of Society involvement."



#### Diana Farkas Professor, Virginia Polytechnic Institute and State University Citation: For pioneering research on nanocrystalline materials, intermetallics and diffusion with atomistic simulations and for distinguished service to the materials profession nationally and internationally.

"It is a great honor for me to receive this award. I am very proud to have the recognition of the Society. It symbolizes the contributions that I have made to the materials science field and the community over the years."



#### Dorte Juul Jensen Professor, Technical University of Denmark

**Citation:** For seminal contributions to the understanding of physical metallurgy, in particular recrystallization and plastic deformation, based on 2D, 3D, and 4D electron, neutron, and X-ray diffraction techniques.

"Ever since I became a TMS member in 1986, I have considered TMS as the global leading professional society in the materials field. Besides the annual meeting, the various specialized conferences such as 3DMS and ICME are, in my opinion, essential in following the latest developments and catching new trends. I have very much appreciated being a member and have participated in meetings organized by TMS almost every year since the mid-1980s. I am therefore very honored and happy to receive the TMS Fellow Award."



#### Karl Ulrich Kainer Retired Director, Institute of Materials Research, and Head, Magnesium Innovation Centre (MagIC)

**Citation:** A leading authority on global magnesium technology, a contributor to magnesium applications and alloy development, the director of

MagIC, and an active promoter of TMS.

"I have been a TMS member for nearly 20 years and have been involved in the Magnesium Technology Committee from its start. This committee grew to become one of the main pillars of the Light Metals Division and I have benefited greatly from my active involvement in it. This made TMS far more than a professional society for me: my professional family and the voice of the international magnesium community. The TMS meetings and meeting with colleagues was a constant source of inspiration, new ideas, and friendships. I am very proud to be elected as a Fellow of the Society, and I look forward to many more years of active membership and interaction."

#### A MARK OF EXCELLENCE: THE 2020 TMS AWARD RECIPIENTS



David McDowell Regents' Professor and Carter N. Paden Jr. Distinguished Chair in Metals Processing, Georgia Institute of Technology

**Citation:** For contributions to multiscale modeling and design of structural materials, microstructure sensitive simulation of material

property variability, and leadership in materials innovation. "I regard my selection as TMS Fellow to be among the highest honors of my career, for several reasons. First, I have great respect for the wide range of activities and distinctive leadership profile of TMS in materials research and education. TMS conferences, symposia, and workshops bring together international leaders to share latest research advances with high levels of quality and impact. With regard to my own research field, computational multiscale modeling of metallic alloys, TMS has established one of the most progressive leadership positions in support to integrated computational materials engineering and the Materials Genome Initiative, and I have been most fortunate to be involved in service. Finally, I have the highest regard for the cadre of TMS Fellows-I have always viewed these individuals as inspirational in terms of their impact, intellect, and longstanding influence on their fields of materials research and education. It is my distinct honor to join this group."



#### **Neville Moody**

**Retired, Sandia National Laboratories Citation:** For developing experimental testing methods to assess materials reliability and environmental degradation in critical systems and for shaping the profession through service and mentoring.

"TMS has helped me stay connected with colleagues and the materials community for over 40 years. Being part of the Society has allowed me to grow professionally in all aspects of my career from technical contributions to networking with colleagues. Some of the most enjoyable aspects of TMS membership have been through active participation as a volunteer in committees and Society functions. These volunteer activities helped advance my career, influence programming and policy, and most importantly have led to many personal friendships all while serving the materials community. It is a real honor to become a TMS Fellow. To be recognized within this select group is truly rewarding."

#### 2020 BRIMACOMBE MEDALISTS

This mid-career award recognizes individuals with: sustained excellence and achievement in business, technology, education, public policy, or science related to minerals, metals, or materials science and engineering, and a record of continuing service to the profession.



#### Brad Boyce Distinguished Member of Technical Staff, Sandia National Laboratories

**Citation:** For outstanding contributions to understanding material behavior at small scales, commitment to mentoring students and young staff, and continuing service to TMS and materials communities.

"From safer, more fuel efficient vehicles to thin film sensors in our smartphones, our field is contributing in many ways to the advancement of humankind. I have a great respect for the many pioneers in our field, including past recipients of this award, and numerous collaborators over the years. I view this honor not only as a humbling recognition of prior accomplishments, but also as a challenge to continue to expand the impact of our research for the betterment of society."



#### **Kyle Brinkman**

Department Chair Materials Science and Engineering, Clemson University

**Citation:** For advances gained by working at the "interface" between disciplines, including solid state ionic for fuel cells/batteries and ceramics for nuclear fuels and waste immobilization.

"I have been engaged with TMS for over a decade starting with Young Leaders and Professional Development programs. Early in my career, these programs provided travel funds and networking opportunities that helped boost my career in a national laboratory and in academic settings. The Society is truly interdisciplinary in nature and has enabled a venue for our group to present work ranging from nuclear materials development to solid oxide fuel cell advances. I am grateful and honored to receive the TMS Brimacombe Medal."



#### Amy Clarke Associate Professor, Colorado School

of Mines Citation: For profound and lasting

contributions to materials science through the use of advanced techniques, educating and mentoring the next generation, and dedicated service to TMS.

"I am honored to be included in this year's class of Brimacombe Medalists. My involvement in TMS began as a student, accelerated as a young professional, and has continued to grow with my career. I choose to give back to TMS because TMS has given so much to me. I wish to thank all of my peers, mentors, and students that inspire me to do my best to serve the materials science and engineering community; they are the fabric of TMS."

BOHNERT



Nikhil Gupta Professor, Tandon School of Engineering, New York University Citation: For innovations in the development of lightweight porous materials and for commitment to educating public about impact of materials research on society. "It is humbling to join the list of

distinguished awardees of this honor. I have been a TMS member since my time as a graduate student and have thoroughly enjoyed the professional development opportunities. I have especially enjoyed connecting with my peers in the Composite Materials Committee and developing programming for the conferences and journals over the past several years."



## Christina Meskers

Senior Manager Open Innovation, Umicore

**Citation:** For sustained excellence and achievement in business, technology, and public policy in recycling and sustainable mobility, and for continuing service to the profession.

"It is an honor to receive this award from colleagues and friends in the profession and the TMS community. We have worked together across disciplines, divisions, and geographies on a common goal: inspiring each other and the community along the way."



#### **Andre Phillion**

Associate Professor and Dofasco Endowed Chair in Ferrous Metallurgy, McMaster University Citation: For substantial and sustained contributions to alloy solidification through multi-physics meso-scale modeling and in-situ 3D characterization.

"I am honored to receive a TMS Brimacombe Medal. TMS has been my home professional society for nearly 20 years and has been instrumental in supporting my career development. As a TMS member, I have had much opportunity for materials scientific discussion that has advanced my own research activities. As a TMS volunteer, I have had many rewarding experiences while meeting new colleagues and friends."

# ALEXANDER SCOTT DISTINGUISHED SERVICE AWARD

Recognizing a member's outstanding contributions to TMS, this award is typically presented for 10 or more years of TMS service in membership development, student chapters, education and professional affairs, and/or other society-level activity.



#### Elizabeth Holm Professor, Materials Science and Engineering, Carnegie Mellon University

**Citation:** For thoughtful, innovative and energetic service and leadership that has had a pervasive impact on TMS members and TMS. "Serving as a TMS volunteer has

been an honor, an adventure, and a never-ending learning experience. I deeply appreciate the opportunity to participate in my profession beyond my workplace and across borders. It is especially meaningful to me to receive this award in honor of Alex Scott, a great friend and supporter, who himself gave so much to TMS over so many years."

#### JULIA AND JOHANNES WEERTMAN EDUCATOR AWARD

This award recognizes an individual who has made outstanding contributions to education in metallurgical engineering and/or materials science and engineering.



#### Andrea Hodge

Vice Provost for Undergraduate Programs, University of Southern California

**Citation:** For her outstanding contributions to educating and mentoring students in materials science and engineering.

"TMS has been my home society for over 20 years: it is the place where I meet my colleagues and closest friends as well as the place where I send my graduate students to their first conference. My TMS membership has allowed me to participate at numerous conferences and events that highlight my work while learning about new and interesting research from other members. It is an international passport to the world of materials science. It is an honor to receive this award named after two of my main role models: Julia and Hans Weertman." A MARK OF EXCELLENCE: THE 2020 TMS AWARD RECIPIENTS

#### **LEADERSHIP AWARD**

This award recognizes an individual who has demonstrated outstanding leadership in the national and international materials community.



#### Sergio Nves Monteiro Full Professor, Military Institute of Engineering

**Citation:** For sustained international leadership in materials, for initiating graduate materials education in Brazil, for conducting globally recognized research for 50 years, and for strengthening the ties between the

Brazilian Metallurgical, Materials, and Mining Association (ABM) and TMS.

"As a long time TMS member, I have been involved in several volunteer roles that I believe could be valuable for a stronger professional society. These contributions include the coordination of the Characterization of Materials symposia, creation of the TMS-ABM and Pan-American Materials Congresses, and enlarging the Brazilian delegation to TMS meetings. This award serves as recognition that this involvement has been considered worthwhile."

#### **APPLICATION TO PRACTICE AWARD**

This award recognizes an individual who has demonstrated outstanding achievement in transferring research results or findings into commercial production and practical use.



#### Alan Taub

Professor, Materials Science and Engineering and Mechanical Engineering, University of Michigan Citation: Leadership that led to the formulation and execution of novel industrial research and development projects which brought together many parts of the supply chain, and

demonstrated that modern materials design practices can lead to new products and pathways to success for the entire manufacturing industry.

"It is quite an honor to be recognized by my colleagues at TMS with the Application to Practice Award. I have always felt that performing leading edge scientific discovery and then applying those insights to technology development and commercialization is key to world-class innovation. I have been fortunate in being able to practice that approach in both industry and academia. TMS meetings have always provided an excellent forum for presenting and discussing the results of that research."

#### **BRUCE CHALMERS AWARD**

This award honors outstanding contributions to the science and/or technology of materials processing by an individual.



#### David StJohn

## *Emeritus Professor, University of Queensland*

**Citation:** For outstanding contributions to the solidification science of nucleation during grain refinement and the materials processing of aluminum, magnesium and titanium alloys of technological importance.

"Bruce Chalmers' work on constitutional supercooling was an important concept studied during my Ph.D., and it has been a key element of my, and my colleagues', research on grain refinement and nucleation ever since. Of the many awards that TMS offers, this one is closest to my research interests and I thank TMS for recognizing the contribution that Bruce Chalmers made to metallurgy and, in particular, the field of solidification. Receiving this award was made possible by the contributions of my students, research fellows, and collaborators and therefore this award belongs to all of us."

#### **MORRIS COHEN AWARD**

This award recognizes an individual who has made outstanding contributions to the science and/or technology of materials properties.



#### Eduard Arzt

Director, Leibmiz Institute for New Materials

**Citation:** For seminal contributions that significantly advanced our knowledge of creep, densification, electronic transport in materials, biological materials, and bioinspiration.

"Materials science (the 'mother' of sciences) is a wonderful research area for linking deep fundamentals with direct application in everyday life. The mission to build this bridge is also at the heart of TMS. I see this award as confirmation that my own path from very basic metals physics to bioinspired microstructures for robotic applications has created visibility. And I am flattered to see that so many of my international colleagues have converged in their views to nominate me for this award. Many thanks to them and to TMS for bestowing this honor on me!"

#### **CYRIL STANLEY SMITH AWARD**

This award recognizes outstanding contributions to the science and/or technology of materials structure.



#### Yunzhi Wang

Professor, The Ohio State University Citation: For outstanding achievements in fundamental and computational study on microstructural evolution during solid state phase transformations, grain growth, and plastic deformation in metals and alloys

"It is truly a distinct honor to receive this award named after Cyril Stanley Smith, a giant and pioneer in the field of microstructure science, whose seminal work on homo-phase and hetero-phase interfaces in materials has inspired me since I was a graduate student and during my entire career development. I would like to share this recognition with my students and colleagues, because it is their contributions that have made possible what I have accomplished. I also acknowledge TMS, my home professional society, for providing a vibrant platform for close interactions and long-lasting collaborations with other researchers in the field, which has shaped my career path."

#### **OLEG D. SHERBY AWARD**

This award recognizes an individual, or small group of collaborators, who has made significant contributions to the understanding of the behavior of materials at high temperatures.



#### Farghalli Mohamed Professor Emeritus, University of California

**Citation:** For pioneering contributions in the areas of creep and superplasticity.

"It is a great honor to be selected as the recipient of the Oleg D. Sherby Award. I knew the late professor Sherby since

1974. He was a great man and a wonderful mentor. His work on creep has inspired my research activities in several areas including creep of solid solution alloys, the effect of stacking fault energy on creep behavior of metals, stability of subgrain size during creep, low-temperature creep, and superplasticity."

#### WILLIAM HUME-ROTHERY AWARD

This honor is awarded in recognition of exceptional scholarly contributions to the science of alloys.



#### Ursula Kattner *Physical Scientist, National Institute of Standards and Technology* **Citation**: For outstanding contributions to the development and application of the multicomponent thermodynamic descriptions for industrial applications.

Presentation Title: "Phase Diagrams,

Computational Thermodynamics and CALPHAD" "I feel very honored to be selected for the William Hume-Rothery Award. Looking at the list of past recipients only emphasizes what a great honor it is to receive this award. Like Hume-Rothery, I am passionate about working on understanding phase equilibria and intermetallic phases. Unlike Hume-Rothery, I have the fortune of having modern computers for the study of phase equilibria in systems with more than three components and their application to practical problems. I am looking forward to the 2020 symposium to discuss advances in experimental and computational methods for the investigation of phase equilibria and intermetallic phases, as well as application to technological problems."

#### INSTITUTE OF METALS LECTURER & ROBERT FRANKLIN MEHL AWARD

In receiving this pinnacle award, honorees present a lecture at the TMS annual meeting, which is also published in *Metallurgical and Materials Transactions A*.



#### Yuntian Zhu Distinguished Professor, North Carolina State University Citation: For outstanding leadership and pioneering work in deformation physics and mechanical properties of nanostructured and heterostructured metals.

Presentation Title: "Heterostructured

Materials: A New Paradigm for Designing Metals with Superior Mechanical Properties"

"I have been a TMS member for over twenty years and am now a life member. TMS has played a critical role in my career development. I'm deeply honored and humbled to join the group of distinguished colleagues who have received this award earlier. Robert Franklin Mehl, after whom this award is named, advocated for a more fundamental approach to materials. I have admired him and followed his philosophy by focusing my research on fundamental deformation physics of materials and on utilizing these fundamentals to design nanostructured and heterostructured materials." A MARK OF EXCELLENCE: THE 2020 TMS AWARD RECIPIENTS

#### **ELLEN SWALLOW RICHARDS DIVERSITY AWARD**

This award recognizes an individual who, in the remarkable pioneering spirit of Ellen Swallow Richards, has helped or inspired others to overcome personal, professional, educational, cultural, or institutional adversity to pursue a career in minerals, metals, and/or materials.



#### Oscar Marcelo Suarez Professor & Graduate Program Coordinator, University of Puerto Rico-Mayagüez

**Citation:** For developing and growing a materials science education program that enables underrepresented students to excel and achieve.

"As an educator and a materials

scholar, I consider this award a career milestone. Moreover, coming from TMS makes this recognition particularly consequential in my professional life. However, I must say that I do not identify myself as a pioneer. It just happened that I discovered fertile ground to spark something in my students' eager minds. Indeed, that is my prime reason to be a professor in a minority-serving institution."

#### FRANK CROSSLEY DIVERSITY AWARD

Awarded to an individual who has personally overcome personal, professional, educational, cultural, or institutional adversity to pursue a career in minerals, metals, and/or materials.



#### **Raul Rebak**

#### Corrosion Engineer, General Electric Global Research

**Citation:** For conquering GLBT bias from family, culture, and the education system to make outstanding contributions to the corrosion and nuclear fields.

"As a gay man in an engineering

field, I was deeply moved to receive this recognition of the Frank Crossley Award. Being a member of a minority group implies that one must spend extra energy and charm to overcome prejudice and barriers to be included and respected in the engineering community. This award is a testament that maybe one was effective in these goals of claiming equality and inclusion. I hope this award will serve as a motivation for many younger people to be comfortable to be themselves. Being proud and out-of-the-closet saves a lot of energy and makes the professional more efficient in the work place. This is a win-win proposition for both the company and the employee."

#### WILLIAM D. NIX AWARD

This award highlights and promotes continued progress and innovation relevant to research into the underlying mechanisms and mechanical behavior of macro-, micro-, and nanoscale materials.



#### **Robert Ritchie**

H.T. & Jessie Chua Distinguished Professor of Engineering, University of California, Berkeley

**Citation:** Fundamental and sustained contributions to the mechanistic understanding of the multiscale mechanisms of the fracture and fatigue behavior of structural and biological

materials.

**Presentation Title:** "Damage Tolerance in Materials" "I have been a member of TMS now for over 40 years and have always regarded it as my principal society membership. Thus, to win any TMS award is a genuinely major event in my life, but to be the inaugural recipient of a TMS medal bearing the name of William D. Nix is literally overwhelming, yet at the same time humbling. Bill has been at the very top of our field for so many years; he is an absolutely stellar scientist and above all a true gentleman. To have my name linked to his through this new TMS award is truly an honor."

#### YOUNG LEADERS INTERNATIONAL SCHOLAR AWARD – JIM

The award, jointly administered by TMS and the Japan Institute of Metals and Materials (JIM), promotes young member activities and strengthens the collaborations between these two international societies. Recipients travel to the JIM annual meeting where they can present papers at international sessions.



#### **Michael Titus**

Assistant Professor, Purdue University

"I am very grateful to TMS and JIM for this recognition and opportunity to present our work at the JIM Annual Spring Meeting. As my home professional society, TMS provides me and my students

numerous opportunities to present our work, network with other professionals, and engage with students. The wide variety of symposia and conferences offered enhances the possibilities for multi-disciplinary collaboration and helps us expand our areas of research. I look forward to further engagement with TMS, my first-ever attendance at a JIM meeting, and meeting the many great JIM members in Japan."

#### BOHNERT

#### EARLY CAREER FACULTY FELLOWS

This award recognizes an assistant professor for his or her accomplishments that have advanced the academic institution where employed, and for abilities to broaden the technological profile of TMS.



Jessica Krogstad

Assistant Professor of Materials Science and Engineering, University of Illinois at Urbana-Champaign Presentation Title: "Challenging the Paradigm for Materials in Extreme Environments: Embracing Dynamic Material Properties"

"The TMS 2014 Annual Meeting was not my first TMS meeting, but it may have been my most formative as I was attending as a TMS Young Leader—a program supported by the TMS Foundation. It was at this meeting that I recognized the full potential of my TMS membership, and it went far beyond the technical talks. The deliberate and dedicated support of young professionals in TMS, made possible by both the TMS Foundation and so many engaged, uplifting members, has helped advance my career and has made TMS feel like home. I am excited to continue working within TMS and alongside the Foundation to ensure that our membership will be diverse, vibrant, and dynamic as we tackle the most pressing technological challenges now and into the future."



C. Cem Tasan Associate Professor of Materials Science and Engineering, Massachusetts Institute of Technology Presentation Title: "Following Nature's Guidance in Alloy- and Career-Design"

"TMS creates the framework on which our research community has formed

and thrived. It helps create opportunities for researchers in industry and academia to come together and discuss scientific phenomena, explore solutions for key engineering problems, think about most effective teaching approaches, and yes, have fun together. I learned more during Q&A's of my presentations, and while listening to the works of others, than I did through any other means. In this regard, these meetings and interactions have truly shaped my career, and my understanding of the physics of metals; and thus I am extremely thankful for TMS for all of that."

#### FRONTIERS IN MATERIALS AWARD

The TMS Frontiers of Materials Award is given competitively to top-performing early career professionals capable of organizing a Frontiers of Materials Event comprising a hot or emergent technical topic at the TMS Annual Meeting & Exhibition.



#### Keith Brown

Assistant Professor, Boston University Symposium Title: Frontiers of Materials Award Symposium: Machine Learning and Autonomous Researchers for Materials Discovery and Design



Natasha Vermaak Assistant Professor, Lehigh University Symposium Title: Frontiers of Materials Award Symposium: Leveraging Materials in Topology Optimization

#### **TMS BEST PAPER CONTEST**

This award recognizes student essays on global or national issues as well as technical research papers, relating to any field of metallurgy or materials science





#### BEST PAPER AWARD -FIRST PLACE GRADUATE Yuan Li

*Student, University of Tennessee* **Paper Title:** "In-Situ Real-Time Neutron Diffraction Studies of Dynamic Recrystallization and Texture Evolution During Friction Stir Processing of a Mg Alloy"

#### BEST PAPER AWARD – SECOND PLACE GRADUATE Kevou Mao

Student, Purdue University Paper Title: "Irradiation-Tailored Deformation Mechanisms in Austenitic Stainless Steel"

"It is a blessing to be honored by such a prestigious award. The TMS

Foundation and Materials Advantage provide me with a high-level professional platform to connect with the materials science community via sharing the frontiers of our research so that we can innovate materials to make our world a better place. This award also allows me to present my work at the TMS 2020 Annual Meeting. I believe all of these TMS benefits equip me with knowledge for my academic endeavors and elevate my motivation for solving greater materials problems. In the future, I will continue my career in materials research and development and open a start-up company."

A MARK OF EXCELLENCE: THE 2020 TMS AWARD RECIPIENTS



#### BEST PAPER AWARD – FIRST PLACE UNDERGRADUATE Benjamin Suslavich,

Student, Montana Technological University

Paper: "Synthesis and Characterization of the Hydroxamic Acid N,3-dihydroxy-2-napthamide and its Copper (II) Complex – An Investigation on Keto/ Enol Forms and Rare Earth Flotation"

Enor rounds and Rare Earth riotation

#### **KAUFMAN CALPHAD SCHOLARSHIP**

Awarded through CALPHAD Inc. and the TMS Foundation to sophomore or junior undergraduate students majoring in metallurgical engineering, materials science and engineering, or minerals processing/extraction programs.



#### **Emily Proehl**

Student, University of Wisconsin-Madison

"For the past four years I have been involved with the University of Wisconsin-Madison Material Advantage chapter. The student program has allowed me to explore my passion of materials science and

engineering through countless chapter meetings, industry connections, and funding of chapter events like foundry fun nights and forging. The chapter has encouraged my curiosity in the field and helped me develop as a future scientist and engineer. In the fall of 2020, I hope to attend graduate school in the field of nuclear materials. I am excited by the prospect of continued involvement in Material Advantage and TMS at the graduate level and in a professional career ahead."

#### AIME AWARDS

#### **AIME CHAMPION H. MATTHEWSON AWARD**

Awarded to the author(s) of a paper, or a series of closely related papers, representing the most notable contribution to metallurgical science during the period under review.



Peter C. Collins, The Al & Julie Renken Professor of Materials Science, Iowa State University; Vikas Dixit, Process Engineer, Intel Corporation; Hamish Fraser, Ohio Regents Eminent Scholar and Professor, The Ohio State University; and Santhosh Koduri, Intel Corporation **Paper:** "Understanding the Interdependencies between Composition, Microstructure, and Continuum Variables and Their Influence on the Fracture Toughness of a/b-Processed Ti-6Al-4V," *Metallurgical and Materials Transactions A*, March 2018

"We are honored that the community sees value in the science that was conducted and the manner in which the paper was prepared," said Collins. Dixit noted, "The recognition of this work has shown the growing relevance of utilizing numerical methods in exploring microstructureproperties correlations in novel and complex materials systems." Fraser added, "TMS is an outstanding organization...It is important to recognize those in our Society who have done so much to bring together those in academia, the national laboratories, and industrial organizations and companies."

#### AIME MINERAL INDUSTRY EDUCATION AWARD

The Mineral Industry Education Award was established in 1950 and is given for distinguished contributions to the advancement of mineral industry education.



Ramana Reddy Professor, University of Alabama

#### AIME ROBERT LANSING HARDY AWARD

For more than half a century, this award has recognized professionals under the age of 35 in the broad fields of metallurgy and materials science for exceptional promise of a successful career.



#### Ravishankar Sundararaman Assistant Professor, Rensselaer Polytechnic Institute

**Citation:** For seminal contributions to transmute and harness quantum electronic structure calculations for computational materials design in diverse fields of materials research including electrochemistry and plasmonics.

"It is a great honor to receive the AIME Robert Lansing Hardy Award. I am extremely grateful to my nominators as well as my advisors, mentors, collaborators, and students that made this possible. I am excited to join the ranks of the outstanding recipients of this award making important contributions to diverse fields of materials research. I look forward to developing new research directions and collaborations by engaging actively with the dynamic research community at TMS meetings for years to come."

#### AIME ROSSITER W. RAYMOND MEMORIAL AWARD

This award honors one of the American Institute of Mining, Metallurgical, and Petroleum Engineers' founders and recognizes the best paper published by AIME in a given period where the lead author is a member under 35 years of age.



Amirhossein Khalajhedayati, *R&D Device Expert, TowerJazz,* and Timothy Rupert, *Associate Professor, University of California, Irvine* 

**Paper:** "High-Temperature Stability and Grain Boundary Complexion Formation in a Nanocrystalline Cu-Zr Alloy," *JOM*, December 2015

"I am very honored to be selected for this award, especially because I am sharing this award with a former graduate student of mine. Amir was my first Ph.D. student and is an incredible scientist with unparalleled creativity and work ethic," remarked Rupert. "Recognition of one's research work is nice, but being able to share this with great people is even better. Our work on amorphous grain boundary complexions was extremely challenging yet also fulfilling, so I am delighted to see it being recognized."

#### **AIME HENRY DEWITT SMITH SCHOLARSHIP**

This scholarship is awarded to graduate students majoring in mineral, metals, and/or materials engineering. The award aims to advance the mineral industries by assisting students in the pursuit of graduate education in mining, metallurgical, materials, or petroleum-related disciplines.



#### Kathleen Chou

Student, University of Michigan "I am very thankful to TMS and AIME for this honor and support in my graduate degree. I have been a member of TMS and Material Advantage since my undergraduate degree and have had tremendous opportunities for professional development and career

growth as a student member. I have been able to share my research through conference presentations, lead a studentorganized symposium on science policy and materials research, and meet many other students and researchers within the materials community. These interactions have enriched my graduate school experience and have allowed me to continuously develop my technical and professional skills. After completing my degree, I am interested in continuing to develop my technical skill set at a national laboratory or in industry research and development."

#### Murtatha Jamel

#### Student, University of Wisconsin-Milwaukee

"I would like to express my appreciation to TMS and AIME for honoring me with this scholarship. Joining professional societies has added more potential to my professional goals and broadened my ability to join the industry work force. I am very eager to explore materials engineering as a potential career to share my knowledge with industry, and apply advanced techniques to enhance materials processing and characterization."

#### TMS/SME/AIME JAMES DOUGLAS GOLD MEDAL

This award honors distinguished achievement in nonferrous metallurgy, including both the benefication of ores and the alloying and utilization of nonferrous metals.



James Orlich Senior Director of Metallurgical Technology, Newmont Goldcorp

#### ACTA MATERIALA AWARDS

#### GOLD MEDAL AWARD

Awarded to a proven leader in materials science and engineering whose research has significantly impacted the development of the discipline.



Enrique Lavernia Provost and Executive Vice Chancellor, University of California, Irvine

#### SILVER MEDAL AWARD

This award honors scientific contributions and leadership from academic, industry, and public sector leaders in the midst of their careers.



Diana Lados Milton Prince Higgins II Distinguished Professor, Worcester Polytechnic Institute A MARK OF EXCELLENCE: THE 2020 TMS AWARD RECIPIENTS

#### **HOLLOMON MATERIALS & SOCIETY AWARD**

This recognition honors an individual who promotes understanding of the relationship and interactions between materials technology and societal interest or needs.



Lynnette D. Madsen Program Director, National Science Foundation

#### ACTA MATERIALIA UNDERGRADUATE SCHOLARSHIP

This scholarship recognizes two undergraduate students majoring in metallurgical engineering or materials science and engineering, or to students with significant interest in the materials area.



#### William Carpenter Student, South Dakota School of Mines & Technology

"I am very honored to receive this award and would like to extend my gratitude to the TMS scholarship committee. TMS has provided me with invaluable insight into the career paths and trends within the materials

science and engineering community. In the most pragmatic way, TMS has provided me the opportunity to meet experts within the metallurgical community and assisted in my career development. Material Advantage has provided me the opportunity to grow professionally and scholarships to facilitate my education."



#### William Jeang

Student, Northwestern University "Receiving the Acta Materialia Scholarship stands as an immense honor and instrumental kick-starter for my career as an aspiring materials researcher. In addition to offering this valuable avenue for financial support and recognition, TMS and

the Material Advantage student program presented unique opportunities that have enriched my university experience over the years. Most notably, participating in the annual Material Advantage speaking contest matured my confidence in public speaking and technical communication. Additionally, attending the Materials Science & Technology conferences connected me with other students from unique backgrounds who provided interesting ideas for improving materials science outreach at my own university."

#### **DIVISION AWARDS**

In addition to the many society-level awards administered by TMS, each of the Society's, five divisions provide opportunities for recognition specific to the work performed in their areas of technical interest. More information on each of these awards, as well as quotes and photos from recipients, are available at awards.tms.org.

#### EXTRACTION & PROCESSING DIVISION (EPD) DISTINGUISHED LECTURE AWARD



#### Phillip Mackey President, P.J. Mackey Technology Inc.

**Citation**: For nearly 50 years of research in non-ferrous pyrometallurgy and his leadership in planning and organizing key conferences and symposia in North America and internationally.

Lecture: "Around the Lead and Zinc Metallurgical World in Eighty Days: A Virtual Tour of World Lead and Zinc Operations and Technologies"

#### EPD DISTINGUISHED SERVICE AWARD

#### **Michael Free**



Professor, University of Utah Citation: For outstanding service to EPD council and the extractive community. This award especially notes his leadership for Hydrometallurgy 2018 and the Electrometallurgy series of symposia. "I have enjoyed working with many

people through my TMS membership and my involvement with the EPD. The relationships with others in connection with my service in TMS has been the most rewarding aspect of my TMS service. TMS is a great professional organization for covering research and development for a broad range of topics associated with metals, materials, and minerals. TMS membership and involvement in its committees and activities provide a great opportunity for networking and professional service."

BOHNERT

#### **EPD SCIENCE AWARD**



Jungho Heo, **R&D** Researcher, LS-Nikko Copper (left), and Joohyun Park, Professor, Hanyang University (right) Paper: "Effect

of Direct Reduced Iron (DRI) on Dephosphorization of Molten Steel by Electric Arc Furnace Slag," Metallurgical and Materials Transactions B, December 2018

#### **EPD TECHNOLOGY AWARD**











Transactions B, April 2018





Pictured above, left to right: Eugenia Araneda-Hernandez, Assistant Professor, Universidad de Concepción (UdeC); Eduardo R. Balladares-Varela, Associate Professor, UdeC; Francisco Brown Bojorquez, Professor, Universidad de Sonora (UNISON); Agustin Gomez-Alvarez, UNISON; Roberto A. Parra-Figueroa, Professor, UdeC; Victor R. Parra-Sanchez, UdeC; Manuel Perez-Tello, Ph.D., UNISON; and Victor Manuel Sanchez-Corrales, Ph.D., UNISON Paper: "Evolution of Size and Chemical Composition of Copper Concentrate Particles Oxidized Under Simulated Flash Smelting Conditions," Metallurgical and Materials

#### EPD PYROMETTALLURY BEST PAPER AWARD



Toru H. Okabe, Professor, University of Tokyo (left), and Yu-Ki Taninouchi. Kyoto University (right) **Presentation:** 

"Recovery of Platinum Group Metals from Spent Catalysts Using Iron Chloride Vapor Treatment," Metallurgical and Materials Transactions B, August 2018

#### **NAGY EL-KADDAH AWARD FOR BEST PAPER IN** MHD MATERIAL PROCESSING









Pictured above, left to right: Carelyn Campbell, Metallurgist, National Institute of Standards and Technology (NIST); Eric Lass, Professor, University of Tennessee, Knoxville; Lyle Levine, Project Lead, Additive Manufacturing of Metals, NIST; Mark Stoudt, Materials Research Engineer, NIST; and Fan Zhang, Physicist, NIST Not pictured are: Greta Lindwall, Assistant Professor, KTH Royal Institute of Technology; Daniel Ng, Massachusetts Institute of Technology; and Maureen Williams, NIST Paper: "The Influence of Annealing Temperature and Time on the Formation of  $\delta$ -Phase in Additively-Manufactured Inconel 625," Metallurgical and Materials Transactions A, July 2018

A MARK OF EXCELLENCE: THE 2020 TMS AWARD RECIPIENTS

#### FUNCTIONAL MATERIALS DIVISION (FMD) JOHN BARDEEN AWARD



#### James Coleman Professor, University of Texas at Arlington

**Citation:** For seminal and sustained contributions to strained layer semiconductor lasers and selective area epitaxy for integration of optoelectronis devices. "I am humbled and honored to receive

the John Bardeen Award. I did my graduate work at the University of Illinois and had the opportunity to meet and briefly work with Bardeen. He was an inspiration to several generations of graduate students in physics, materials science, and electrical engineering. His enduring message, which I have tried to fully embrace, is that science and engineering are inextricably intertwined, and both are necessary for technical excellence."

#### FMD DISTINGUISHED SCIENTIST/ENGINEER AWARD



#### C. Robert Kao

**Professor, National Taiwan University Citation:** For his distinguished career in materials research involving metallurgical reactions in electronic packaging, service to TMS and the electronics industry and academic leadership in Taiwan.

"I attended my first TMS meeting as a graduate student in 1993 and have been a loyal FMD member since its days as the Electronic, Magnetic & Photonic Materials Division. To receive this award is so very humbling. Nowadays, I attend TMS meetings every year, always accompanied by several students of mine. I want my students to experience the same professional growth I have gained through my activities with TMS. I'm truly grateful to the Society for everything and for this award."

#### FMD DISTINGUISHED SERVICE AWARD



James R. Morris Chief Research Officer, Ames Laboratory

**Citation:** In recognition of his leadership and sustained services to the TMS, particularly his ability to introduce and develop new volunteers that keep the vibrancy of the Society for members.

"This wonderful honor is truly humbling as my experience is that the people serving TMS are all hard working and service-oriented. The TMS volunteer community, particularly the Chemistry and Physics of Materials Committee, has inspired my own service. Serving TMS has introduced me to new science, new people, and new opportunities."

# LIGHT METALS DIVISION (LMD) DISTINGUISHED SERVICE AWARD



#### Donna Post Guillen Distinguished Research Engineer, Idaho National Laboratory

**Citation:** For dedicated service to LMD and to the Energy Committee as vice-chair, chair, past chair, JOM advisor, representative, symposia organizer, session chair, and technical paper presenter.

"I'm absolutely delighted to receive this honor, and most genuinely grateful. It validates the importance of service and leadership. I am humbled to join the ranks of other distinguished individuals that have received this award in past years. It has been a pleasure working with TMS staff and the other volunteers over the past decade. Thank you for this great honor."

#### LMD LIGHT METALS AWARD



Pictured, left to right: Patrice Côté, Principal Advisor Data Science and Artificial Intelligence, Rio Tinto Aluminum, Arvida Research

and Development Center (left), and Sébastien Guérard, Research Scientist, Rio Tinto Aluminum, Arvida Research and Development Center (right)

**Paper:** "A Transient Model of the Anodic Current Distribution in an Aluminum Electrolysis Cell," *Light Metals* 2019

#### LMD TECHNOLOGY AWARD



#### Alan Luo *Professor, The Ohio State University* Citation: For outstanding contributions to research, development and education in light metals technology.

"Over the years, TMS has provided me with tremendous opportunities for technology development and

professional networking. I appreciate my colleagues and friends at TMS and the LMD for their support and recognition."

#### MATERIALS PROCESSING & MANUFACTURING DIVISION (MPMD) DISTINGUISHED SERVICE AWARD



#### Yunzhi Wang

**Professor, The Ohio State University Citation:** For outstanding achievements in fundamental and computational study on microstructural evolution during solid state phase transformations and plastic deformation in metals and alloys. "I am deeply honored and humbled by the recognition of my peers for this

prestigious award. I would like to share this recognition with my students and colleagues, because it is their contributions that have made possible what I have accomplished. I also acknowledge TMS, my home professional society, for providing a vibrant platform for close interactions and longlasting collaborations with other researchers in the field, which has shaped my career path."

#### MPMD DISTINGUISHED SCIENTIST/ENGINEER AWARD

#### Douglas Spearot Associate Professor, University of Florida

**Citation:** A dedicated member and leader in different technical committees and council of MPMD for more than a decade. Also, serving in several leadership committees of TMS including vice chair of the Membership and

Student Development Committee.

"TMS has been the most important professional society to the advancement of my career. Scientifically, TMS has provided a forum for me to engage with preeminent scholars in my field of research. In addition, through technical and administrative committee service, TMS has provided me the opportunity build leadership skills and a network of colleagues beyond my research field. I am grateful to be recognized for my service to TMS."

#### LIGHT METALS SUBJECT AWARDS

#### ALUMINA/BAUXITE

Mariana A.L. Braulio, 4Cast-Technical Assistance and Consultancy on Refractories; José R. Cunha, Alumar; Austin Maxwell, Alcoa; Victor C. Pandolfelli, Alcoa Laboratory and Federal University of Sao Carlos; and Dean Whiteman, Alcoa Paper: "Improving the Reliability of Fluidized Bed Alumina Calciners by Suitable Refractory Lining Selection," Light Metals 2019

#### **ALUMINUM ALLOYS**

Frederic De Geuser, Alexis Deschamps, and Dami Meddeb, *Grenoble Institute of Technology*; Brad Diak, *Queen's University*; Baptiste Gault, Dierk Raabe, and Huan Zhao, *Max-Planck-Institut für Eisenforschung*; and Gilles Guiglionda and Michael Langille, *Constellium Technology Center* 

Paper: "Understanding the Role of Cu and Clustering on Strain Hardening and Strain Rate Sensitivity of Al-Mg-Si-Cu Alloys," Light Metals 2019

#### **ELECTRODE TECHNOLOGY**

Christophé Bouche, Xavier Genin, and Pierre Mahieu, *Fives Solios*; and David Brismalein and Hervé Pédroli, *Aluminium Dunkerque* 

Paper: "Carbon Block Tracking Package Based on Vision Technology," Light Metals 2019

#### WARREN PETERSON CAST SHOP FOR ALUMINUM PRODUCTION

Nils Bauerschlag and Georg Romback, *Hydro Aluminum Rolled Products GmbH* Paper: "LIBS Based Sorting—A Solution for Automotive Scrap," *Light Metals 2019* 

#### EPD/LMD JOURNAL OF SUSTAINABLE METALLURY BEST PAPER AWARD

**Chuan-ming Du, Xu Gao, Shin-ya Kitamura, and Shigeru Ueda**, *Tohoku University* **Paper:** "Effect of Fe<sup>2+</sup>/T.Fe Ratio on the Dissolution Behavior of P from Steelmaking Slag with High P<sup>2</sup>O<sup>5</sup> Content," *Journal of Sustainable Metallurgy*, April 2018

#### LMD/EPD SUBJECT AWARD – RECYCLING

Blake Fullenwider, U.S. Army Research Laboratory; Parnian Kiani and Julie M. Schoenung, University of California, Irvine; and Kaka Ma, Colorado State University

Paper: "From Recycled Machining Waste to Useful Powders for Metal Additive Manufacturing," REWAS 2019

#### STRUCTURAL MATERIALS DIVISION (SMD) DISTINGUISHED SCIENTIST/ENGINEER AWARD



#### Rajiv Mishra

Distinguished Research Professor, University of North Texas Citation: For advancing understanding of temperature dependent deformation mechanisms in metallic materials and composites.

"TMS has been my primary professional society, and I remember the excitement

when I attended my very first committee meeting more than 20 years back. It has been an excellent experience to be involved with TMS and the SMD at various levels. Continuously attending annual meetings for the last 25 years has been critical for my scientific and professional growth. To receive this award is very gratifying as it is an acknowledgement from my peers. I am very grateful to all my students, postdocs, and collaborators for helping with my scientific endeavors."

#### SMD DISTINGUISHED SERVICE AWARD

#### **Ellen Cerreta**

Deputy Division Leader, Los Alamos National Laboratory Citation: For exceptional service and

dedication to the Structural Materials Division of TMS.

"Serving the materials profession through membership in the Structural Materials Division of TMS has been

extremely gratifying for me."

#### LMD MAGNESIUM TECHNOLOGY AWARDS

#### APPLICATION

Maximilian Bechly, Matthias Jahn, and Petra Maier, *Stralsund University of Applied Sciences*; Benjamin Bittner and Roman Menze, *MeKo Laser Material Processing*; and Adam Griebel and Jeremy Schaffer, *Fort Wayne Metals* 

**Paper:** "Corrosion Bending Fatigue of RESOLOY® and WE43 Magnesium Alloy Wires," *Magnesium Technology* 2019

#### **FUNDAMENTAL RESEARCH**

Irene Beyerlein and Brandon Leu, University of California, Santa Barbara; M. Arul Kumar, Los Alamos National Laboratory; and Paul Rottman, University of Kentucky

Paper: "Characterization of Staggered Twin Formation in HCP Magnesium," Magnesium Technology 2019

#### **STUDENT PAPER**

Amine Benzerga and Joshua Herrington, *Texas A&M University*; Jacques Besson, *École des Mines*; and Yazid Madi, *EPF École D'Ingenieru-e-s* 

**Paper:** "Modeling the 3D Plastic Anisotropy of a Magnesium Alloy Processed Using Severe Plastic Deformation," *Magnesium Technology 2019* 

#### **BEST POSTER**

Sarbajit Banerjee and Rachel Davidson, *Texas A&M University* Title: "Elucidation of Growth Mechanisms and Control of Morphology in Electrodeposited Magnesium Thin Films"

Zachary Brunson and Aaron Stebner, *Colorado School of Mines* Title: "In Situ Characterization of the Deformation Mechanisms Present in Biaxially Loaded Mg"

#### BOHNERT

#### **EPD MATERIALS CHARACTERIZATION AWARDS**

#### **BEST PAPER AWARD - FIRST PLACE - TIED**

Shadi Jamil Ikhmayies, *Al Isra University*; and Hassan K. Juwharai and Bashar Ibrahim Mahmouh Lahlouh, *University* of Jordan

Paper: "Properties of ZnO Micro/nano Structures on Aluminum Substrates," Characterization of Minerals, Metals, and Materials 2019

#### **BEST PAPER AWARD - FIRST PLACE - TIED**

Tao Jiang, Guanghui Li, Jianhui Peng, Zhiwei Peng, Liancheng Wang, Leixia Zheng, and Zhongping Zhu, *Central South University* 

Paper: "Microwave-Assisted One Step Synthesis of FeCo/Graphene Nanocomposite for Microwave Absorption," *Characterization of Minerals, Metals, and Materials 2019* 

#### **BEST PAPER AWARD - THIRD PLACE**

Lin Cheng, University of Pittsburgh; Yan Luo, Qiang Ren, and Lifeng Zhang, University of Science and Technology Beijing; and Piotr Roman Scheller, TU Begakademi Frieberg Paper: "Evolution of Precipitates during Rolling and Annealing Process in Non-oriented Electrical Steel," Characterization of Minerals, Metals, and Materials 2019

#### **BEST POSTER AWARD – FIRST PLACE**

Ken Kurosako, Hiroaki Muta, Yuji Ohishi, and Yifan Sun, Osaka University Title: "Thermal Conductivity of Liquid Phase Al-Si Alloys"

#### **BEST POSTER AWARD – SECOND PLACE**

Ruben Mendoza-Cruz, Prakash Parajuli, Arturo Ponce, and Miguel Yacaman, *University of Texas at San Antonio* Title: "Alloying and Annealing Effects on Grain Boundary Character Evolution of Al Alloy 7075 Thin Films: An ACOM-TEM Analysis"

#### **BEST POSTER AWARD – THIRD PLACE**

James Keiser, Kyungjun Lee, Jun Qu, and Sougata Roy, *Oak Ridge National Laboratory*; Erik Kuhn and Ed Wolfrum, *National Renewable Energy Laboratory*; and Jeffrey Lacey and Vicki Thompson, *Idaho National Laboratory* 

Title: "Investigation of Equipment Wear Issues in Biomass Pre-processing and Pre-treatment"



Editor's Note: Geralyn Smith provided assistance compiling this article.

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# TMS2020 Proceedings Volumes Now Available



Registrants of the TMS 2020 Annual Meeting & Exhibition (TMS2020) will have free, online access to the meeting's proceedings publications as a benefit of attending. If you can't make it to TMS2020, you can still purchase proceedings volumes, as well as individual papers, through the TMS Bookstore portal at www.tms.org/Bookstore. All 11 publications will be available by the start of the meeting.

TMS members receive a 40 percent discount on TMS proceedings, and a 20 percent discount on TMS non-proceedings titles published with Springer. The discount codes that you need to enter during checkout are presented at www.tms.org/Bookstore when you are logged in to the TMS website. Read on to learn more about each of the TMS2020 titles.

#### 11th International Symposium on High-Temperature Metallurgical Processing

This collection features contributions covering the advancements and developments of new high-temperature metallurgical technologies and their applications to the areas of processing of minerals; extraction of metals; preparation of refractory and ceramic materials; sintering and synthesis of fine particles; treatment and recycling of slag and wastes; and saving of energy and protection of the environment.

#### Advances in Powder and Ceramic Materials Science

This book emphasizes the advances of powder and ceramic materials in fundamental research, technology development, and industrial applications. Ceramic materials science covers the science and technology of creating objects from inorganic, nonmetallic materials, and includes design, synthesis, and fabrication of ceramics, glasses, concretes, and ceramic-metal composites.

# Characterization of Minerals, Metals, and Materials 2020

This volume gives broad and up-to-date results in the research and development of materials characterization and processing. Topics covered include advanced characterization methods, minerals, mechanical properties, coatings, polymers and composites, corrosion, welding, magnetic materials, and electronic materials. The book also explores scientific processes to characterize materials using modern technologies, and focuses on the interrelationships and interdependence among processing, structure, properties, and performance of materials.



#### Energy Technology 2020: Recycling, Carbon Dioxide Management, and Other Technologies

This collection addresses the pressing needs for sustainable technologies with reduced energy consumption and environmental pollutions and the development and application of alternative sustainable energy to maintain a green environment and efficient and long-lasting energy supply. Contributors represent both industry and academia and focus on new and efficient technologies including innovative ore beneficiation, smelting technologies, and recycling and waste heat recovery, as well as emerging novel energy solutions. The volume also covers a broad range of mature and new technological aspects of sustainable energy ecosystems, processes that improve energy efficiency, reduce thermal emissions, and reduce carbon dioxide and other greenhouse emissions.

#### **Light Metals 2020**

The Light Metals symposia at the TMS Annual Meeting & Exhibition present the most recent developments, discoveries, and practices in the primary aluminum science and technology. The annual *Light Metals* volume has become the definitive reference in the field of aluminum production and related light metal technologies. The 2020 collection includes papers from the following symposia: Alumina and Bauxite; Aluminum Alloys, Processing, and Characterization; Aluminum Reduction Technology; Cast Shop Technology; Cast Shop Technology; Cast Shop Technology for Aluminum Production.

#### Magnesium Technology 2020

The Magnesium Technology symposium, the event on which this collection is based, is one of the largest yearly gatherings of magnesium specialists in the world. Papers represent all aspects of the field, ranging from primary production to applications to recycling. Moreover, papers explore everything from basic research findings to industrialization. *Magnesium Technology 2020* covers a broad spectrum of current topics, including alloys and their properties; cast products and processing; wrought products and processing; forming, joining, and machining; corrosion and surface finishing; and structural applications. In addition, there is coverage of new and emerging applications.

#### Materials Processing Fundamentals 2020

This volume includes contributions on the physical and numerical modeling of materials processing and covers a range of metals and minerals. Authors present models and results related to the basics of processing such as extraction, joining, separation, and casting. The corresponding fundamentals of mass and heat transport as well as physical and thermodynamics properties are addressed, allowing for a cross-disciplinary vision of the field.

#### **Nanocomposites VI: Nanoscience and** Nanotechnology in Advanced Composites

able of Contents

NANOCOMPOSITES

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This volume presents novel and innovative contributions in the domain specific to nanocomposites, specifically on aspects both related and relevant to the following: science at the nanoscale level; innovations and advances in processing; characterization, quantification, and analysis; mechanical property and evaluation and rationalization; failure analysis; and technological applications at the nanoscale level. This collection brings together a range of developments in areas spanning basic science, processing, analysis, characterization, mechanical property evaluation, and failure analysis rationalization of composite materials.

#### PbZn 2020: 9th International Symposium on Lead and Zinc Processing

Established in 1970, the PbZn symposium series is considered the leading international technical forum for the lead and zinc processing industries. PbZn 2020 continues to bring together operators, engineers, and researchers to exchange information regarding all aspects of current processing technologies for primary and secondary lead and zinc, as well as emerging technologies for both metals. The scope extends from process fundamentals to operational practices and also includes the important aspect of environmental issues.

#### **Rare Metal Technology 2020**

This collection presents papers from a symposium on the extraction of rare metals as well as rare extraction processing techniques used in metal production. Metals represented include neodymium, dysprosium, scandium, and others; platinum group metals including platinum, palladium, iridium, and others; battery-related metals including lithium, cobalt, nickel, and aluminum; electronicsrelated materials including copper and gold; and refractory metals including titanium, niobium, zirconium, and hafnium.

#### TMS 2020 149th Annual Meeting and **Exhibition Supplemental Proceedings**

This collection features papers presented at the 149th Annual Meeting & Exhibition of The Minerals, Metals & Materials Society. The contributions represent 48 symposia from the meeting.

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# TMS meeting headlines

View all upcoming meetings online at www.tms.org/Meetings.

#### **Other Meetings** of Note

OTC Asia 2020 March 24–27, 2020 Kuala Lumpur, Malaysia

**Offshore Technology** Conference (OTC 2020) May 4-7, 2020 Houston, Texas, USA

Solidification Course 2020 May 10-15, 2020 Les Diablerets. Switzerland

The 11th International **Conference on Molten** Slags, Fluxes and Salts (Molten 2020) May 25–29, 2020 Seoul, South Korea

Technological Innovations in Metals Engineering (TIME 2020) June 2-4, 2020 Youngstown, Ohio, USA

The 12th International Conference and Workshop on Numerical Simulation of 3D Sheet Metal Forming Processes (NUMISHEET 2020) July 19–24, 2020 Toronto, Ontario, Canada

The 14th International Symposium on Superalloys (Superalloys 2020) September 13-17, 2020 Seven Springs, Pennsylvania, USA

**Energy Materials 2020** October 13-15, 2020 Huzhou, Zhejiang, China



Philadelphia Marriott Downtown Philadelphia, Pennsylvania, USA **Discount Registration Deadline:** May 11, 2020

#### www.SafetyCongress.org

- Former NASA astronaut and U.S. Navy captain Jim Wetherbee will deliver the opening keynote, "Controlling Risk in a Dangerous World."
- Chair of the Washington Metrorail • Safety Commission and founder of Hart Solutions LLC Chris Hart will present the dinner keynote, "The Power of Collaboration to Improve Safety."
- Speakers from Boeing, General Electric, IBM, NASA, the National Institute of Standards and Technology, and more will discuss safety's value proposition, risk management, technology and innovation, and lessons learned in plenary talks each day followed by breakout sessions with other experts.

The 5th International Congress on



June 28–July 1, 2020 **Hyatt Regency Washington** on Capitol Hill Washington, D.C., USA **Discount Registration Deadline:** May 18, 2020 www.tms.org/3DMS2020

The International Congress on 3D Materials Science (3DMS) series is the home for professionals leading the advancement and application of 3D materials science. Join the conversation at 3DMS 2020, the fifth iteration of this landmark meeting, to assess the state of the art and to roadmap the key areas of future research.



July 26-31, 2020 The Ohio State University Columbus, Ohio, USA **Discount Registration Deadline:** June 15, 2020 www.tms.org/ICTP2020

- The 13th International Conference on the Technology of Plasticity (ICTP 2020) brings together colleagues across industry, academia, and government to discuss all aspects of metal forming science and technology.
- Eight keynote speakers will present their latest improvements and innovations covering the focal points of global issues, simulation, materials, and innovation.
- Learn more about the ICTP 2020 • keynote session as well as honorary symposia planned for this conference on the Technical Program page of the website.

# MATERIALS SCIENCE & TECHNOLOGY

October 4-8, 2020 David L. Lawrence **Convention Center** Pittsburgh, Pennsylvania, USA **Abstract Submission Deadline:** March 15, 2020 www.matscitech.org/MST20

- Be a part of one of the most extensive • Materials Science & Technology (MS&T) technical programs yet-submit your work to one of approximately 100 symposia on a variety of topics.
- New for 2020: an Artificial Intelligence • programming track has been added, consisting of seven symposia exploring big data, machine learning, materials informatics, and more.

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# Classifieds

Whether you are seeking a new job opportunity or needing to fill an open position, the *JOM* Job Board provides companies, academic institutions, and other organizations with a valuable resource to post and search for job openings. For \$125 per column inch, your ad can be posted, searched, and viewed by thousands of qualified candidates. Questions on placing a *JOM* classified advertisement?

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#### Faculty Position in Materials Science and Engineering

Missouri University of Science and Technology Department of Materials Science and Engineering

The Department of Materials Science and Engineering at the Missouri University of Science and Technology (Missouri S&T) in Rolla, Missouri is seeking outstanding applicants for a tenure-track, Assistant Professor faculty position in Metallurgical Engineering. Preference will be given to applicants who have expertise in iron and steel, with emphasis on physical metallurgy. Competitive salary commensurate the qualifications of the candidates will be offered.

Successful candidates will be expected to have strong commitments to (a) contributing to the departmental and college research efforts, (b) high-quality teaching both at the undergraduate and graduate levels, (c) service in the applicant's professional community and our institution, and (d) increasing the diversity of both the student body and faculty. Applicants should have demonstrated excellence in research and evidence of potential for excellence in external funding, highquality teaching, service, and increasing diversity. Applicants must hold a Ph.D. in Metallurgical Engineering or a closely related field. Candidates from national labs or industry with a strong research record coupled with academic experience are encouraged to apply as well.

Interested candidates should electronically submit their application consisting of: 1) a cover letter, 2) a current curriculum vitae, 3) a research statement, 4) a teaching statement, 5) a diversity statement, and 6) complete contact information for at least four references to Missouri S&T's Human Resources Office at:

<u>https://hr.mst.edu/careers/academic-employment/</u> using Reference Number 00075944. Acceptable electronic formats are PDF and MS Word. Applications will be reviewed as they are received and the review of applications will continue until the position is filled. For full consideration, applicants must apply by **January 15, 2019. For more information prior to submitting an application, please contact the Search Committee Chair, Wayne Huebner, at** <u>huebner@mst.edu</u>.

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# call for papers

*JOM* is seeking contributions on the following topics for 2020. For the full Editorial Calendar, along with author instructions, visit www.tms.org/EditorialCalendar.



#### August 2020 Manuscript Deadline: March 1, 2020 Topic: Additive Manufacturing for Energy Applications (By Invitation Only)

**Scope:** This invited topic will feature manuscripts based on experimental and computational approaches in the following topic areas

- Processing-microstructure-property relationship of AM fabricated materials for structural components in energy sectors
- In-situ sensor development and in-situ processing and characterization
- Advances in AM design methodologies, new material designs and AM techniques
- Modeling and simulations for design of highperformance AM fabricated materials
- Qualification approaches
- Economic advantages: case studies

Only papers presented at the Additive Manufacturing for Energy Applications II symposium at the TMS 2020 Annual Meeting & Exhibition will be considered for this topic.

Editor: Isabella van Rooyen

**Sponsors:** Additive Manufacturing Committee and Nuclear Materials Committee

#### Topic: Additive Manufacturing: Beyond the Beam Technology (By Invitation Only)

Scope: This invited topic will explore the print processs and post-print processing variables of non-beam solidstate print technologies, which determine properties, application performance, and economics and enable component functionality. These processes include but are not limited to: binder jetting, material extrusion, filament processing, nano-inkjet printing and sintering.
Editors: Paul Prichard, Peeyush Nandwana, Matt Dunstan, James Paramore, and Kathy Lu
Sponsors: Powder Materials Committee and Additive Manufacturing Committee **Topic: Advanced Processing and Additive Manufacturing of Functional Magnetic Materials Scope:** Papers are invited on advanced processing and advanced manufacturing of functional materials with particular emphasis on magnetic materials. In particular, papers addressing permanent magnets, magnetocaloric materials, soft magnets, magnetic shape memory alloys, and multiferroics are welcome. Additive approaches to similar classes of functional materials are invited as well. **Editors:** Scott McCall and Ikenna Nlebedim **Sponsor:** Magnetic Materials Committee

#### **Topic: Biologically Induced Corrosion**

**Scope:** Papers in all areas of biologically induced or influenced corrosion are welcome. Examples include microbially induced corrosion, corrosion in biomedical devices, etc.

Editor: Vilupanur Ravi

**Sponsor:** Corrosion and Environmental Effects Committee

#### Topic: Metal Matrix Composites: Analysis, Modeling, Observations and Interpretations (By Invitation Only)

**Scope:** This invitation-only topic will present papers from the symposium Metal Matrix Composites: Analysis, Modeling, Observations and Interpretations, at the TMS 2020 Annual Meeting & Exhibition. The goal of this special topic is to publish papers representing developments in the analysis, modeling, and observations of metal matrix composites.

**Editors:** T.S. Srivatsan and W.C. Harrigan Jr. **Sponsors:** Composite Materials Committee and Mechanical Behavior of Materials Committee

# Topic: Metastable Phases and Phase Equilibria (By Invitation Only)

**Scope:** Invited authors will provide original research submissions on next-generation alloys enabled by the design and control of metastable phases. In these alloys, outstanding properties are achieved through a

call for papers



combination of carefully tailored chemical composition and thermal processing. Examples include metastable austenite in TRIP, TWIP and Q&P steels, beta-stabilized titanium alloys, gamma double prime precipitates in nickel superalloys, high entropy alloys, and spinodal decomposition during aging of aluminum alloys. **Editors:** Gregory Thompson, Raj Banerjee, Eric Lass, and Bij-Na Kim

**Sponsors:** Phase Transformations Committee and Additive Manufacturing Committee

#### **September 2020** Manuscript Deadline: April 1, 2020

#### Topic: Aluminum: Recycling and Carbon / Environmental Footprint

**Scope:** This topic covers recycling of aluminum (and its alloys), as well as mitigating the carbon footprint and/or environmental ramifications of both primary and secondary aluminum production.

**Editors:** David S. Wong and Anne Kvithyld **Sponsors:** Aluminum Committee and Recycling and Environmental Technologies Committee

#### Topic: High Temperature Processing of Complex Ores (By Invitation Only)

**Scope:** Invited papers only will be published in this topic covering pyrometallurgical processes developed to recover metals from complex ores. The term complex refers to multi-metal sulfide resources, which often present inclusions and intricate structural or alteration patterns. Also included are orebodies such as multi-metal oxide ores that complicate processing due to the diversity of minor elements they contain. This topic will present a state-of-the-art picture of the high-temperature processing of complex ore, from historical to best available technologies.

**Editors:** Leili Tafaghodi, Camille Fleuriault, and Joseph Grogan

Sponsor: Pyrometallurgy Committee

**Topic: Materials Research in Reduced Gravity Scope:** Reduced-gravity experiments can isolate phenomena otherwise obscured in ground-based experiments, leading to new discoveries that can improve materials and processes. Ground-based facilities for reduced-gravity experiments include drop tubes and towers that provide seconds of reduced gravity, aircraft that provide tens of seconds, and suborbital rockets that provide hundreds of seconds. Manuscripts are solicited in all areas of materials research employing reduced gravity, including crystal growth, containerless processing, materials processing and properties, and experimental facilities for materials research.

**Editors:** Douglas M. Matson, Robert W. Hyers, Michael Sansoucie, Jonghyun Lee, and Shaun McFadden **Sponsors:** Process Technology and Modeling Committee and Solidification Committee

#### October 2020 Manuscript Deadline: May 1, 2020

#### **Topic: Electrometallurgical Processing**

**Scope:** Industrial electrochemistry has made great strides in the manufacture of base, precious, refractory and reactive metals and their alloys/compounds. Significant improvements have been made to obviate some of the process challenges that include energy-efficiency, often complex process chemistry, throughput, and safety. Manuscripts covering current practices and future projections of electrometallurgy including advanced materials, materials recycling, nuclear materials, secondary recovery, contaminated water and waste treatments, and design of process equipment are invited. **Editors:** Prabhat K. Tripathy, Takanari Ouchi, Hojong Kim, Hong (Marco) Peng, and Gisele Azimi **Sponsors:** Hydrometallurgy and Electrometallurgy Committee and Pyrometallurgy Committee

**Topic: Interfacial Stability in Multi-component Systems Scope:** Papers are invited for this special topic covering interfacial bonding, interfacial stability, reaction kinetics, phase formation and characterization, and complex interfacial phenomena in various applied fields, including advanced microelectronics packaging, semiconductor systems, thermoelectric modules, and energy materials. **Editors:** Chao-hong Wang and Shih-Kang Lin **Sponsor:** Alloy Phases Committee

#### Topic: Practical Research in Processing Science (By Invitation Only)

**Scope:** A primary objective of research is the eventual reduction to practice and use by industry. Papers for this topic were solicited from "Purveyors of Processing Science and ICME: A Symposium to Honor the Many Contributions of Taylan Altan, Wei Tsu Wu, Soo-Ik Oh, and Lee Semiatin," who devoted their careers to understanding processes and developing practical simulations of them. This special topic pays homage to the lifelong work of these researchers. **Editors:** Adam Pilchak and Ed Herderick **Sponsors:** Titanium Committee, Shaping and Forming Committee, and ICME Committee

#### Topic: Solidification Behavior in the Presence of External Fields

**Scope:** The introduction of external fields, including electromagnetic fields, ultrasonic excitation, and mechanical shearing to solidification processes can significantly alter solidification behavior. This encompasses a wide range of applications in casting, welding, remelting, and additive manufacturing processes that have been explored in industry to refine grains, homogenize segregation, prevent defect formation, and break up agglomeration of particles. Publications focused on new scientific discoveries, engineering advancement and industrial applications are solicited under this topic.

**Editors:** Lang Yuan and Andrew Kao **Sponsor:** Solidification Committee

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We look forward to another successful year in 2020.



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