JOM

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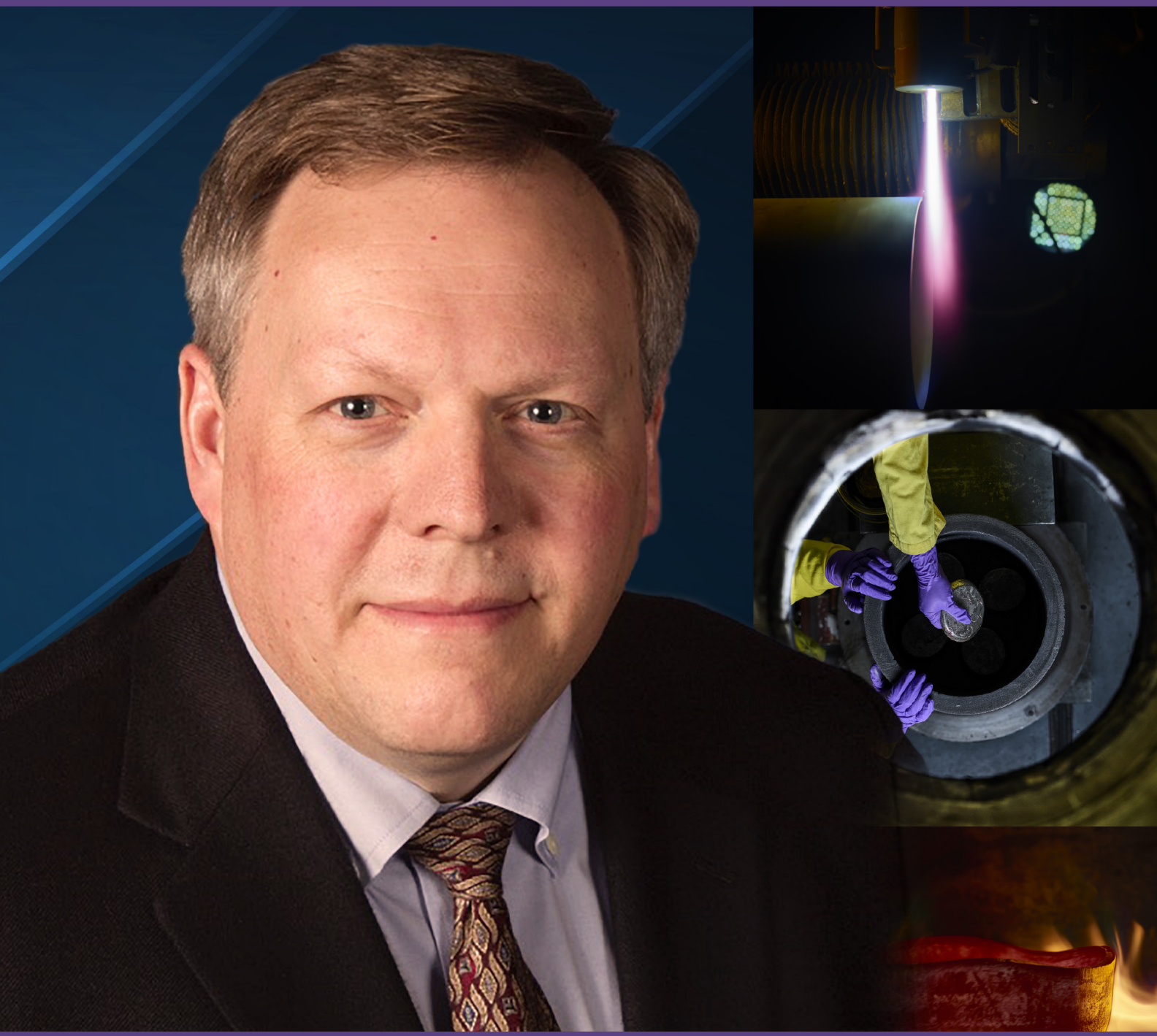

MEET THE 2019 TMS PRESIDENT: James Foley Plans for Success

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Energy Materials: Part II

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Technical Articles

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About the Cover

James Foley, Sigma-1 Group Leader at Los Alamos National Laboratory (LANL), was officially installed as the 2019 TMS President at the TMS 2019 Annual Meeting & Exhibition in March, and shared his plans for the Society in his first TMS Presidential Perspective in the April *JOM* Magazine. The background images on this cover show technologies from the three teams that Foley leads at LANL (from top to bottom): the Powder Materials Processing team; the Foundry & Solidification Science team; and the Deformation Processing team. Photo credit: Michael Pierce.

April 2019 Guest Editors

Deformation and Transitions at Grain Boundaries
Mechanical Behavior of Materials Committee
Saryu Fensin, Los Alamos National Laboratory
Thomas Bieler, Michigan State University
Shen Dillon, University of Illinois
Jian Luo, University of California, San Diego
Douglas Spearot, University of California, San Diego

Protein-Based Structural Materials
Biomaterials Committee
Hannes C. Schniepp, The College of William & Mary

Advanced High-Strength for Automobiles
Steels Committee
Mingxin Huang, University of Hong Kong

Characterization of Biodegradable Medical Materials
Materials Characterization Committee and Biomaterials Committee
Jaroshaw Drelich, Michigan Technological University
Tolou Shokuhfar, University of Illinois at Chicago

Energy Materials: Part II
Energy Committee
Tao Wang, Nucor Castrip Arkansas
Shadia J. Ikhmayies, Al Isra University

Additive Manufacturing of Composites and Complex Materials
Composite Materials Committee
Dirk Lehmhus, Fraunhofer - Ifam
Nikhil Gupta, New York University
Jonathan Spowart, Air Force Research Laboratory
Eric Jägle, Max-Planck-Institut für Eisenforschung

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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in the final analysis

JOM
Volume 71
Number 4
April 2019

"The list could surely go on, and there is nothing more wonderful than a list, instrument of wondrous hypotyposis."

—Umberto Eco, *The Name of the Rose*

While I like to think of myself as having a reasonably robust vocabulary and while I love the turn of a clever phase as much as the next writer (especially the phrases that I turn), I have to concede that I had no clue as to the meaning of "hypotyposis"—in or out of the context of the above quote. Is it a physiological condition? A psychological one? An extractive technique? Rhetorical point, game, and match to Umberto Eco (per usual). Defeated, I had to go to the dictionary. Ahhh, hypotyposis means to describe something with particular vividness. What a handy new term for my elocutionary toolbox! As a lover of lists, I'm aligned with Umberto that a well-assembled list can speak with great eloquence. Which leads me to, surprise, a list.

This list came to my email as a U.S. Department of Energy (DOE) press release. In broad terms, it itemizes the top ten DOE highlights from 2018. I'm intrigued. TMS has about 400 professional members at more than ten DOE national labs throughout the United States. The three largest national laboratory member hubs are Oak Ridge National Laboratory with 89 members, Los Alamos National Laboratory with 74 members, and Sandia National Laboratories with 59 members. Many of these folks are quite active within TMS as volunteers (thank you for that!). With such an important constituency being represented, I pay attention whenever news of the DOE system comes our way. Depending on how liberally we cast the net, there is almost always a materials and, hence, TMS member consideration in any such system-wide aggregation. While not hierarchical despite the numbering, the DOE reports being particularly proud that they are:

1. Improving global energy security through exports (think fossil fuels).
2. Promoting cybersecurity by creating the office of Cybersecurity, Energy Security, and Emergency Response (CESER).
3. Partnering on energy across the globe by use of strategic partnerships.
4. Advancing supercomputing and artificial intelligence, noting that Summit at Oak Ridge National Laboratory and Sierra at Lawrence Livermore National Laboratory were 2018's highest-performance computing resources, respectively.
5. Innovating in quantum science, including investment in the Quantum Science Initiative and funding quantum information science. The National Quantum Initiative Act was also signed into law.
6. Modernizing the grid by funding research in such areas as large-power transformers, solar, big data, and machine learning with grid sensors.
7. Environmental management, particularly with regard to nuclear waste cleanup.
8. Investing in all-of-the-above energy, including advanced vehicle technologies, offshore wind research, advanced nuclear technology projects, and solar manufacturing.
9. Addressing water challenges, including funding research on solar desalination technology.
10. Supporting American manufacturing to produce more with less energy and promote manufacturing competitiveness (e.g., the Sustainability in Manufacturing Partnership and the Manufacturing Innovator Challenge).

For more on the materials elements featured within these initiatives, we can keep reading TMS periodicals like *JOM* and attending TMS meetings. These are among the principal places where the talented and dedicated materials scientists and engineers working within the national laboratory system report their advancements . . . and where those members will surely continue to report the next-generation accomplishments that will feature in the 2019 DOE list. That's my kind of hypotyposis!

James J. Robinson
Executive Director

"TMS has about 400 professional members at more than ten DOE national labs throughout the United States. . . . I pay attention whenever news of the DOE system comes our way."

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JOM themagazine

Access Thousands of Papers in the Light Metals Library; Apply for the 2019 ELA Conference

member news

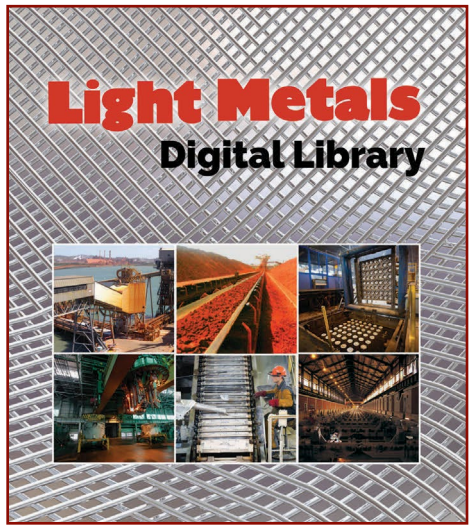
Share the good news about your professional accomplishments! Contact Kaitlin Calva, JOM Magazine Managing Editor, at kcalva@tms.org. Please note that only news submitted by current TMS members will be considered.

Light Metals Digital Library Provides Access to Decades of TMS Proceedings Papers

In February 2019, TMS introduced a new member benefit—the Light Metals Digital Library. The new online collection houses more than 5,200 technical papers from TMS's signature *Light Metals* proceedings series, from the Light Metals symposia held at the TMS Annual Meeting & Exhibition each year. The collection, which includes papers published from 1971 to 2010, can be searched by author, year, or title keyword, or browsed using the alphabetical list.

Individual articles from the collection can be purchased for $10 each for TMS members or $25 for nonmembers. TMS members can purchase a subscription to the library for $50 per year, providing them access to the complete collection of articles. Subscription purchases can be made through the online TMS membership application/renewal form at www.tms.org/Portal/Membership/Join_Renew. Institutional subscriptions are also available—contact publications@tms.org for more information

If you are not a TMS member, but are interested in obtaining member discounts on this and other resources and events, visit www.tms.org/Membership for more information on benefits and joining TMS.



Emerging Leaders Alliance Prepares Next Generation of TMS Leaders

Each year, the Emerging Leaders Alliance (ELA) provides cross-disciplinary training for the future leaders of the science and engineering community. The conference series goes a step further than most academic programs by focusing on the strengthening nontechnical skills in a setting that allows them to obtain foundational, executive-level knowledge, while weaving themes of social responsibility and environmental stewardship throughout the training curriculum. As one of nine ELA partner societies, TMS was proud to send seven members, through the support of the TMS Foundation, to the 2018 ELA conference, held November 4–7, in Falls Church, Virginia.

"It was an excellent experience learning from leaders in industry as well as a great opportunity to network with individuals from all over the U.S. and several other countries," said Amber Ollis, Technology Analyst, TimkenSteel Corporation, and one of the TMS members who participated in the 2018 program. "The most valuable takeaway for me was learning that 'soft skills' are just as important in a manufacturing/metals industry as technical skills. Not an engineer by trade, I have sometimes devalued what I bring to my team and to TimkenSteel. Working together with highly intelligent and goal-focused individuals at ELA showed me that strengths and weaknesses vary across the board."

"I found that I am more open to challenges and tackling new opportunities," Ollis continued, noting how the skills she learned at ELA have transferred to her current role. "I have attended quite a few conferences, and this is by far one of the more valuable and educational experiences. Along with recommending it to other team members in my own department, I would encourage others to look into this program."

Registration for the ELA conference is sponsored through the TMS Foundation for up to eight TMS young professional members each year. Applicants must be TMS members, typically ages 24–40, with rising or current leadership positions in their organizations. To apply for a seat at the November 3–6, 2019, conference, send a letter of interest, one or two letters of recommendation, and a resume or curriculum vitae to Deborah Hixon, TMS Awards and Program Administrator, at hixon@tms.org. **The deadline to apply is June 15.**

More established TMS members can participate by donating to the TMS Foundation. Any level of support helps ensure that future leaders of the minerals, metals, and materials community have access to this unique and valuable training program, in addition to other Foundation initiatives geared toward developing early career professionals. Visit www.TMSFoundation.org to make an online donation.

Attending the 2018 ELA program from TMS were: (back row, left to right) Clarissa Yablinsky, Los Alamos National Laboratory; Arif Mubarok, PPG Industries; Andrew Baker, Boeing; Ajith Chakkedath, Intel Corporation; and Konstantin Redkin, WHEMCO Inc.; (front row, left to right) Oscar Terrazas, ATI Specialty Materials; Deborah Hixon, TMS; and Amber Ollis, TimkenSteel Corporation.

Randy Beals Named Chair of ACRC

TMS member Randy Beals began a two-year appointment as the chair of the board of the Advanced Casting Research Center (ACRC) at Worcester Polytechnic Institute (WPI) in January 2019. Beals came to the ACRC after seven years with Magna International, where he worked most recently as a senior materials engineer and received the Magna Cosma Inspiring Innovator Award. He has brought his more than 25 years of experience working in aluminum and magnesium processing and product development in the automotive and aerospace industries to his new role at the ACRC.

Within TMS, Beals has been a *JOM* advisor and a member of the Aluminum, Magnesium, and Industrial Advisory Committees as well as the Light Metals Division Council.

Randy Beals
(Photo courtesy of WPI.)

Corby Anderson Selected for Cypress Advisory Board

Corby Anderson has recently joined the Cypress Development Corp.'s Technical Advisory Board. Anderson, currently the Harrison Western Professor in the Kroll Institute for Extractive Metallurgy at the Colorado School of Mines, offers more than 40 years of industrial, research, and educational experience in extractive metallurgy, mineral processing, waste minimization, and recycling to his new position at Cypress.

A TMS member for nearly 25 years, Anderson has been involved in the Extraction & Processing Division (EPD) Council and several other technical committees. In 1996, he received the EPD Technology Award and later the 2017 EPD Distinguished Lecturer Award. As a part of the honors for the latter award, Anderson presented a lecture at the TMS 2017 Annual Meeting & Exhibition in San Diego, California.

Corby Anderson

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JOM themagazine

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

New Strategy to Boost Western Australian Battery Industry

Perth, Australia: Western Australian Premier Mark McGowan announced the launch of the Future Battery Industry Strategy. As Australia's mineral reserves cover about ninety percent of the elements required in lithium-ion battery production, McGowan hopes the strategy "will drive the development of the Western Australian battery materials industry." The strategy includes plans for the government to continue to facilitate the establishment of new future battery projects in Western Australia.

Terrestrial Energy Engages NRG for Nuclear Materials Testing

Oakville, Ontario, Canada: Terrestrial Energy, a developer of Generation-IV advanced nuclear power plants, has entered into an agreement with NRG to test materials at NRG's High-Flux Reactor at Petten. The materials to be tested include graphites that will be utilized in key components of Terrestrial Energy's Integral Molten Salt Reactor power plant. NRG will also provide technical services such as advising on test design and preparation as well as performing in-process and post-irradiation examinations and evaluations of the test materials.

Rio Tinto's BC Works Smelter Receives ASI Certification

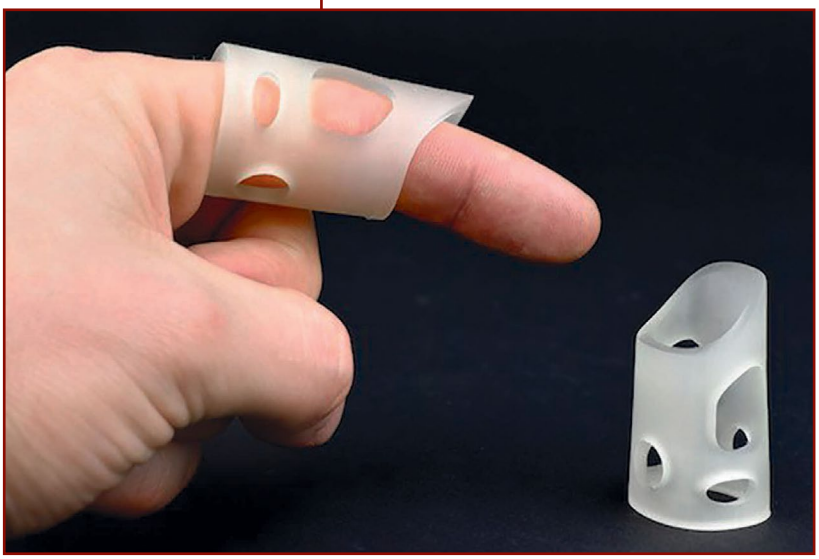
Kemano, British Columbia, Canada: Multinational metal and mining corporation Rio Tinto's BC Works aluminum smelter and Kemano power operations have been certified by the Aluminium Stewardship Initiative (ASI). The certification of this site means that all of Rio Tinto's aluminum operations in Canada are now ASI certified. Additionally, this makes Rio Tinto the only company that sells ASI certified aluminum through the chain of custody, from bauxite mines in Australia to its alumina refinery, aluminum smelters, and casthouses in Québec and British Columbia.

GFG Alliance Inaugurates Europe's Largest Smelter

Dunkirk, France: International business group GFG Alliance has inaugurated Europe's largest smelter, Liberty Aluminium Dunkerque. The site, which currently produces 285,000 tonnes of primary aluminum annually, aims to provide materials and components for French industry, namely the automotive sector. GFG acquired the facility from Rio Tinto in December 2018.

Newmont Appoints New Chief Operating Officer

Greenwood Village, Colorado, USA: American gold mining company Newmont announced that Rob Atkinson, currently Rio Tinto's head of productivity and technical support, has been appointed executive vice president and chief operating officer and will start with Newmont in June 2019. Atkinson will succeed Tom Palmer, who will be taking over as president and chief executive officer when Gary Goldberg retires. Atkinson has held various roles in the mining industry, leading operations and business improvement efforts in Australia, the United Kingdom, and the United States.



San Francisco, California, USA: Modular additive manufacturing hardware vendor Origin announced that Henkel will join their Open Material Network, which intends to provide manufacturing customers with flexibility. Henkel and Origin will work together to co-develop materials for their programmable photopolymerization technology. Proposed applications for the materials under development include surgery tools, pre-surgical models, and hearing aids. The finger splint pictured above, for example, was printed using medical-grade silicone. (Photo courtesy of Origin.)

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2019 TMS President James Foley: A Simple Plan for A Successful Year

James Foley

I first became interested in metallurgy when I took an undergraduate class on materials. I was working to become an aeronautical engineer and not a metallurgical engineer. I ended up switching to metallurgical engineering where I felt it was a natural fit for me. When I switched, I had to meet with an undergraduate advisor and that was John H. Perepezko. Little did I know at the time that John would eventually become my master's and Ph.D. advisor. I owe a lot to John, as he provided me the opportunities to grow and learn about the field of materials. Many of my successes stem from a learning experience I had at the University of Wisconsin-Madison working with John and his other students.

I first became involved with the Society because John invited me to attend a Solidification Committee meeting, but I stayed involved because of the encouragement of numerous members, like Dan Thoma, John Smugeresky, Eric Taleff, Joy Forsmark, Tresa Pollock, Elizabeth Holm, and Rusty Gray. TMS has been integral to my career. I obtained my postdoctoral fellow position at Ames Laboratory after giving a presentation at a TMS meeting—I probably would not have obtained that position if I had not given that presentation. I have received several other professional opportunities as a result of attending and participating in TMS activities. And I have met so many people through my involvement with TMS who I otherwise would have not had the chance to meet. So, it is clear to me that one of TMS's strengths is the ability to foster careers in materials. TMS encourages young scientists and engineers by providing a forum to discuss their ideas and work with people who have vast amounts of experience and knowledge. I believe what sets TMS apart from other societies is its inclusiveness and bottom-up approach.

My plan for the coming year is fairly simple and consists of five things. During the course of my tenure as President I plan to be volunteering a great deal of my time. In my case that will be representing TMS at events, leading the Board of Directors, and participating in a lot of meetings. The reason our Society is so great is because of all the many individuals spending their precious time volunteering.

I plan to nominate people for awards and positions. In the past, I have received great joy and happiness in nominating people who I respect for awards and positions. We all have many opportunities to feel that joy of ensuring someone gets recognized. I would like to see more people nominated for awards and positions within the Society.

I also plan to continue to donate to the TMS Foundation as I believe it is vital to continue the great work that it supports. I believe that if the majority of TMS members gave even a small amount to the Foundation every year, it would ensure that its mission is healthy and able to continue providing the many scholarships, awards, and support for bright young people. I plan to join the select group of people who have reached Lifetime Giving milestones in the coming year.

I also plan to promote TMS in any place I can. It is kind of surprising to me, and likely many of you, when someone says that they don't see the value of being a

James Foley

"It is clear to me that one of TMS's strengths is the ability to foster careers in materials."
—James Foley

"I really love the process of encouraging, because I believe that when it is done correctly, it is very powerful."
—James Foley

TMS member. I have gained so much by being part of this Society that it is hard to put into words. I hope to help others value TMS as much as I do.

Lastly, and maybe most importantly, I plan to encourage others to do the same. I really love the process of encouraging, because I believe that when it is done correctly, it is very powerful. Sometimes all it takes is a little voice saying you are *worthy*, you are *capable*, and you are *valued*.

My simple plan is to volunteer my time, nominate people, donate to the TMS Foundation, promote TMS, and encourage others to do the same. I ask all TMS members to take this simple plan and make it fit what they are planning to do for the year. Just think of what we can do as a community if every TMS member checked all of these boxes. Everyone's efforts in these five areas make a difference.

I look forward to working with the Board of Directors to keep TMS moving forward. I believe we are in an exciting time where technology is making a difference in the world and the people that find TMS as the natural place for them to be are an important part of that world.

2019 TMS Board of Directors

James Foley was officially installed as the 2019 TMS President at the TMS 2019 Annual Meeting & Exhibition in March. The following individuals join him on the TMS Board of Directors to lead the Society in the coming year:

TMS President
James Foley
Scientist,
Los Alamos National Laboratory

TMS Past President
Kevin J. Hemker
Professor and Chair,
Johns Hopkins University

TMS Vice President
Thomas P. Battle
Extractive Metallurgy Consultant

TMS Financial Planning Officer
Adrian Deneys
Business Development Manager,
Praxair Inc.

TMS Director, Professional Development
Chester Van Tyne
Professor Emeritus,
Colorado School of Mines

TMS Director/Chair, Content Development & Dissemination
Michele Manuel
Professor,
University of Florida

TMS Director/Chair, Member & Student Development
Alexis C. Lewis
Program Director,
National Science Foundation

TMS Director/Chair, Programming
Brad Boyce
Senior Member for the Technical Staff,
Sandia National Laboratories

TMS Director/Chair, Public& Governmental Affairs
John Howarter
Assistant Professor,
Purdue University

TMS Director/Chair, Extraction & Processing Division
Cynthia Belt
Energy Management Consultant,
Metals Energy Management LLC

TMS Director/Chair, Functional Materials Division
Raymundo Arroyave
Professor,
Texas A&M University

TMS Director/Chair, Light Metals Division
Eric Nyberg

TMS Director/Chair, Materials Processing & Manufacturing Division
Mark R. Stoudt
Materials Research Engineer,
National Institute of Standards and Technology

TMS Director/Chair, Structural Materials Division
Daniel B. Miracle
Senior Scientist,
Air Force Research Laboratory

TMS Secretary/ Executive Director
James Robinson

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A Celebration of Success: Meet the 2019 TMS Young Leaders

Far more than acknowledging a single achievement, the TMS Young Leaders Professional Development Awards confer a special kind of honor on young members of TMS. Individuals from each of the five technical divisions are recognized for their exceptional promise as materials science and engineering professionals and the potentiality of what their futures as TMS members and leaders may hold. The Young Leaders Professional Development Awards program provides financial assistance for attending the TMS annual meeting, where recipients have access to a variety of leadership development opportunities. By participating in activities like division council meetings, luncheon lectures, and a TMS Board of Directors meeting, these early career members gain new experiences that enable them to network with professionals at all stages of their careers and prepare them for future leadership roles within the Society.

Each of the 2019 Young Leaders introduced on the following pages received their awards at the TMS 2019 Annual Meeting & Exhibition (TMS2019), March 10–14, in San Antonio, Texas. Although TMS2019 is over, be sure to add them to your professional network as they continue to flourish as accomplished contributors to your professional community.

2019 Young Leaders Professional Development Award Recipients

EXTRACTION & PROCESSING DIVISION (EPD)

Neslihan Dogan

Neslihan Dogan

"I would like to express my gratitude to the TMS Foundation for its generous support. This award will provide me recognition and visibility in my research community," said Neslihan Dogan, assistant professor of materials science and engineering and Stelco Research Chair on Sustainable Steel Production at McMaster University. "I found new collaborations through networking opportunities in the meetings. I look forward to participating actively within the technical committees and working on my professional growth." Dogan's research focuses on the kinetics and thermodynamics of chemical reactions in steelmaking processes using modeling and high-temperature experimental techniques. She received her bachelor's degree from Yıldız Technical University and her Ph.D. from Swinburne University of Technology. Before joining McMaster University, Dogan worked as a postdoctoral fellow at the University of Wollongong.

Leili Tafaghodi

Leili Tafaghodi

"I am delighted to have been chosen as one of the recipients of 2019 EPD Young Leaders Professional Development Award," commented Leili Tafaghodi, an assistant professor and the extractive metallurgy research chair at the University of British Columbia. "I have greatly benefited from the events organized by TMS since I attended the TMS 2012 Annual Meeting & Exhibition as a Ph.D. student. TMS provides an opportunity to meet academic and industrial researchers and offers me a platform to present my research to the scientific community." Currently, Tafaghodi's research centers on sustainable high-temperature extraction and refining of materials. Her focus is on thermodynamics and kinetics of high-temperature materials processes and synthesis and refining of high-quality metals and alloys. Tafaghodi obtained her Ph.D. from the University of Toronto.

"TMS provides an opportunity to meet academic and industrial researchers and offers me a platform to present my research to the scientific community."

—Leili Tafaghodi

FUNCTIONAL MATERIALS DIVISION (FMD)

Surojit Gupta

Surojit Gupta

"It is an honor to receive the 2019 TMS FMD Young Leaders Professional Development Award," said Surojit Gupta, associate professor of mechanical engineering at the University of North Dakota (UND). "TMS membership helps me to connect with my fellow scientists. This award will help me to network and be a part of an esteemed materials society for solving challenging engineering problems." In his position at UND, Gupta teaches both fundamental and applied materials science and engineering courses. His research interests include sustainable materials, high-temperature ceramics and alloys, nanotechnology, additive manufacturing, and green manufacturing.

"This award will help me to network and be a part of an esteemed materials society for solving challenging engineering problems."

—Surojit Gupta

Ning Zhang

"TMS has always provided me with excellent opportunities to connect with faculty, students, and researchers around the world. As a junior research faculty member, TMS allows me to interact closely with the top scientists and engineers in the materials field by co-organizing a symposium, guest-editing a special issue of *JOM*, and participating in technical committee meetings," reflected Ning Zhang, research assistant professor in the Department of Mechanical Engineering at the Colorado School of Mines. "I have also benefitted a lot through presenting my work and communicating with researchers in my field. I am grateful and proud to receive this award, which will encourage me to be more involved in future TMS events and activities." Zhang received her B.S. in mechanical engineering from Dalian University of Technology, her M.S. in solid mechanics from Huazhong University of Science & Technology, and her Ph.D. in mechanical engineering from the University of Florida. With a diverse background in materials science engineering, mechanical engineering, and civil engineering, Zhang is currently interested in studying fundamental deformation/failure mechanisms and developing interatomic potentials for various materials.

Ning Zhang

LIGHT METALS DIVISION (LMD)

Kristian Etienne Einarsrud

"Since my first visit at TMS in 2011, I have always been inspired by the dedication from staff and volunteers, hosting a large event for a large audience," recalled Kristian Etienne Einarsrud, associate professor in the Department of Materials Science and Engineering at the Norwegian University of Science and Technology (NTNU). "The diversity, both in subjects and in attendees, is one of my main motivations for attending the meeting—I always learn new skills and find new opportunities upon which I can continue to build my career and network. The high quality of TMS journals allows me to go into the depth of the topics introduced at the annual meeting, thereby serving my professional needs throughout the year." Einarsrud earned both his M.Sc., in applied physics and mathematics, and Ph.D., in fluids engineering, from NTNU. His thesis work focused on CFD modeling of anodic bubble flow. Today, his main research topics include computational fluid mechanics, reactive multiphase flow and interface phenomena, process metallurgy, and electrochemistry.

Samuel Wagstaff

Currently a process scientist at the Novelis Global Research and Development Center, Samuel Wagstaff focuses on next generation alloy and research development. Wagstaff recalled "growing up" in the aluminum industry, helping his father with research work starting at the age of seven. "The TMS Foundation has been a source of inspiration to me for nearly my entire life. As I watched my father, Robert Wagstaff, prepare for presentations and publications it inspired me to dig deeper, and search further, throughout my entire education," said Wagstaff. "As a TMS member myself now, I can take part in those same discussions, be a part of the greater scientific community, and draw inspiration from, and foster collaboration with my peers. TMS and the TMS Foundation have been one of the major catalysts in my career thus far. I look forward to the further collaborations, discussions, and discoveries that they will inspire in the years to come." Wagstaff earned his B.S. in mechanical and aerospace engineering from Cornell University, and his M.S. and Ph.D. in materials science and engineering from the Massachusetts Institute of Technology.

Kristian Etienne Einarsrud

Samuel Wagstaff

"I always learn new skills and find new opportunities upon which I can continue to build my career and network."

—Kristian Etienne Einarsrud

MATERIALS PROCESSING & MANUFACTURING DIVISION (MPMD)

Oliver Johnson

Srikanth Patala

Oliver Johnson

"Being a member of TMS has provided a wide range of opportunities to contribute to and serve my professional community and for professional development," noted Oliver Johnson of his membership with TMS so far. "I am grateful for the opportunity to meet, learn from, collaborate with, and serve with distinguished colleagues in my field. This award expands the scope of these opportunities, and I am grateful for that privilege. I look forward to many decades of participation as a member of TMS." Johnson is currently an assistant professor in the Mechanical Engineering Department at Brigham Young University (BYU), where his research focuses on theoretical, computational, and experimental approaches to design and synthesize advanced materials. His other areas of interest include characterization and materials design for grain boundary networks, atomic and mesoscale characterization of grain boundary structure, experimental and theoretical methods for quantifying structure-property correlations, and synthesis of designed microstructures. Johnson earned his B.S. in mechanical engineering from BYU and his Ph.D. in materials science and engineering from the Massachusetts Institute of Technology

Srikanth Patala

"I feel extremely honored to receive this award. TMS membership has provided me the opportunity to engage with leaders in the field who have positively impacted my career, both as a researcher and a teacher in materials science," said Srikanth Patala, assistant professor in the Department of Materials Science and Engineering at North Carolina State University (NC State). "As a technical committee member, I was able to meet like-minded people with diverse sets of perspectives and ideas, co-organize symposia in areas close to my research interests, and form new collaborations through these meetings. I look forward to involving myself in a leadership role at TMS and engaging with young researchers and students who will shape the future of the Society." At NC State, Patala's research interests focus on developing analytical and computational tools for designing high-performance structural alloys, with a special emphasis on investigating and manipulating the properties of interfaces. He received his B.E. from the Indian Institute of Technology Madras and his Ph.D. in materials science and engineering from the Massachusetts Institute of Technology.

"I am grateful for the opportunity to meet, learn from, collaborate with, and serve with distinguished colleagues in my field." **—Oliver Johnson**

STRUCTURAL MATERIALS DIVISION (SMD)

Andrew Baker

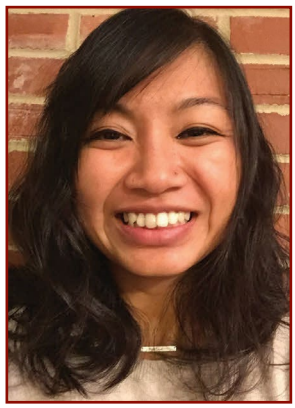
Andrew Baker

Andrew Baker, a materials and process engineer in the Next Generation Metals Group of Boeing Research & Technology, serves as a subject matter expert on the structure-property relationships in additively manufactured titanium and related processes within Boeing. He has also worked as program manager of an effort to establish process-microstructure-property models and tools to speed up certification and qualification of additively manufactured components. Other positions at Boeing have included serving as principal investigator for efforts to improve fatigue models in aluminum and bring modern metallic alloys into production aerospace systems. "I am honored to receive the 2019 TMS SMD Young Leaders Professional Development Award," Baker said. "TMS has provided significant opportunities and an inviting atmosphere to create, maintain, and foster key relationships between persons in the materials community for the benefit of the field and its membership. This award will allow me to continue serving on several committees to assist in executing

some of the TMS strategic goals such as advocacy for materials and manufacturing innovation, industrial engagement, and advancing diversity and inclusion in the minerals, metals, and materials profession."

Lily Nguyen

"TMS has been incredibly important to my career. In addition to serving as a platform to present my research, it provides so many opportunities to network and engage with other scientists at all stages," stated Lily Nguyen, a postdoctoral research associate at the U.S. Naval Research Laboratory (NRL). "It is a great resource and support system for me as I try to integrate materials science and engineering outreach efforts to students and become more involved in policy. I am excited to learn more about the opportunities within TMS, so that I can better serve our community." Her work at NRL focuses on developing an automated mechanical serial sectioning system to study the 3D microstructure of as-built additively manufactured materials. Nguyen earned her B.S. in metallurgical and materials engineering from the Colorado School of Mines, and her M.S. and Ph.D. in materials science and engineering from Carnegie Mellon University. During her thesis study, her work included the application of moment invariants to quantify microstructural evolution in materials systems.



Lily Nguyen

"I am excited to learn more about the opportunities within TMS, so that I can better serve our community."
—Lily Nguyen

Are You A Young Leader?

TMS Young Leaders Professional Development Award recipients are dynamic individuals who are looking to become more involved in the minerals, metals, and materials community. They are linked by a common commitment to taking their leadership skills to the next level by being more active as TMS volunteers and helping to advance TMS's strategic initiatives and impact on the profession.

If you feel that you, or someone you know, fit these criteria, visit the TMS Honors and Awards website at awards.tms.org to learn more and download the application. Applicants must be TMS members in good standing who are age 40 or younger. Awardees must also demonstrate a desire to play an active role in TMS and the potential to advance to volunteer leadership roles with the Society. The deadline to submit applications for the 2020 Young Leaders Awards is **August 15, 2019**.

If you are interested in becoming more involved in TMS before awards applications are due, join the Young Professionals Committee. The committee is primarily focused on enabling networking, developing programming for young professionals and that addresses materials-based concerns, and fostering an appreciation and awareness of TMS activities. For more information on joining the TMS Young Professionals Committee, contact Bryn Simpson, TMS Membership & Volunteerism Program Manager, at bsimpson@tms.org. To learn more about this committee and other opportunities for early career members of the Society, visit www.tms.org/YoungProfessionals.

International Scholars Announced

Jennifer Carter

Fadi Abdeljawad

Sakiko Kawanishi

The TMS Young Leaders International Scholar program was established in 2006 as a collaboration between TMS and the Japanese Institute of Metals and Materials (JIM). In 2013 the program was expanded to include a second award conferred as a collaboration between TMS and the Federation of European Materials Societies (FEMS). Made possible by funding through the TMS Foundation, the TMS Young Leaders International Scholar Awards enable early career TMS members to travel to the JIM Annual Spring Meeting or EUROMAT meeting where they will present a paper and tour nearby universities, research labs, or industrial facilities. Additionally, JIM and FEMS each sponsor a young professional from their memberships to present a paper at a TMS annual meeting.

The 2019 TMS/FEMS Young Leaders International Scholar Award recipient is **Jennifer Carter**, an assistant professor at Case Western Reserve University. "TMS membership and the TMS Foundation have been instrumental in my success as a young leader and as a materials engineer and materials educator. The Society and the awards provided by the Foundation have allowed me to participate in and direct the technical discussions that impact our community," Carter noted. "When I look for mentors and collaborators, I look to my peers in TMS for support. I highly value the commitment that the TMS membership has made to my success and I recommend to all my students that they volunteer and get involved with TMS. It is during the discussions at the annual meetings and other TMS sponsored meetings that the future is discussed and brought one step closer." In 2014, Carter received the Structural Materials Division Young Leaders Professional Development Award. As a student member of Material Advantage, she also received the American Institute of Mining, Metallurgical, and Petroleum Engineers (AIME) Henry deWitt Smith Scholarship in 2012.

"TMS has always been a home for all my research and professional development needs. My participation at TMS has been instrumental in advancing my career," said **Fadi Abdeljawad**, the 2019 TMS/JIM Young Leaders International Scholar. "The TMS annual meetings have helped me grow professionally through formal presentations of my research work, participation in committees, organizing symposia, and establishing connections with the top researchers in the field, and involvement in young professional activities. I am very grateful to the TMS Foundation for funding the Young Leaders International Scholar Award." Abdeljawad is currently an assistant professor in the Department of Mechanical Engineering at Clemson University, where his research focuses on understanding materials microstructures and their formation and evolution, as well as quantitatively predicting their performance. In 2017, he received the Functional Materials Division Young Leaders Professional Development Award. He received his B.Sc. from North Carolina State University, and his M.A. and Ph.D. from Princeton University, where he also received the Francis Upton Fellowship.

The JIM Young Leader representing JIM at TMS2019 is **Sakiko Kawanishi**, an assistant professor at Tohoku University. Kawanishi presented her paper "An Approach for Solubility Measurement of SiC in Molten Silicon and its Alloy by Real-Time Interference Observation," on Tuesday, March 12, during the Advanced Real Time Imaging: Thermodynamic and Mechanical Properties session at TMS2019.

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JOM themagazine

TMS meeting headlines

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

Other Meetings of Note

Offshore Technology Conference (OTC) 2019
May 6–9, 2019
Houston, Texas, USA

TMS Aluminum Cast Shop Science & Technology Course
May 6–10, 2019
Athens, Greece

5th World Congress on Integrated Computational Materials Engineering (ICME 2019)
July 21–25, 2019
Indianapolis, Indiana, USA

11th International Conference on Porous Metals and Metallic Foams (MetFoam 2019)
August 20–23, 2019
Dearborn, Michigan, USA

2019 Liquid Metal Processing & Casting Conference (LMPC 2019)
September 8–11, 2019
Birmingham, United Kingdom

Materials Science & Technology 2019 (MS&T19)
September 29–October, 3, 2019
Portland, Oregon, USA

ICTP 2020: The 13th International Conference on the Technology of Plasticity
July 26–31, 2020
Columbus, Ohio, USA

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

CONTROL OF POTLINE SCRUBBER & FUGITIVE EMISSIONS for Aluminum Smelters Course

June 17–20, 2019
The Rilano Hotel Hamburg
Hamburg, Germany
Discount Registration Deadline: April 25, 2019
www.tms.org/PSFE2019

- The TMS Control of Potline Scrubber & Fugitive Emissions for Aluminum Smelters Course (PSFE 2019) will include interactive sessions such as open group discussions and a tour of the Hamburg TRIMET Aluminium plant.

TMS METALLURGICAL AND MATERIALS PROFESSIONAL ENGINEER (PE) LICENSING EXAM REVIEW COURSE

August 14–17, 2019
TMS Headquarters Office
Pittsburgh, Pennsylvania, USA
www.tms.org/PEReview2019

- This program is the only review course focused specifically on the Metallurgical and Materials Engineering Professional Engineer (PE) Licensing Exam.
- A variety of approaches and methodologies will be addressed, including design, analysis, application, and operations.

ANODE TECHNOLOGY for the Aluminum Industry Course

September 9–13, 2019
Hydro Aluminium AS Årdal
Årdal, Norway
www.tms.org/Anode2019

- Leading experts in the field will present practical topics on the development of anodes, such as rodding and fume control with an emphasis on operational aspects and theoretical lectures.
- This course will focus on improving anode efficiency and performance for the aluminum industry.

WORLD CONGRESS ON HIGH ENTROPY ALLOYS HEA2019

November 17–20, 2019
Hyatt at Olive 8
Seattle, Washington, USA
Abstract Submission Deadline: April 15, 2019
www.tms.org/HEA2019

- The World Congress on High Entropy Alloys (HEA 2019) is a new, cross-disciplinary technical forum designed to share the latest research advances in metallic, intermetallic, and ceramic high entropy materials, including single-phase and multiphase (compositionally complex) alloys.
- Stay up-to-date on congress details such as registration and housing deadlines, tours, and other social events by clicking the "Sign up for Updates" link on the congress homepage.

THE WORLD COMES HERE
TMS2020
149th Annual Meeting & Exhibition

February 23–27, 2020
San Diego Convention Center and Marriott Marquis & Marina
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Abstract Submission Site Opens in May!
www.tms.org/TMS2020

- Special symposia at the TMS 2020 Annual Meeting & Exhibition (TMS2020) will include PbZn 2020: The 9th International Conference on Lead-Zinc Processing and Electrometallurgy 2020.
- Reserve a space for your company in the Exhibit Hall or become a sponsor of TMS2020 today. View exhibitor benefits, sponsorship options, and more in the Exhibitors & Sponsors section of the TMS2020 website today.

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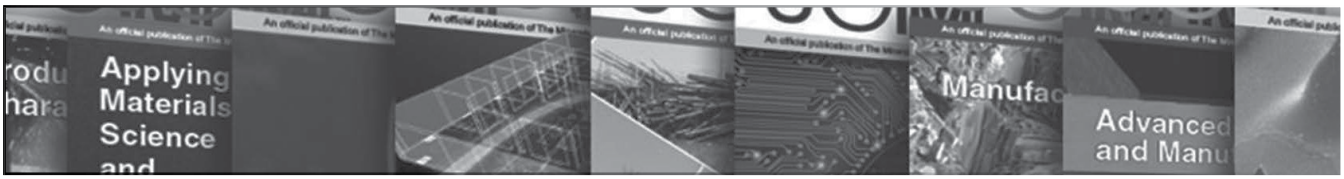
https://doi.org/10.1007/s11837-019-03414-x

call for papers

***JOM* is seeking contributions on the following topics for 2019 and 2020. For the full Editorial Calendar, along with author instructions, visit www.tms.org/EditorialCalendar.**



October 2019:
Manuscript Deadline: May 1, 2019

Topic: New Developments in Nanomechanical Methods
Scope: This special topic will focus on the advances used to measure mechanical properties of small-volume and low-dimensional materials, as well as bulk nanostructured materials. Of particular interest are new instrumentation, methods, and environmental control to evaluate mechanical behavior in terms of size effects, time scales, environmental testing, as well as in-situ experimental methods.
Guest Editors: Megan Cordill and Janelle Wharry
Sponsor: Nanomechanical Materials Behavior Committee

Topic: Microstructure Evolution During Deformation Processing
Scope: Processing-structure-properties-performance relationships can be created from the characterization data and, along with modeling, allow for the definition of material-specific process parameters to control the microstructural evolution and resulting material properties. Papers are invited that investigate these aspects of microstructural evolution during deformation processing.
Guest Editor: Daniel Coughlin
Sponsors: Shaping and Forming Committee and Advanced Characterization, Testing, and Simulation Committee

Topic: Progress in High-Entropy Alloys
Scope: The unique compositions and the resulting attractive properties of high-entropy alloys (HEAs) have stimulated growing research interest due to scientific curiosity and potential industrial applications. This special topic on high-entropy alloys invites contributions from authors working in the various fields of HEAs to disseminate the rapid progress in this fascinating and expanding class of advanced materials.
Guest Editors: Chuang Zhang, Michael C. Gao, and Shih-Kang Lin
Sponsor: Alloy Phases Committee

Topic: Modeling and Simulation of Composite Materials
Scope: This topic will highlight modeling and simulation currently used in advancing the understanding of the complex interactions and structure-property relationship in composite materials by ab-initio methods, atomistic methods, mesoscale simulations, finite element methods, and multi-scale modeling.
Guest Editors: Rakesh Behera, Dinesh Pinisetty, and Dung Luong
Sponsor: Composite Materials Committee

Topic: Mesoscale Materials Science: Experiments and Modeling
Scope: This topic invites contributions in the area of advanced mechanical testing, enhancements in computational approaches, and integration of experiments and modeling for engineering the evolution of mesoscopic structures and defects.
Guest Editors: Saurabh Puri and Amit Pandey
Sponsor: Invited

November 2019:
Manuscript Deadline: June 1, 2019

Topic: Advanced Characterization and Testing of Irradiated Materials
Scope: This topic focuses on the characterization and testing of radiation-affected materials through scanning and transmission electron microscopy, atom probe tomography, micro-mechanical testing, x-ray diffraction, etc.
Guest Editors: Dhriti Bhattacharyya, Fan Zhang, and Peter Hosemann
Sponsors: Advanced Characterization, Testing, and Simulation Committee and Nuclear Materials Committee

Topic: Solid Oxide Fuel Cells: Recent Scientific and Technological Advancements

Scope: Relevant topics include, but are not limited to, understanding and enhancement of the oxygen reduction reaction at the cathode; understanding and mitigation of chromium poisoning of cathodes; enhancing the stability, electrochemical activity, and sulfur tolerance of anodes; new materials and processing techniques for electrolytes; enhancing interfacial stability between electrodes and electrolyte; and advanced materials and coatings for interconnections and balance of plant.
Guest Editors: Soumendra Basu and Amit Pandey
Sponsor: Energy Conversion and Storage Committee

Topic: Crystal Orientation Dependence of Mechanical and Thermal Properties in Functional Nanomaterials

Scope: The emphasis of this special topic will be on the latest advances in the investigation and understanding of various crystal orientation phenomena toward functional nanomaterials design, and characterization in single-crystal, bicrystal, and polycrystalline metallic, ceramic, oxide, composite materials, etc. using theoretical, computational, and experimental methods.
Guest Editors: Ning Zhang and Chang-Yong Nam
Sponsor: Nanomaterials Committee

Topic: Progress with Lead-Free Solders

Scope: Pb-free solders are now in widespread use and can out-perform Pb-based materials in many applications. Despite this success, there is an ongoing need to develop next-generation interconnection materials for smaller joints that can operate in more extreme environments and that are more reliable. This topic covers recent advances in solder alloy design for harsh environments, new interconnection materials and bonding technologies, and advances in the understanding of electronics reliability.
Guest Editors: Chris Gourlay and Babak Arfaei
Sponsor: Electronic Packaging and Interconnection Materials Committee

Topic: Ceramic Materials for Nuclear Energy Applications

Scope: This topic covers experimental and computational studies of ceramics, both practical reactor materials and surrogate material, for nuclear energy research and applications. Papers of interest include, but are not limited to, fabrication, microstructure characterization, measurement and computation of properties, and degradation in operating conditions.
Guest Editors: Yongfeng Zhang and Xian-Ming Bai
Sponsor: Nuclear Materials Committee

December 2019:

Manuscript Deadline: July 1, 2019

Topic: Advances in Surface Engineering

Scope: This special topic aims to capture recent advances in processing, characterization, simulation/modeling, and applications related to surface engineering of materials. Areas of interest include surface protection from wear and corrosion, surface characterization techniques, surface alloying, and nanostructured surfaces.
Guest Editors: Tushar Borkar, Rajeev Gupta, Sandip Harimkar, and Mary Lyn Lim
Sponsor: Surface Engineering Committee

Topic: Aluminum: Shape Casting and Forming

Scope: This topic covers processes and manufacturing technologies to produce final shapes for aluminum applications.
Guest Editor: Dmitry Eskin
Sponsors: Aluminum Committee and Shaping and Forming Committee

Topic: Extraction and Recycling of Battery Materials

Scope: This topic covers the fundamentals and latest developments in battery recycling including lead acid, nickel-cadmium, nickel-metal-hydride, and lithium ion batteries. Papers discussing applications of primary processes for the treatment of battery materials are also welcome.
Guest Editors: Xiaofei Guan, Camille Fleuriault, and Joseph Grogan
Sponsors: Pyrometallurgy Committee and Recycling and Environmental Technologies Committee

Topic: Functional Nanomaterials for Energy Harvesting on a Flexible Substrate

Scope: The scope of this topic will address nanomaterials for energy harvesting on a flexible substrate. Specifically, recent advances in the fabrication, characterization, and synthesis of energy harvesting nanomaterials, including piezoelectric nanowires, nanofibers, and thin film, for flexible substrate will be covered.
Guest Editors: Jiyong Chang and Chang-Yong Nam
Sponsor: Nanomaterials Committee

January 2020:

Manuscript Deadline: August 1, 2019

Topic: Design, Development, Manufacturing, and Applications of Refractory Metals and Materials

Scope: This topic encompasses the latest advances in the design, development, manufacturing, and applications of refractory materials, including metals, alloys, carbides, nitrides and borides, and more. Papers are invited on topics including experimental and theoretical research of the process-microstructure-property relationship in refractory metals and materials.
Guest Editors: Ravi Enneti and Chai Ren
Sponsors: Surface Engineering Committee and Steels Committee

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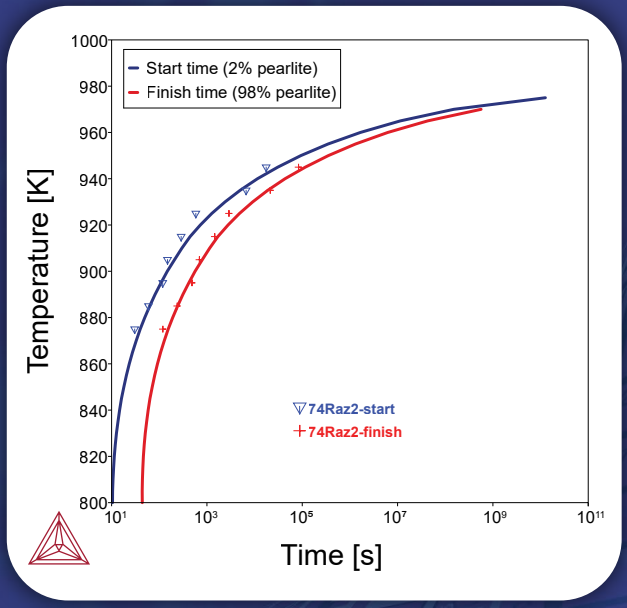
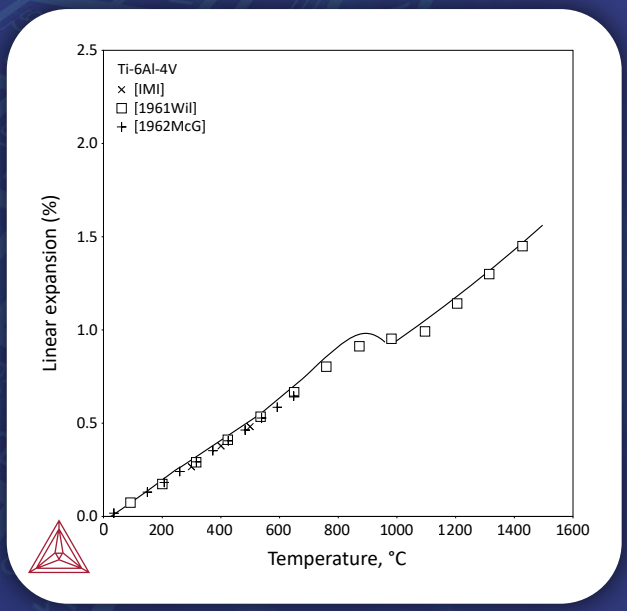


TTT diagram calculated using the new Steel Pearlite Model

Highlights of 2019a release:

- ✓ **New Martensite + Perlite Models -** calculate Ms and Mf temperatures and predict pearlite growth kinetics
- ✓ **New TC-Python API -** link Thermo-Calc, DICTRA and TC-PRISMA to other packages using the easy to learn Python language
- ✓ **New Databases TCTI2, TCNI9, TCAL6 -** Major updates to the Titanium, Nickel and Aluminum thermodynamic databases and their corresponding mobility databases



Linear expansion rate for Ti-6Al-4V

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