

JOM

FEBRUARY 2025
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// An official publication of The Minerals, Metals & Materials Society



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February 2025 Guest Editors

Advances in Surface Engineering

Tushar Borkar, Cleveland State University; Bharat Jasthi, South Dakota School of Mines and Technology; Arif Mubarok, PPG

High Temperature Electrochemistry for Energy and Sustainability

Soumendra Basu, Boston University; Srikanth Gopalan, Boston University

About the Cover

The five cover images represent the five technical divisions of The Minerals, Metals & Materials Society: Extraction & Processing, Functional Materials, Light Metals, Materials Processing & Manufacturing, and Structural Materials. In representing the five technical divisions, *JOM: The Journal* balances the interests of its members and authors in the monthly topics and articles it publishes.

About JOM:

The scope of *JOM* (ISSN 1047-4838) encompasses publicizing news about TMS and its members and stakeholder communities and publishing high-quality 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 application of materials.

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TABLE OF CONTENTS

JOM Volume 77
Number 2
February 2025

FEATURES

- 7:** TMS Welcomes New Members in October 2024
- 10:** A Sneak Peek at the TMS2025 Proceedings
Volumes: Kaitlin Calva
- 14:** Opportunities for Honors and Recognition: When and How to Submit Nominations for TMS Awards:
Jillian Schultz and Kelly Zappas

DEPARTMENTS

- 3:** In the Final Analysis: James J. Robinson
- 4:** JOM Technical Topics
- 6:** TMS Member News
- 17:** TMS Meeting Headlines



IN THE FINAL ANALYSIS

"Technology has progressed to such an extent that it now depends on electronics that were largely unimaginable decades ago but whose viability and dependability are crucial. I often wonder if we have not overextended our dependence on technology of this kind, which leads to an unintended vulnerability."

—Ronald M. Latanision, Editor in Chief of *The Bridge*

Last summer, *The Bridge* (the quarterly publication of the National Academy of Engineering) delivered an impressive issue on critical materials. Not surprising owing to an excellent list of contributors that includes several TMS members and a pair of TMS Past Presidents. Certainly, the use and availability of critical materials is one of the leading hand-wringing issues of our times. Just in terms of policy, as of late 2024, the U.S. Congress was considering such bills as the "Critical Mineral Consistency Act of 2024," the "Securing America's Midstream Critical Materials Processing Act of 2024," the "Critical Materials Future Act of 2024," the "Recognizing the Importance of Critical Minerals in Healthcare Act of 2023," the "Critical Minerals Security Act of 2024," the "Intergovernmental Critical Minerals Task Force Act," and the "National Critical Minerals Council Act." There are more.

Before editorializing further, let us first have a common understanding of often misused critical terminology. *Rare earth elements* are the 15 lanthanides plus scandium and yttrium. *Critical materials* are metals, alloys, and compounds that are essential to a given country's economy and/or security and are at significant risk of supply-chain disruption. *Critical minerals* are naturally occurring inorganic substances that are, again, economically important and at high-risk of supply disruption. All rare earth elements count as critical materials *and* as critical minerals. Similarly, critical minerals are a subset of critical materials. Phew!

Putting the "c" and "r" in *critical* are China and Russia as they frequently represent the first links in many essential and risky supply chains. As I write, China has announced that it is banning the export of several critical materials to the U.S., including gallium, germanium, antimony, tungsten, and others. This action was in response to new U.S. restrictions on Chinese access to advanced semiconductors.

Is the critical materials user community fated to an endless battering by the ill-winds of trade wars? From the U.S. perspective, I recently read with interest seven recommendations being made to the second Trump Administration and the 119th Congress toward building U.S. critical minerals security. The recommendations were developed by a Washington, D.C., think tank: The Center for Strategic and International Studies, which describes itself as "a bipartisan, nonprofit policy research organization dedicated to advancing practical ideas to address the world's greatest challenges." There are plenty of those.

Most of the recommendations are big lifts, but not the typical big lifts that we think of in TMS terms. There's no "improve extractive processing efficiency," no "find substitutes for gallium arsenide," and no "redouble recycling and sustainability efforts." Instead, it's "improve business relationships with other countries" and "put capital into other countries' mining businesses" and "streamline regulation so that refining can return to the U.S." It is all policy rather than technology. It is also a good reminder that our TMS community is ever vulnerable to formidable macro-factors such as funding re-prioritization, the global economy, and geo-politics. That said, such opportunities for big lifts translate into great platforms for innovation. I wonder what is coming next that might have been unimaginable just a few years earlier.



James J. Robinson
Executive Director



"Is the critical materials user community fated to an endless battering by the ill-winds of trade wars?"

Find peer-reviewed technical articles covering the full range of minerals, metals, and materials science and engineering in the February issue of *JOM: The Journal*. Each issue features several technical topics presenting a series of related articles compiled by guest editors. A preview of February technical topics and articles are listed below. TMS members can log in to www.tms.org/Journals for full access to technical articles from *JOM: The Journal* and additional TMS journals.

Below is a sample of articles that will appear in the February issue, based on information available at press time. For the most up-to-date article listing, visit www.tms.org/JOM.

// FEBRUARY 2025

Advances in Surface Engineering

Editors: Tushar Borkar, Cleveland State University; Bharat Jasthi, South Dakota School of Mines and Technology; Arif Mubarok, PPG

"Design of a Ti-Zr-P-Si Chromium-Free Passivation Composite Film with High Corrosion Resistance and Eco-Friendliness on Tinplate," **Siyu Gao**, et al.

"Optimized Laser Surface Remelting of 3D-Printed Ti6Al4V Manufactured Through Electron Beam Melting," **Yi-Cheng Chen**, et al.

"Influence of Titanium-Coated Diamond Content on the Microstructure and Wear Resistance of Ni60A Laser Cladding Coatings," **Xu Huang**, et al.

"Microstructure and Mechanical Properties of Nanocrystalline CoCrCuFeNi High-Entropy Alloy Coating Manufactured by Atmospheric Plasma Spraying," **Lihui Tian**, et al.

"Influence of Electromagnetic Effect on the Microstructure and Properties of Cobalt-Based Alloys by Laser Metal Deposition," **Kang Qi**, et al.

"Enhanced Pseudocapacitive Performance of Electrochemically Deposited -NiMoO₄ Nanoworms on 3D Reduced Graphene Oxide Scaffold," **Mahdi Kazazi**, et al.

"Enhanced Surface Properties of 1080 Eutectoid Steel by Cathodic Arc Plasma TiN Deposition," **L.P. Silva**, et al.

"Performance Study of MCrAlY Flame Sprayed Coating on AISI 304 Stainless Steel of Microstructure and Sliding Wear at High Temperatures," **Abou Bakr Elshalakany**, et al.

"Influence of Sputtering DC Sputtering Power on the Surface Evolution of Ti Thin Films: A Fractal Description," **F.M. Mwema**, et al.

"Numerical Study of the Thermodynamic Behavior and Wear on the Surface of Hot-Rolling Descaling Roll," **Guoxin Zhang**, et al.

"Enhancing Tribological Performance of SS-316 Through Microwave Cladding of NiCr-Cr₃C₂ Composite: Fabrication, Characterization, and Optimization," **Paramjit Singh**, et al.

"Multi-energy Field-Assisted Water Jet Strengthening 2519a Dynamic Impact Behavior and High Cycle Fatigue Enhancement Mechanism," **Ping Zhang**, et al.

"Process and Performance Study of FeMnSi Shape-Memory Alloy Coating Prepared by Laser Alloying on Stainless Steel Surface," **Yubin Sun**, et al.

"Enhancing Wear Resistance of AISI 1045 Steel through Duplex Plasma Treatment with Vanadium Cage," **Maxwell Santana Libório**, et al.

"Effect of Laser Parameters on the Microstructure and Properties of CoCrFeNiMn High Entropy Alloy Coatings," **Xinlong Zhang**, et al.

"Investigation of Protective Coatings for Reducing High-Temperature Oxidation of Steels," **Manoj Mugale**, et al.

"A Review of External Field-Enhanced Metal Electrodeposition: Mechanism and Applications," **Zhen Zhong**, et al.

High Temperature Electrochemistry for Energy and Sustainability

Editors: Soumendra Basu, Boston University; Srikanth Gopalan, Boston University

"Study on the Hydrogen Evolution Performance of Ni(OH)₂/NF Nanoflowers as Efficient Electrocatalysts,"
Qian Li, et al.

"Facile Electrosynthesis of Ti₃AlC₂ and Its Derived Porous Carbon in Molten Salt," **Zhenqiang Jiang**, et al.

"Sb³⁺-Doped and Carbon Nanotubes-Wrapped Li₄Ti₅O₁₂ with Large-Capacity at High-Rate,"
Huan Kuang, et al.

"Effects of Ni-Doping in CuMn₂O₄ Spinel Coatings for Interconnects in Solid Oxide Fuel Cells,"
Zhikuan Zhu, et al.

"Phase Equilibria and Thermodynamic Properties of Compounds in the Ag₂FeS₂-Ga₂S₃ Cross-Section of the Ag-Fe-Ga-S System Determined by the EMF Method," **Mykola Moroz**, et al.

Contribute Your Work

View the *JOM* Editorial Calendar to see upcoming topics and learn how to submit your own article for *JOM: The Journal*. Visit www.tms.org/EditorialCalendar.

View More Technical Articles

JOM regularly publishes additional articles that fit within the scope of the journal, but not within the scope of a particular technical topic. Read these in the "Technical Articles" section of *JOM* on Springer.



TMS MEMBER NEWS

Share the Good News!

Contact Kelly Zappas, *JOM: The Magazine* editor, at kzappas@tms.org to share your professional accomplishments. Please note that only news submitted by current TMS members will be considered.

Mark Hersam Talks Sustainable AI at TEDxChicago



TEDxChicago 2024 included TMS member **Mark C. Hersam** as a featured speaker at its September 2024 event. For this independently organized TED event centered around the theme "Lighting the Way," Hersam focused his TEDxChicago talk on the work his team at Northwestern University is

doing in sustainable artificial intelligence (AI). Hersam believes the solution for a more energy efficient AI platform lies in nanotechnology and, in collaboration

with neurobiologists, neuromorphic computing. "As a nanotechnologist for the last 25 years, I strongly believe that by understanding matter at the shortest of length-scales, we can find solutions to the world's largest problems," he said in his presentation.

Hersam is the Walter P. Murphy Professor and chair of the Department of Materials Science and Engineering at Northwestern University. He is also director of the university's Materials Research Center.

A TMS member since 2002, Hersam is a recipient of the AIME Robert Lansing Hardy Award. He is a member of the National Academy of Inventors, the National Academy of Engineering, and the American Academy of Arts and Sciences.

The Results Are In: Material Advantage 2024 Fall Membership Drive



Congratulations to the Indian Institute of Technology, Kanpur (IITK) Material Advantage (MA) Chapter for winning the Most Students Recruited Award during the annual MA Fall Membership Challenge. The IITK chapter hosted 15 events during the drive, which took place from September 16 to October 21, 2024, and resulted in 36 new members—a 51.43% increase in their membership. This award also earned the chapter a \$1,000 prize.

Students at the Texas A&M University (TAMU) MA Chapter were also rewarded for their efforts with the Most Creative Recruitment Strategies Award. Their chapter saw 15.71% growth in membership and earned a \$500 prize.

In total, 55 new members joined MA between four different chapters during the 2024 Fall Membership Challenge. Material Advantage is a partner program between TMS, the American Ceramic Society (ACerS), ASM International, and the Association for Iron & Steel Technology (AIST) that allows students to access the technical resources, scholarship and grant monies, and networking opportunities of four materials-related societies for a single membership fee. To learn more about MA, visit www.materialadvantage.org.



Students at the Indian Institute of Technology, Kanpur Material Advantage Chapter gather at a recruitment event held in September 2024.



Students at the Texas A&M University Material Advantage Chapter hosted a number of recruitment events in September and October 2024.

TMS Welcomes New Members in October 2024

The TMS Board of Directors approved professional membership for the following individuals at its October 2024 meeting. Please join us in congratulating them and welcoming them to all the privileges and benefits of TMS membership.

Approved October 2024

Akama, Daichi; Mitsubishi Heavy Industries, Ltd., Japan	Burak, David M.; GE Aerospace, United States	Derosa, Pedro A.; Louisiana Tech University, United States
Akanbi, Olatunde David; Case Western Reserve University, United States	Büscher, Markus; OTTO FUCHS KG, Germany	Devine, Bryce D.; Lockheed Martin, United States
Al-Buainain, Maryam; Northwestern University, United States	Byrnes, Allison; United States	Diaz, Fabian; SMS Group, Germany
Anahid, Masoud; United States	Cano, Lawrence; University of Texas Rio Grande Valley, United States	Dunn, Mick; United States
Anderson, Kenneth R.; Naval Nuclear Laboratory, United States	Cervellon, Alice; Safran Aircraft Engines, France	Eby, David; Design Research Engineering, United States
Anderson, Mark; Wyman-Gordon, United States	Chakrapani, Sunil; Michigan State University, United States	Egan, Ashton J.; Friedrich-Alexander-Universität (FAU) Erlangen-Nürnberg, Germany
Annadanam, Rayaprolu G. Sreekar; United States	Chalasanani, Dharmendra; Morgan Advanced Materials, United States	Elagab, Abrar; CBMM, United States
Atalay Kalsen, Tugba Selcen; Necmettin Erbakan University, Turkey	Chauhan, Ankur; Indian Institute of Science, India	Fischer, Nathan L.; Spirit AeroSystems, United States
Becker, Dylan; GE Aerospace, United States	Chesnes, Rich; GE Aerospace, United States	Fucinaro, Vince; Engineering Systems, Inc., United States
Bennett, Justin; GE Aviation, United States	Chien, TeYu; University of Wyoming, United States	Futoma, Magdalena; MTU Aero Engines Polska, Poland
Beridon, Margie D.; Acta Materialia, Inc., United States	Cho, James; United States	Garcia-Mendez, Regina; Johns Hopkins University, United States
Betremieux, Sylvie; DCX Chrome, France	Coyne-Grell, Angus; University of Strathclyde, United Kingdom	Geißler, Thomas; voestalpine BÖHLER Aerospace GmbH & Co KG, Austria
Bezold, Andreas; The Ohio State University, United States	Dash, Soumya Sobhan; University of Toronto, Canada	Gettinger, Christian; Voestalpine, Austria
Bishop, Catherine M.; University of Canterbury, New Zealand	Datta, Kumar S.; Chromalloy, United States	Goken, Mathias; University Erlangen-Nurnberg, Germany
Borggren, Ulrika; Alleima EMEA AB, Sweden	De Souza Machado, Tessa; Trane Technologies, United States	Gonzalez Mendez, Jose L.; Carpenter Technology, United States
Breneman, Ryan; Pratt & Whitney, United States	Delacruz, Christian; United States	Grodent, Baptiste; DCX Chrome, France
	Delshad, Pooya; PG&E, United States	

Gustinvil, Raden; Savannah River National Laboratory, United States	Kim, Dongyoung; Doosan Enerbility, South Korea	March-Rico, Jose; Fluor Marine Propulsion, United States
Halonen, Andrew; Amatrium, Inc., United States	Kim, Jin Hyeok; South Korea	Mathew, Reshma Saira; GE Aerospace, India
Han, Kwangsik; Doosan Enerbility, South Korea	Kim, Youngjun; Doosan Enerbility, South Korea	Matlage, Paul; Howmet Aerospace, United States
Hanlon, Timothy; GE Global Research, United States	Kitaguchi, Hiroto; University of Birmingham, United States	May, Joseph; Eutectix, LLC, United States
Hayashi, Shigenari; Hokkaido University, Japan	Kobayashi, Daisuke; Chubu Electric Power, Japan	McCracken, David; Canada
Hinshaw, Andrew L.; Howmet Aerospace, United States	Kuipers, Justin; Liburdi Turbine Services, Canada	McKerns, Michael; The UQ Foundation, United States
Howell, Joseph; ATI Specialty Materials, United States	Kumar, Khagesh; Argonne National Laboratory, United States	Mendoza, Alvaro G.; Mendoza Metallurgy, United States
Hryha, Eduard; Chalmers University of Technology, Sweden	Kurchin, Rachel C.; Carnegie Mellon University, United States	Middleswarth, Melissa; United States
Hu, Jianian; Jiangnan University, China	Kwon, Hyukjoon; South Korea	Miller, Joshua; United States
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Table of Contents

Novotnak, David; Boston Metal, United States	Rose, Ian; Underwriters Laboratories Inc, United States	Texier, Damien; Clément Ader Institute, France
O'Connell, Will; ATI Forged Products, United States	Roth, Melissa; Simpson Gumpertz & Heger, United States	Thigpen, Andrew; United States
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Pantoja Salgado, Gabriela; Bolivia	Sadrabadi, Peiman; Siemens Energy, United States	Trojan, Andrzej; Consolidated Precision Products Poland sp. O.o., Poland
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Park, Sanghun; United States	Shrestha, Triratna; University of Idaho, United States	Vaidyanathan, Ranji; Oklahoma State University, United States
Parkinson, Graham; United States	Sidor, Dorota; Consolidated Precision Products Poland sp. O.o., Poland	Van Lue, Jim D.; PRCO America Inc., United States
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Roe, Justin; United States	Teruya, Julio Uza; National Engineering University, Peru	Zhang, Jianqiang; UNSW Australia, Australia
Rogoff, Erik; ATI Specialty Materials, United States		

A SNEAK PEEK AT THE TMS2025 PROCEEDINGS VOLUMES

Kaitlin Calva



THE WORLD COMES HERE. TMS2025 154th Annual Meeting & Exhibition

Registrants of the TMS 2025 Annual Meeting & Exhibition (TMS2025) will receive free, online access to the meeting's proceedings publications as part of their registration fee. Those who are unable to attend TMS2025 can still purchase proceedings volumes, as well as individual papers, through the TMS Bookstore at www.tms.org/Bookstore. All 12 publications will be available by the start of the meeting, which is scheduled to take place March 23–27, in Las Vegas, Nevada.

TMS members receive a 40% discount on TMS proceedings publications and a 20% discount on TMS non-proceedings titles published with Springer. To receive the appropriate discount on the books described in this article, visit www.tms.org/Bookstore, log in to see the discount codes in the text above the product listing, and enter the proceedings code during checkout on the Springer website.

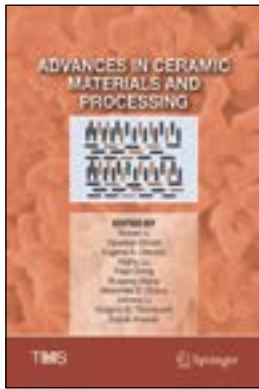
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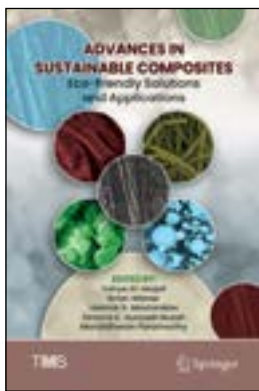
Advances in Ceramic Materials and Processing



This collection emphasizes the advances of powder and ceramic/glass materials in fundamental research, technology development, and industrial applications. Ceramic materials science covers the science and technology of creating objects from inorganic, non-metallic materials and includes design, synthesis, and fabrication of ceramics, glasses, advanced

concretes, and ceramic-metal composites. Topics include but are not limited to: silicates, oxides, and non-oxide ceramics and glasses; design and control of ceramic microstructure and properties; catalyst and catalyst support materials; high entropy ceramics; bioceramics, electronics, magnetic ceramics, and applications; and ceramics used for extreme environment.

Advances in Sustainable Composites: Eco-friendly Solutions and Applications



This volume covers innovations in the field of composite materials with a specific focus on eco-friendly and environmentally sustainable systems. All composite fields are explored, including polymer, metal, and ceramic matrix composites with an emphasis on sourcing raw materials in a sustainable way as well as the development of composite

materials for environmental sustainability. Topics will include the development of new materials for structural applications, reduction in energy consumption, and increased component life along with discussions of novel methods to reuse existing materials. Additional topics include but are not limited to: naturally sourced materials feedstock; recycled material feedstock; application of composite for reduced carbon footprint; development of novel materials to repurpose waste from other areas; eco-nanomaterials/nanocomposites; and selected rapid prototyping.

Characterization of Minerals, Metals, and Materials 2025: In-Situ Characterization Techniques



This collection focuses on the advancements of characterization of minerals, metals, and materials and the applications of characterization results on the processing of these materials. Advanced characterization methods, techniques, and new instruments are emphasized. Areas of interest include but are not limited to: extraction and processing of

various types of minerals, process-structure-property relationship of metal alloys, glasses, ceramics, polymers, composites, semiconductors, and carbon using functional and structural materials; novel methods and techniques for characterizing materials across a spectrum of systems and practices; and characterization of structural, morphological, and topographical natures of materials at micro- and nano-scales.

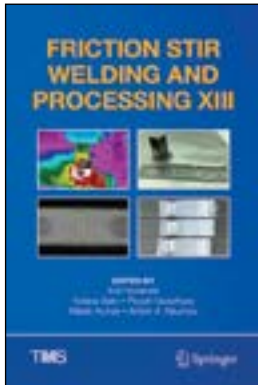
Energy Technology 2025: Carbon Dioxide Management and Other Technologies



This collection is focused on industrial energy sustainability and carbon dioxide (CO₂) management, including processes that improve energy efficiency and reduce or eliminate industrial greenhouse gas (GHG) emissions. Topics address technology areas such as clean energy technologies, innovative beneficiation, smelting technologies, and

process intensification, as well as CO₂ capture and conversion for industrial applications. This proceedings volume features research and development papers on sustainable energy ecosystems, life cycle assessments, energy-efficient technologies in extractive metallurgy, and strategies to improve energy efficiency while minimizing GHG emissions.

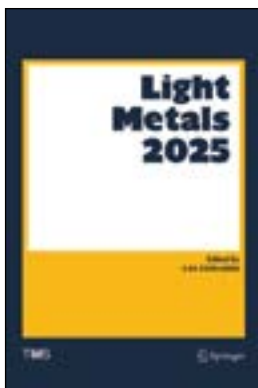
Friction Stir Welding and Processing XIII



This volume presents fundamentals and the current status of friction stir welding (FSW) and solid-state friction stir processing of materials. It also provides researchers and engineers with an opportunity to review the current status of friction stir-related processes and discuss future possibilities. Contributions cover various aspects of FSW and processing, including

their derivative technologies. Topics include but are not limited to: additive friction stir technologies; friction stir extrusion technologies; high temperature applications; industrial applications; friction stir spot technologies; dissimilar alloys and materials; lightweight alloys; and simulation, characterization, and non-destructive examination techniques.

Light Metals 2025



The Light Metals symposia at the TMS Annual Meeting & Exhibition present the most recent developments, discoveries, and practices in 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 2025

collection includes contributions from the following symposia: Alumina & Bauxite; Aluminum Alloys: Development and Manufacturing; Aluminum Reduction Technology; Decarbonization and Sustainability in Aluminum Primary Processing; Joint Session of Aluminum Reduction, Electrode Technology, and REWAS 2025; Electrode Technology for Aluminum Production; Melt Processing, Casting, and Recycling; Recycling and Sustainability in Cast Shop Technology: Joint Session with REWAS 2025; and Scandium Extraction and Use in Aluminum Alloys.

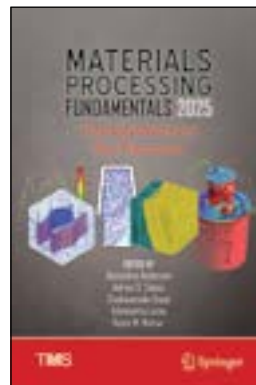
Magnesium Technology 2025



The Magnesium Technology symposium at the TMS Annual Meeting & Exhibition 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 and recycling. Moreover, papers explore everything from basic research findings to

industrialization. *Magnesium Technology 2025* is a definitive reference that covers a broad spectrum of current topics, including novel extraction techniques; primary production; integrated computational materials engineering; thermodynamics and kinetics; cast products and processing; forming, joining, and machining; corrosion and surface finishing; dynamic response; degradation and biomedical applications; additive manufacturing of powders; recycling, ecological issues, and life cycle analysis; and more.

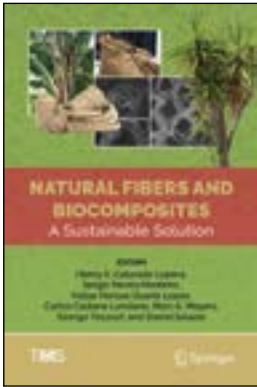
Materials Processing Fundamentals 2025: Thermodynamics and Rate Phenomena



This collection covers first principle and applied studies of thermodynamics and rate-governed phenomena, including reaction kinetics and meso- and macro-scale transport of mass, momentum, and energy throughout the sequence of processing operations. Topics represented include but are not limited to: thermodynamic modeling for the optimization

of alloy solutions, slag compositions, and other types of materials; mass and energy balance simulations of material processing systems using software such as FactSage, MPE, HSC-SIM, and METSIM; experimental and numerical studies on kinetic rate theories pertaining to crucial material processes such as chemical reactions, diffusion, nucleation and phase transformations, and solidification; and more.

Natural Fibers and Biocomposites: A Sustainable Solution



Natural fibers' abundance, excellent properties, biodegradability, and low cost make this renewable resource a green alternative to synthetic fibers for composite material reinforcement. The need to create sustainable solutions has promoted applications in sports, transportation, armor, medicine, infrastructure, construction and building

materials, and architecture. This collection promotes the use of natural materials and their composites as a possible strategy to increase environmental sustainability, as well as to study materials fundamentals for new applications. Topics include but are not limited to: properties and fundamentals of natural fibers; surface modifications to improve properties; biocomposite materials and potential contributions to sustainability; and durability, dynamic behavior, adhesion, impact response, mechanical, thermal, and other properties related to natural materials and their composites.

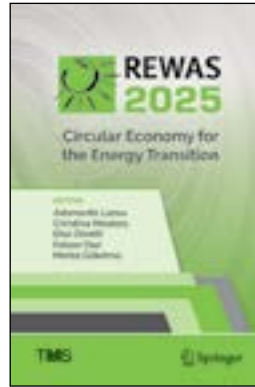
Rare Metal Technology 2025



This volume presents papers from a symposium on extraction of rare metals from primary and secondary materials and residues as well as rare extraction processing techniques used in metal production. The collection covers the extraction of less common or minor metals and includes rare metals of low-tonnage sales compared to high-tonnage metals. Rare

metal processing covers biometallurgy, hydrometallurgy, and electrometallurgy while novel high-temperature processes such as microwave heating, solar-thermal reaction synthesis, and cold crucible synthesis of rare metals are also addressed. Also included in this collection is the design and extraction equipment used in these processes from suppliers as well as laboratory and pilot plant studies.

REWAS 2025: Circular Economy for the Energy Transition



The 8th installment of the REWAS conference series held at the TMS Annual Meeting & Exhibition focuses on circular economy for the energy transition. The papers in this volume explore the latest technical and societal developments enabling sustainability within our global economy with an emphasis on recycling and waste management. The 2025

collection includes contributions from the following symposia: Automation and Digitization in Recycling Processes; Sustainable End-of-Life Management and Recycling Solutions for Batteries, Wind Turbines, and Photovoltaics; and Sustainable Practices in Strategic and Critical Raw Materials: Exploring Supply Chain Resilience and Recycling Innovations.

TMS 2025 154th Annual Meeting & Exhibition Supplemental Proceedings



This collection features contributions that represent 56 symposia from the meeting.

Kaitlin Calva is an independent contributor and a former Editor of JOM: The Magazine.

OPPORTUNITIES FOR HONORS AND RECOGNITION: WHEN AND HOW TO SUBMIT NOMINATIONS FOR TMS AWARDS

Jillian Schultz and Kelly Zappas

The TMS Honors and Awards Program serves several purposes for the TMS community. It offers valuable recognition to help scientists and engineers at all stages of their careers and in all technology areas to gain the notice of their peers. It gives members respected accomplishments to add to their resumes. But beyond these personal benefits, the TMS Honors and Awards Program primarily exists to recognize the contributions that our members make to the good of the profession and for the benefit of their fellow scientists and engineers. The program shines a light on the very best aspects of our community.

All TMS members are invited to contribute to this mission by helping to recognize the individuals who move our field forward. Below is a complete listing of awards offered by TMS and the deadlines to submit a nomination, self-nomination, or application. You can learn more about each of these awards and how to apply at www.tms.org/Awards.

**Deadline for Submissions:
March 15**

Student Awards

- Acta Materialia, Inc. Undergraduate Scholarship
- AIME Henry DeWitt Smith Scholarship
- Extraction & Processing Division Scholarship
- Functional Materials Division Gilbert Chin Scholarship
- TMS International Symposium on Superalloys Scholarship
- Kaufman CALPHAD Scholarship
- Light Metals Division Scholarship
- Materials Processing & Manufacturing Division Scholarship
- Structural Materials Division Scholarship
- TMS Best Paper Contest—Graduate
- TMS Best Paper Contest—Undergraduate

**Deadline for Submissions:
April 1**

Society Awards

- Acta Materialia Gold Medal Award Nominee
- AIME Champion H. Mathewson Award
- AIME Honorary Membership Award
- Alexander Scott Distinguished Service Award
- Brimacombe Medalist
- Bruce Chalmers Award
- Cyril Stanley Smith Award
- Ellen Swallow Richards Diversity Award
- Fellow Award
- Frank Crossley Diversity Award
- Institute of Metals/Robert Franklin Mehl Award
- Julia and Johannes Weertman Educator Award
- Leadership Award
- Morris Cohen Award
- Oleg D. Sherby Award
- Sadoway Materials Innovation and Advocacy Award
- Research to Industrial Practice Award
- William D. Nix Award
- William Hume-Rothery Award
- John Bardeen Award

Division Awards

- EPD Distinguished Lecturer Award
- EPD Distinguished Service Award
- EPD Science Award
- EPD Technology Award
- EPD/LMD *Journal of Sustainable Metallurgy* Best Paper Award
- FMD Distinguished Scientist/Engineer Award
- FMD Distinguished Service Award
- LMD Distinguished Service Award
- LMD Technology Award
- MPMD Distinguished Scientist/Engineer Award
- MPMD Distinguished Service Award
- MPMD ICME Industry Implementation Award
- Nagy El-Kaddah Award for Best Paper in MHD in Material Processing
- SMD Distinguished Scientist/Engineer Award
- SMD Distinguished Service Award

Young Professionals Awards

- AIME Robert Lansing Hardy Award
- Early Career Faculty Fellow Award
- Frontiers of Materials Award
- Young Innovator in the Materials Science of Additive Manufacturing Award

**Deadline for Submission:
May 15**

Young Professionals Award

- Emerging Leaders Alliance Program

**Deadline for Submission:
June 1**

Division Award

- TMS/SME/AIME James Douglas Gold Medal Award

Types of Awards Offered by TMS

Society Awards represent the whole Society and draw from many different technical interest areas. These awards include some of the highest honors offered to TMS members and cover a wide range of accomplishments. For awards sponsored by other organizations—like Acta Materialia and the American Institute of Mining, Metallurgical, and Petroleum Engineers (AIME)—TMS and other societies nominate qualified members to be considered for these awards. When TMS members are selected as recipients by these partner societies, they can accept their awards at TMS meetings.

Division Awards are presented through the five TMS technical divisions: Extraction & Processing Division (EPD); Functional Materials Division (FMD); Light Metals Division (LMD); Materials Processing & Manufacturing Division (MPMD); and Structural Materials Division (SMD). Division awards focus on more specific technology areas than Society awards.

Young Professionals Awards are designed to support the professional growth and leadership development of TMS members in the early years of their career.

Student Awards include scholarships, travel grants, and contests sponsored by each of the five TMS technical divisions. Awards are available for both graduate and undergraduate students.

**Deadline for Submission:
June 15**

Student Award

- Student Travel Grants to MS&T

**Deadline for Submission:
August 15**

Young Professionals Awards

- EPD Young Leaders Professional Development Award
- FMD Young Leaders Professional Development Award
- LMD Young Leaders Professional Development Award
- MPMD Young Leaders Professional Development Award
- SMD Young Leaders Professional Development Award
- Young Leaders International Scholar—Federation of European Materials Societies (FEMS)
- Young Leaders International Scholar—Japan Institute of Metals and Materials Award (JIMM)
- Young Leaders International Scholar—Korean Institute of Metals and Materials (KIM)

**Deadline for Submission:
September 1**

Society Award

- TMS/ASM Joint Distinguished Lectureship in Materials and Society Award

**Deadline for Submission:
October 15**

Division Award

- FMD *Journal of Electronic Materials* Best Paper Award

**Deadline for Submission:
November 15**

Student Award

- Student Travel Grants to TMS Annual Meeting

**Deadline for Submissions:
November 30**

Other Awards

- TMS/AIST John F. Elliott Lectureship Award (administered by the Association for Iron & Steel Technology [AIST])

**Deadline for Submissions:
December 31**

Other Awards

- Brimacombe Prize (awarded in alternate years through the Brimacombe Prize Selection Committee)



TMS MEETING HEADLINES

Meeting information is current as of November 25, 2024. For the most recent updates on TMS-sponsored events, visit www.tms.org/Meetings.

TMS 2025 Annual Meeting & Exhibition (TMS2025)



March 23–27, 2025
Las Vegas, Nevada, USA

Housing Deadline: February 24, 2025

Join your colleagues from nearly 70 nations at the meeting that the global minerals, metals, and materials community calls home.

www.tms.org/TMS2025

TMS Specialty Congress 2025



June 15–19, 2025
Anaheim, California, USA

Discount Registration Deadline: April 30, 2025

The 8th World Congress on Integrated Computational Materials Engineering (ICME 2025), co-located at TMS Specialty Congress 2025, serves as a pivotal platform uniting leading researchers, practitioners, and stakeholders to exchange cutting-edge knowledge and advancements in the discipline.

www.tms.org/SpecialtyCongress2025

TMS Fall Meeting 2025 at Materials Science & Technology (MS&T25)



September 28–
October 1, 2025
Columbus, Ohio, USA

Abstract Submission Deadline: May 1, 2025

TMS presents robust programming, networking and social activities, and professional development events tailored to its members' interests within the broader structure of the MS&T conference series, giving members an opportunity to experience both their TMS community and the resources of all the MS&T partnering societies.

www.tms.org/TMSFall2025

OTHER MEETINGS OF NOTE



Extraction 2025 Meeting & Exhibition (Extraction 2025)

November 16–22, 2025
Phoenix, Arizona, USA

www.extractionmeeting.org/Extraction2025



Materials in Nuclear Energy Systems 2025 (MiNES 2025)

December 7–11, 2025
Cleveland, Ohio, USA

www.tms.org/MiNES2025



TMS 2026 Annual Meeting & Exhibition (TMS2026)

March 15–19, 2026
San Diego, California, USA

www.tms.org/TMS2026

CO-SPONSORED MEETINGS

Offshore Technology Conference (OTC) 2025

May 5–8, 2025
Houston, Texas, USA
Co-sponsored by TMS

OTC Brasil 2025

October 28–30, 2025
Rio de Janeiro, Brazil
Co-sponsored by TMS

PRICM 12

August 9–13, 2026
Gold Coast, Australia
Co-sponsored by TMS

THE WORLD COMES HERE.

TMS 2025

154th Annual Meeting & Exhibition

March 23–27, 2025

MGM Grand Las Vegas Hotel & Casino

Las Vegas, Nevada, USA

#TMSAnnualMeeting | www.tms.org/TMS2025



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Your registration includes access to more than 4,000 technical presentations, a three-day exhibit pass, workshops and short courses, and more.

BOOK YOUR ROOM

Reserve your room at the MGM Grand Las Vegas Hotel & Casino, the venue for all technical sessions, exhibits, networking events, and other activities at the TMS 2025 Annual Meeting & Exhibition.

REQUEST YOUR TRAVEL VISA

If you require a visa to travel to TMS2025, please begin the application process now. You can request a visa invitation letter through the TMS2025 website.



**FEATURING
CO-LOCATED
EVENTS:**

DIVERSITY (DMMMS)
IN THE MINERALS, METALS, AND MATERIALS PROFESSIONS

 **REWAS
2025**

Scan the QR code or visit:
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SUBMIT AN ABSTRACT

Abstracts Due May 1, 2025

TMS FALL 2025

@MS&T
MATERIALS SCIENCE & TECHNOLOGY

September 28–October 1, 2025 | Columbus, Ohio | #TMSFallMeeting

Join your TMS colleagues for the
TMS Fall Meeting 2025 at
Materials Science & Technology.

Submit your work to one of 35 TMS-sponsored symposia
planned in the following subject areas:

- Additive Manufacturing
- Artificial Intelligence
- Biomaterials
- Ceramic and Glass Materials
- Fundamentals and Characterization
- Iron and Steel (Ferrous Alloys)
- Lightweight Alloys
- Materials-Environment Interactions
- Nuclear Energy
- Processing and Modeling
- Sustainability, Energy, and the Environment
- Special Topics



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