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About the Cover

Tom Battle, extractive metallurgy consultant, was officially installed as the 2020 TMS President at the TMS 2020 Annual Meeting & Exhibition in February and shared his plans for the future of the Society in his first TMS Presidential Perspective in the May *JOM* Magazine. The background image on this cover is an electric arc furnace and metal foundry at a steel melting plant, reflecting Battle's 25-year career in industry and involvement in TMS's Extraction & Processing Division.



Advancing Development and Application of Superalloys High Temperature Alloys Committee

Martin Detrois, National Energy Technology Laboratory

Biodegradable Materials for Medical Applications Invited

Jaroslaw Drelich, Michigan Technological University Ehsan Mostaed, Michigan Technological University Malgorzata Sikora-Jasinska, Michigan Technological University

Heat Transfer Utilization in Pyrometallurgy

Pyrometallurgy Committee Camille Fleuriault, Gopher Resource Joseph Grogan, Gopher Resource



Hydrogen Effects on Material Performance

Nanomechanical Materials Behavior Committee Janelle Wharry, Purdue University Samantha Lawrence, Los Alamos National Laboratory

In-Situ Characterization Techniques for Investigating Nuclear Materials Nuclear Materials Committee

Clarissa Yablinsky, Los Alamos National Laboratory Peter Hosemann, University of California, Berkeley David Frazer, Los Alamos National Laboratory Shradha Agarwal, University of Tennessee and Oak Ridge National Laboratory

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

"They say, timing is everything. But then they say, there is never a perfect time for anything."

—Anthony Liccione

I write this column in the midst of the imperfectly timed Coronavirus outbreak in the U.S. In many states, mine included, restaurants and "non-essential" businesses are closed, grocery stores are experiencing runs on paper and disinfecting products, social distancing is the new form of social intercourse as gatherings limit themselves to 10 or fewer people, and TMS staff is all working remotely to do our part to reduce the risk of community transmission. As you read this column roughly two months in the future, I wonder what you definitively know and about which I can only speculate. . . . Are things better, worse, about the same? Is the disease suppressed? Has life gotten back to something resembling normal? Have investment markets (and my 401K) rebounded? Have countries unlocked themselves and travel resumed? Are associations conducting conferences once more? I wonder, wonder, wonder. . . .

While Quarter 2 is full of unknowns, Quarter 1 was a good one for TMS. We had a very successful TMS 2020 Annual Meeting & Exhibition (TMS2020) in San Diego, California, during late February. Coronavirus was certainly making its presence felt at the time, but it was largely confined to China, and the impact on our event was primarily through the absence of roughly 200+ Chinese attendees. That's a big impactful community to lose from our highly international event. The absence of the Chinese put aspects of the technical program in a difficult spot. However, our staff, organizers, session chairs, and other volunteers responded creatively and effectively to assure that as few glitches as possible were visible to event participants. Knowing that there were universal concerns about Coronavirus, we were proactive in communication about the situation with attendees, worked with the facilities to assure that hygiene was enhanced, and had health professionals on site as a precaution. I heard nary a cough or sniffle.

By the end of meeting week, TMS2020 was our best attended event (by 13) with 4,681 attendees. We also received a record number of abstracts for a TMS event—5,183. If things would have been "normal," we might have scratched the 5,000 attendee level. TMS2020 was also rich in experimentation and innovation. We had a new app with more user tools. We piloted a new approach to our poster session, with invited posters and video poster displays (no thumb tacks!). We tried the next "big thing" in conferencing—silent sessions, where participants listened to presenters by using ear buds and transponders that could be dialed to any one of the ten wall-less session rooms constructed in a single hall. We learned a lot about future pathways for next-generation TMS meetings. That learning is continuing today even as Coronavirus reshapes the conference landscape.

On returning from San Diego and TMS2020, COVID-19 immediately overtook the world and the conference community with major event after major event being postponed or, worse, canceled. Canceling a meeting is a very difficult decision for we nonprofits as contracted event facilities and hotels can impose heavy penalties for failure to satisfy performance clauses. These penalties can range from five to seven figures in U.S. dollars. The damage is compounded by lost revenue to support other aspects of the mission and operation. Unfortunately, as many associations are finding, contract language concerning force majeure and insurance policies are slippery enough that they are hard to invoke under all but the most precise circumstances. Many executive directors have frowny faces over this.

So, reader in the future, will TMS and other associations soon find themselves in good position to return to normalcy? I'm hoping so, and I'm looking forward to the day when the only lasting effect of this particular crisis is us wondering what to do with all of the leftover hand sanitizer that we never had to use.



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Number 5

May 2020

James J. Robinson Executive Director

<u>@JJRofTMS</u>

"We learned a lot about future pathways for nextgeneration TMS meetings. That learning is continuing today even as Coronavirus reshapes the conference landscape."

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Paul E. Krajewski



Eduard Arzt



Chennupati Jagadish

Three TMS Members Selected for National Academy of Engineering

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.

TMS Members Elected to NAE

Congratulations are in order for three TMS members who were elected to the U.S. National Academy of Engineering (NAE) this year. Election to the NAE is among the highest professional distinctions for engineers and honors those who have made outstanding contributions to "engineering research, practice, or education, including, where appropriate, significant contributions to the engineering literature" and to "the pioneering of new and developing fields of technology, making major advancements in the traditional fields of engineering, or developing/implementing innovative approaches to engineering education."

The following TMS member will be inducted as one of 87 U.S. members in the NAE:

Paul E. Krajewski

Krajewski is the director, global research and development, at General Motors Co., in Warren, Michigan. He was elected "for development and implementation of lightweight automotive materials." A TMS member since 1993, Krajewski received the 2013 AIME Champion H. Matthewson Award and

In Memoriam: Nigel Ricketts

TMS extends its condolences to the family, friends, and colleagues of Nigel J. Ricketts, who passed away on June 29, 2019. A TMS member since 1992, he was actively involved in the Society's Aluminum Committee, serving as coorganizer of the Scandium Extraction and Use in Aluminum Alloys symposium at the TMS 2019 Annual Meeting & Exhibition. was in the first class of TMS Brimacombe Medalists in 2012.

The following TMS members will be inducted as two of 18 international members in the NAE:

Eduard Arzt

Arzt, the chief executive officer and scientific director at INM-Leibniz Institute for New Materials of Saarland University in Saarbrücken, Germany, was elected "for research on mechanical properties and development of bio-inspired functional surfaces for medical adhesives and novel gripping systems." A longtime member of TMS, Arzt is the 2020 recipient of the TMS Morris Cohen Award.

Chennupati Jagadish

A distinguished professor of electronic materials engineering at the Australian National University in Canberra, Jagadish was elected "for contributions to nanotechnology for optoelectronic devices." He has been a TMS member since 2013 and is also a 2015 Fellow of the U.S. National Academy of Inventors.

The new class will be formally inducted during a ceremony at the NAE's annual meeting in Washington, D.C., on October 4, 2020.

Throughout his career, Ricketts focused on steelmaking, base metals pyrometallurgy and hydrometallurgy, base metal flotation, magnesium and aluminum metallurgy, gold processing, and exotic metals, like vanadium and scandium. Most recently, he worked as the vice president of project and market development at Scandium International until June 2018.



Three TMS Members Selected for National Academy of Engineering

David Williams Awarded RMS Honorary Fellowship

Longtime TMS member and 1996 TMS Fellow David B. Williams was appointed Honorary Fellow by the Royal Microscopy Society (RMS). Williams, the Monte Ahuja Endowed Dean's Chair and Dean of the College of Engineering at The Ohio State University, was recognized for his pioneering work in developing analytical transmission electron microscopy (ATEM), as well as its applications to a broad range of materials. "Over the past 45 years his work has led to a new understanding of materials and microstructural evolution, including segregation, precipitation phenomena, phase diagrams, and phase transitions in metals and alloys," the RMS said of his appointment.

The distinction of Honorary Fellow is one of the most prestigious awards the society has to offer. The honors will be presented at the European Microscopy Congress 2020, to be held August 23–28, in Copenhagen, Denmark.



David B. Williams

TMS Welcomes New Members

The TMS Board of Directors approved professional membership for the following individuals at its February 2020 meeting. Please join us in congratulating and welcoming them to all the privileges and benefits of TMS membership.

- Abbasi Shirsavar, Mehran; United States
- Abdul Wahab, Mohammad Azizol; Malaysia
- Abdullah, Aboubakr M.; Qatar University, Qatar
- Adam, Hamish; Boreal Laser, Canada
- Adedayo, Babatunde Adelowo; National Iron Ore Mining Company Limited, Nigeria

Ahmadi, Arezoo; RGQ, Iran

- Ahnen, Violet M.; United States
- Akhondi, Alireza; John R. Kieth, Australia
- Akid, Robert; United Kingdom
- Aliasghari, Hadi; Nano Shargh Abzar-e Toos Co., Iran

Aliof, Matt; United States

- Allen, Brian; Dynamic System Inc. (Gleeble), United States
- Allen, Harvey Pascoe; United Kingdom
- Al-Shawi, Fadhil Abbas; United Kingdom
- Altenbaugh, Derek; Robindale Energy Services, United States
- Ambury, Rachael Fiona; United Kingdom
- Anderson, Kevin; Brunswick-Mercury Marine, United States
- Andrade, Marcio S.; IPEN, Brazil

- Anstee, Richard Charles; Canada
- Arai, Isao; Mitsubishi Materials, United States
- Araneda, Eugenia; Chile
- Aregawi, Wondwosen Abebe; University of Minnesota, United States
- Asadikiya, Mohammad; Worcester Polytechnic Institute, United States
- Baker, Lee; United Kingdom
- Bansal, Anushka; United States
- Barnes, Lee A.; United Kingdom
- Basheer, Uday M.; United Kingdom
- Bauerschlag, Nils; Hydro Aluminium Rolled Products GmbH, Germany
- Bechly, Maximilian; University of Applied Sciences Stralsund, Germany
- Bennett, Charles Andrew; United Kingdom
- Bertherat, Marc; Constellium, Switzerland
- Besson, Jacques; École des Mines, France

Bezrukikh, Aleksandr I.; Siberian Federal University, Russian Federation

Bhaskar, Pragna; Georgia Institute of Technology, United States

Bhattacharya, Sudip; 6K Inc., United States

- Bidari, Ehsan; Iran
- Bilotti, Emiliano; United Kingdom

Bin Norizan, Mohd Natashah; Universiti Malaysia Perlis, Malaysia

- Bittner, Benjamin; MeKo Laser Material Processing, France
- Blackledge, Jonathan; United Kingdom
- Blade, Lee; United Kingdom
- Boff, James Charles; United Kingdom
- Bojorquez, Francisco; Univerisdad de Sonora, Mexico
- Boon, Jonathan Charles; United Kingdom
- Boulaki, Foteini; United Kingdom
- Bounou, Aikaterini; United Kingdom

Brandwood, Arthur; Australia

- Breach, Christopher David; United Kingdom
- Brismalein, David; Aluminium Dunkerque, France
- Brown, Keith A.; Boston University, United States
- Buller, Dane; United Kingdom
- Buonocome, Giuseppe; United Kingdom
- Burlatsky, Sergei; United Technologies Research Center, United States
- Burton, Trevor; United Kingdom
- Butala, Megan M.; University of Florida, United States

Buys, Ockert; United Kingdom



Three TMS Members Selected for National Academy of Engineering

Caine, Marcus; United Kingdom

Cairns, Daniel Lee; United Kingdom

- Cam, Gurel; Iskenderun Technical University, Turkey
- Campbell, David Stanley; United Kingdom
- Campbell, Douglas James; United Kingdom
- Campbell, Sylvia; United Kingdom
- Carruthers, Alex William; University of Manchester, United Kingdom
- Casali, Dick; Intel Corp., United States
- Chakraborty, Kalyan Kumar; India
- Chakraborty, Madhusudan; Adamas University, India
- Chalmers, Frances Jane; United Kingdom
- Chan, Helen M.; Lehigh University, United States
- Channer, Akeel; NSWCCD, United States
- Chen, Kongtao; University of Pennsylvania, United States
- Chen, Peng; Texas A&M University, United States
- Chen, Yang-yuan D.; Institute of Physics, Academia Sinica, Taiwan
- Cheng, Lin; University of Pittsburgh, United States
- Chen-Wiegart, Yu-chen Karen; Stony Brook University/Brookhaven National Laboratory, United States
- Chernetskiy, Ivan Vladimirovich; Ural Federal University, Russian Federation
- Chico, Jonathan P.; Sandvik Coromant, Sweden

Choi, Sun; KIST, South Korea

Chowdhury, Sugata; National Institute of Standards and Technology, United States

Christensen, Steffen; Oman

- Christopherson, Rhea; Materion, United States
- Chui, Yin Tak; United Kingdom

- Chung, Sheng-Heng; National Cheng Kung University, Taiwan
- Clark, Julian Peter; United Kingdom
- Clemmey, Richard Henry; United Kingdom
- Co, Noelle C.; Blade Energy Partners, United States
- Coley, Michael Delroy; University of the West Indies, Jamaica
- Conway, Patrick; Jönköping University, Sweden
- Cooper, Sarosh Sam; India
- Cordill, Craig; Wagstaff, United States
- Cortes, Pedro; Youngstown State University, United States
- Costello, Kenneth J.; High Temp Measurement LLC, United States
- Cote, Patrice; Rio Tinto Aluminium, Canada
- Coury, Francisco Gil; Universidade Federal de São Carlos, Brazil
- Couzinie, Jean-Philippe; Université Paris Est, France
- Craig, Thomas Orr; United Kingdom
- Cumings, John; University of Maryland, United States
- Cunha, Jose; Alumar, Brazil
- Dahlstrom, James; Gopher Resource, United States
- Das, Hrishikesh; Pacific Northwest National Laboratory, United States
- Davies, Peter J.; Germany
- De Geuser, Frederic; Simap Université Grenoble Alpes, France
- De Palma, Alex C.; Univeristy of Texas Austin, United States
- Dear, Felicity F.; Imperial College London, United Kingdom
- Demetriou, Demetrios Haralambos; United Kingdom
- Depan, Dilip; University of Louisianna Lafayette, United States
- Deschênes, Jean-Michaël; Laserax, Canada
- Devendhar Singh, Sanjay Kumar; Virginia Polytechnic Institute and State University, United States

Dienn, Henry; High-End Ltd., Japan

Dixit, Vikas; Intel Corp., United States

- Doshi, Aakash; Almex USA Inc., United States
- Douch, Colin J.; New Zealand
- Dryden, Daniel M.; United States
- Du, Chuanming; Tohoku University, Japan
- Dykhuis, Andrew; United States
- El-Atwani, Osman; Los Alamos National Laboratory, United States
- Eliaz, Noam; Tel-Aviv University, Israel
- Elliot, Christopher Neil; United Kingdom
- Ellis, Elizabeth A.I.; Oak Ridge National Laboratory, United States
- Emami Tabrizi, Isa; Sabanci University Orta Mahalle Tuzla, Turkey
- Emdadi, Aliakbar; Germany
- Eskil, Murat; Aksaray University, Turkey
- Failla, David; Puget Sound Naval Shipyard, United States
- Falconer, James Robert; United Kingdom
- Fan, Zhe; Oak Ridge National Laboratory, United States
- Fasoro, Abiodun; United States
- Fayyad, Eman M.; Qatar University, Qatar
- Fernandez-Silva, Beatriz; University of Sheffield, United Kingdom
- Field, Kevin; University of Michigan, United States
- Finstad, Terje G.; University of Oslo, Norway
- Fleming, Thomas John; Ireland
- Flowers, Patrick; Made In Space Inc., United States
- Foster, Samuel Harry; United Kingdom
- Fradet, Claude; Equibras, Canada

Frankel, Gerald S.; The Ohio State University, United States

Three TMS Members Selected for National Academy of Engineering

Fraser, Alex; Laserax Inc., Canada

- Fukunaka, Yasuhiro; Kyoto University, Japan
- Gambone, Justin J.; Georgia Institute of Technology, United States
- Ganjkhanlou, Yadolah; University of Turin, Italy
- Gao, Xu; Tohoku University, Japan
- Gao, Youping; Castheon Inc., United States

Gao, Ziteng; United Kingdom

Geiss, Roy; Colorado State University, United States

- Genin, Xavier; Solios Carbone, France
- Gentils, Aurelie; Université Paris-Saclay, France
- Ghods, Masoud; Middle East Technical University, Turkey
- Ghosh, Dipankar; Old Dominion University, United States
- Giegerich, Larry Joseph; Canada
- Gifford, Robert David; United Kingdom
- Glowacka, Angelika; United Kingdom
- Goken, Mathias; Friedrich-Alexander-University Erlangen-Nürnberg, Germany
- Gomez-Alvarez, Agustin; Univerisdad de Sonora, Mexico
- Gopalan, Prashanth; Univeristy of Utah, United States
- Gorain, Barun K.; Ore2Metal Inc., Canada
- Goshi, Takuya; Denso International America Inc., United States
- Greenwood, Sarah Catherine; United Kingdom
- Griffin, Martin Stephen; United Kingdom

Groves, David; United Kingdom

- Gu, Geun Ho; KAIST, South Korea
- Guda Vishnu, Karthik; Purdue University, United States

- Guiglionda, Gilles; Constellium CRV, France
- Gurin, Elizabeth A.; Becton Dickinson, United States
- Hackett, Benjamin; Texas A&M University, United States

Han, Seung Min; KAIST, South Korea

Hanby, Ian R.; New Caledonia

Harrington, Sean D.; United States

- Harrington, Tyler; Oerlikon Metco, United States
- Harrison, Marcus Elliot; United States
- Hassan, Mohammad K.; Qatar University, Qatar

He, Jianhong; Oerlikon Metco, United States

- He, Jianjun; China
- Heidarzadeh, Akbar; Shahid Madani University, Iran
- Henshaw, David Cristopher; United Kingdom
- Heo, Jungho; LS-Nikko Copper Inc., South Korea
- Heydarinia, Ali; Iran

Hooshmand, Nasrin; Georgia Institute of Technology, United States

Hoover, Brian; Advanced Optical Technologies, United States

Horn, Christopher; Ft. Wayne Metals Research/AMD, United States

- Horrocks, Philip J.; United Kingdom
- Hou, Wenyan; Central South University, China
- Howard, Gary W.; Safety and Forensic Engineering, Canada
- Howe, Tmothy Rowland; United Kingdom
- Hughes, Ian Gwyn; United Kingdom
- Hunter, Graham C.; United Kingdom
- Hunter, Luke William; United Kingdom
- Igbafen, Akure Ohiomomo; Federal University of Technology, Nigeria
- Ikeda, Satoshi; Nippon Light Metal Company Ltd., Japan

- Isherwood, Patrick James M.; United Kingdom
- Jacobson, Peter C.; Questek Innovations, United States
- Jagannadham, Kasichainula; North Carolina State University, United States
- Jahn, Matthias; University of Applied Sciences Stralsund, Germany
- James, Richard; United Kingdom
- Jamieson, Andrew; Navair, United States
- Jermy, C A; United Kingdom
- Jiao, Handong; Beijing Institute of Technology, China
- Johnstone, James; United Kingdom
- Jones, Nicholas G.; University of Cambridge, United Kingdom
- Jones, Selwyn John Lloyd; United Kingdom
- Joseph, David; United Kingdom
- Joseph, Jithin; Deakin University, Australia
- Jublot-Leclerc, Stephanie; JANNuS -Université Paris-Saclay, France
- Juwhari, Hassan; University of Jordan, Jordan
- Kafexhiu, Fevzi; Institute of Metals and Technology, Slovenia
- Kaligotla, Anand; Aludyne, United States
- Kalra, Anisha; Indian Institute of Science Bangalore, India
- Kantner, Chris; QuesTek Innovations, United States
- Kartashov, Vadim V.; Ural Federal University, Russian Federation
- Kawasaki, Megumi; Oregon State University, United States
- Khalajhedayati, Amirhossein; TowerJazz, United States
- Khan, Kamruzzaman; University of Michigan Ann Arbor, United States
- Khoshghadam-Pireyousefan, Mohammad; Fardanegar, Iran



Three TMS Members Selected for National Academy of Engineering

Khosla, Nathan; United States

- Kim, Sang-shik; Gyeongsang National University, South Korea
- King, William L.; AK Steel Corp., United States
- Kishore, Krishna Mugada; Indian Institute of Technology Delhi, India
- Kocaefe, Duygu; University of Quebec at Chicoutimi, Canada
- Kowathanakul, Nopasorn; United States
- Krings, Daniel; Hydro Aluminium Rolled Products, Germany
- Krishna, Athith; University of California, Santa Barbara, United States
- Krishna, Vamsi; Univerisity of Chicago, United States
- Kucza, Nikole J.; GE Global Research, United States
- Kuhn, Erik; National Renewable Energy Laboratory, United States
- Kuiken, Hilbrand; Quantillion Technologies, Netherlands
- Kumar, M. Arul; Los Alamos National Laboratory, United States
- Kurosaki, Ken; Osaka University, Japan
- Lacey, Jeffery; Idaho National Laboratory, United States
- Lahlouh, Bashar; University of Jordan, Jordan
- Lam, Marcus Chunwai; MCAM, Monash University, Australia
- Langille, Michael; Constellium Technology Center (C-TEC), France
- Lannoy, Nate; United States
- Lanzarotta, George; Kammerath & Weiss, United States
- Lau, Yang Hao; Institute of High Performance Computing, Singapore
- Launiere, Cari; Argonne National Laboratory, United States
- Lazarescu, Lucian; Technical University of Cluj-Napoca, Romania

- Lee, Je In; Pusan National University, South Korea
- Lee, Min-Ha; KITECH, South Korea
- Leung, Chu Lun Alex; United Kingdom
- Levine, Lyle E.; National Institute of Standards and Technology, United States
- Li, Shunping; Apple, United States
- Li, Xiangguo; University of California, San Diego, United States
- Liao, Michael E.; University of California, Los Angeles, United States
- Lim, Chao Voon Samuel; Monash University, Australia
- Lips, Andor; Netherlands
- Liu, Jing; University of Alberta, Canada
- Liu, Xianbin; Singapore
- Long, Gerard Christopher; United Kingdom
- Longwell, David Jame; United Kingdom
- Ludwig, Alfred; Ruhr-University Bochum, Germany
- Lukac, Frantisek; Institute of Plasma Physics of the Czech Academy of Sciences, Czech Republic
- Luo, Yan; University of Science & Technology Beijing, China
- Lyle, Luke A.M.; Carnegie Mellon University, United States
- Ma, Ke; University of Connecticut, United States
- Mackie, David Murray; United Kingdom
- Macklin, Stephen Robert; Australia
- Maddox, Jennie C.; Mississippi State University, United States
- Mahieu, Pierre; Solios Carbone, France
- Makepeace, Jeremy D.; United Kingdom
- Martin Da Silva, Iva Luisa; United Kingdom
- Marvel, Christopher J.; Lehigh University, United States
- Maxwell, Austin; Alcoa, Australia
- Mayandi, Jeyanthinath; SMN, Department of Physics, Norway
- McGinnity, Brian T.; United Kingdom

- McGregor, Ronald; Canada
- McLaughlin, Paul; United Kingdom
- McQueen, Fraser Wilson; United Kingdom
- Meadley, Philip Frank; Singapore
- Meddeb, Sami; Grenoble Institute of Technology, France
- Mei, Jun; Queensland University of Technology, Australia
- Mendieta, Marla J.; Ormco, United States
- Mendoza-Cruz, Ruben; University of Texas at San Antonio, United States
- Menze, Roman; MeKo Laser Material Processing, Germany
- Mermet, Stéphane; Liberty Aluminium Dunkerque, France
- Mhay, Amandeep Singh; United Kingdom
- Miao, Jiashi; The Ohio State University, United States
- Mihalop, Owen Daniel; United Kingdom
- Milhet, Xavier; Prime Institute CNRS ENSMA, France
- Millar, Dean Lee; Canada
- Mirabedini, Pegah S.; University of California, Riverside, United States
- Mirak, Mohammad; Behine Sanjesh Pars Alma, Iran
- Mitkova, Maria; Boise State University, United States
- Mohaghegh Moein, Alireza; Iran
- Mohammadzadeh, Ahad; Iran
- Molaei, Fatemeh; University of Arizona, United States
- Mollah, Shahab; University of South Carolina, United States
- Monaghan, Elizabeth A.; GE Power, United States
- Mondal, Kunal; Idaho National Laboratory, United States
- Moon, Yun Sung; South Korea
- Moore, Richie; United Kingdom

Moravcik, Igor; Brno University of Technology, Czech Republic

Three TMS Members Selected for National Academy of Engineering

Moseley, Steven Glyn; Liechtenstein

Moss, Allan; Canada

- Mukhtarov, Shamil Khamzaevich; Institute for Metals Superplasticity Problems, Russian Federation
- Mulheron, Michael John; United Kingdom
- Munoz, Jorge A.; University of Texas at El Paso, United States
- Muta, Hiroaki; Osaka University, Japan
- Mutreja, Isha; University of Minnesota, United States
- Na, Young-Sang; Korea Institute of Materials Science, South Korea
- Naeimi Panjaki, Alireza Ali; Japan
- Naji, Hojjat; I.T. Forging Co., Iran
- Nam, SungWoo; University of Illinois Urbana-Champaign, United States
- Nasiri Khalil Abad, Sajjad; Sahand University of Technology, Iran
- Nasouri, Reza; University of Texas at San Antonio, United States
- Nelaturu, Phalgun; University of Wisconsin, United States
- Nicholls, Peter; United Kingdom
- Niitsu Campo, Kaio; Unicamp, Brazil
- Nish, John; Welman Dynamics, United States
- Nordlund, Kai; University of Helsinki, Finland
- Oba, Satoshi; Nippon Light Metal Company Ltd., Japan
- O'Connor, Christopher; United Kingdom
- Ogle, Richard; United Kingdom
- Oh, Hyunseok; Massachusetts Institute of Technology, United States
- O'Hara, Dante J.; Naval Research Laboratory, United States
- Ohishi, Yuji; Osaka University, Japan
- Orr, Jessica; University of Dayton Research Institute, United States

- Osei-Agyemang, Eric; Lehigh University, United States
- Overman, Nicole R.; Pacific Northwest National Laboratory, United States
- Owusu-Konadu, Barbara M.; BOK Engineering Consulting Services, Ghana
- Ozagir, Ozcan; United Kingdom
- Pandolfelli, Victor; Alcoa Laboratory, Federal University of Sao Carlos, Brazil
- Papaj, Ewa; United Kingdom
- Papakonstantinou, Konstantinos; United Kingdom
- Papanikolaou, Michail; Cranfield University, United Kingdom
- Parisi, Cristian; United Kingdom

Park, Jonghyun; Missouri University of Science and Technology, United States

Park, Joo Hyun; Hanyang University, South Korea

Park, Joon Young; Harvard University, United States

Park, Yongmin; KG Dongbu Steel, South Korea

Parra, Roberto A.; Universidad de Concepcion, Chile

Parra-Sanchez, Victor Roberto; Universidad de Concepcion, Chile

Pateras, Anastasios; Los Alamos National Laboratory, United States

Pavlina, Erik J.; AK Steel Corporation, United States

- Pearson, Alastair Scott; United Kingdom
- Pecharsky, Vitalij K.; Iowa State University, United States

Pedroli, Herve; Aluminium Dunkerque, France

Perry, Carole; Nottingham Trent University, United Kingdom

- Phanopoulos, Christopher; Belgium
- Pickering, Ed; University of Manchester, United Kingdom
- Pierson, Ed; Lockheed Martin Space, United States
- Ping, Xue; Jianghan University, China

- Ponce, Arturo; University of Texas at San Antonio, United States
- Popplewell, Guy; United Kingdom
- Porter, Matthew; United Kingdom
- Potter, Michael; RJ Lee Group, United States
- Potter, Tara Jessica; United Kingdom
- Pouladi, Sara; University of Houston, United States
- Pouranvari, Majid; Sharif University of Technology, Iran
- Pramanik, Brahmananda; Montana Tech, United States
- Prasetyo, Erik; Indonesian Institute of Sciences, Indonesia
- Priddy, Matthew W.; Mississippi State University, United States
- Primeau, Pierre J.A.; Golder Associates Ltd., Canada
- Qu, Jun; Oak Ridge National Laboratory, United States
- Raabe, Dierk R.; Max-Planck Institute, Germany
- Rack, Alexander; European Synchrotron Radiation Facility, France
- Ramasagara Nagarajan, Varun; Altair ProductDesign, United States
- Rao, Apparao M.; Clemson University, United States
- Rashad, Mohamed; Central Metallurgical Research and Development Institute, Egypt
- Rashed, Md Golam; Australia
- Rasooli, Novin; University of Tehran, Iran
- Rathkanthiwar, Shashwat; Indian Institute of Science Bangalore, India
- Rawal, Suraj P; Lockheed Martin Space, United States
- Ray, Atish K.; Novelis Inc., United States
- Raymond, Paul; United Kingdom
- Razmi, Jafar; Arizona State University, United States

Three TMS Members Selected for National Academy of Engineering

- Rees, David Tien; University College London, United Kingdom
- Ren, Qiang; University of Science and Technology Beijing, China

Rhinehart, Katherine; United States

Richard, Gerald; Magma Foundry Technologies Inc., United States

Roma, Guido; CEA, France

- Rosefort, Marcel; Trimet Aluminium SE, Germany
- Roy, Sougata; Oak Ridge National Laboratory, United States
- Sabarudin, Ahmad; Malaysia

Sabeti Monfared, Ahad; Iran

- Sadawy, Mosaad Mohamad; Al-Azhar University, Egypt
- Sadeghi, Nima; Sahand University of Technology, Iran
- Salas Mula, Daniel; Texas A&M University, United States

Sanchez-Corrales, Victor M.; University of Sonora, Mexico

- Sandnes, Espen; Norwegian University of Science and Technology, Norway
- Sarkar, Soumalya; United Technology Research Center, United States
- Schaffer, Jeremy; Fort Wayne Metals, United States
- Scheller, Piotr R.; TU Begakademie Freiberg, Germany
- Schellert, Steven; Universitat Siegen, Germany
- Schliephake, Daniel; Monash Centre for Additive Manufacturing, Australia
- Schofield, Timothy Robert; United Kingdom
- Scholtz, Juliane; The University of Michigan, United States
- Schrefl, Thomas; Danube University Krems, Austria
- Schriner, Doug; North American Stainless, United States

- Schuck, Christopher F.; University of Delaware, United States
- Schulz, Wencke; Bundesanstalt fur Materialforschung und -prufung, Germany
- Scott, James; United Kingdom
- Seetharaman, Sankaranarayanan; ANSYS, India
- Sengupta, Debasis; United States
- Shakoor, Abdul; Qatar University, Qatar
- Shamlaye, Karl; Deakin University, Australia
- Shapiro, Alexander E.; Titanium Brazing Inc., United States
- Shellam, Richard; United Kingdom
- Shen, Xian Chun; CITIC International Cooperation Co. Ltd., China
- Shepherd, Nigel; University of North Texas, United States
- Sherman, Andrew J.; Powdermet Inc./ Terves Inc., United States
- Shibayama, Atsushi; Akita University, Japan
- Shimokawa, Tomotsugu; Kanazawa University, Japan
- Shin, Seungha; University of Tennessee, United States
- Shinozaki, Maya; China
- Shokri, Nayer; Sahand University of Technology, Iran
- Shun, Tao-Tsung; Feng Chia University, Taiwan
- Singh, Ankit; Welspun Corp. Ltd., India
- Singh, Harminder; Guru Nanak Dev University, India
- Sismondi, Shawn; United Kingdom
- Sliem, Mostafa Hussien; Qatar University, Qatar
- Smith, David John; United Kingdom
- Softly, Tilly; United Kingdom
- Spark, Caroline; United Kingdom
- Srinivasan, Srilok; Argonne National Laboratory, United States

- Stamboulis, Artemis; University of Birmingham, United Kingdom
- Stanley, Ashlynn M.; NAVAIR, United States
- Steglich, Jan; TRIMET Aluminium SE, Germany
- Steinbach, Sonja; DLR, Germany
- Stephens, Alan; United Kingdom
- Stevens, Wayne; United Kingdom
- Strawbridge, Anna; United Kingdom
- Su, Yanqing; University of California, Santa Barbara, United States
- Sun, Weiping; Nucor Corporation, United States
- Sutton, Yvonne; United Kingdom
- Szczepanski, Christopher; Special Metals Corp., United States
- Taghavimehr, Mehrnoosh; Iowa State University, United States
- Talapatra, Anjana Anu; Los Alamos National Laboratory, United States
- Tan, Pengfu; Glencore, Switzerland
- Tang, Fengzai; University of Warrick, United Kingdom
- Tang, Wei; Ames Laboratories, United States
- Tariq, Hanan Abureh; Qatar University, Qatar
- Taylor, Justin Paul; Hong Kong
- Thompson, Vicki; Idaho National Laboratory, United States
- Todoroki, Hidekazu; Japan
- Toh, Qiuyi; United Kingdom
- Tomlinson, Sarah Louise; United Kingdom
- Tong, Jianhua; Clemson University, United States
- Torres, Jonathan; Bucknell University, United States
- Torres Arango, Maria; Brookhaven National Laboratory, United States

Trevino, Diana A.; Worley, United States

Three TMS Members Selected for National Academy of Engineering

- Trivedi, Pankaj B.; Booz Allen Hamilton, United States
- Trotter, Carolyn; BlueScope Steel Ltd., Australia
- Tsai, Ming-Hung; National Chung Hsing University, Taiwan
- Ueda, Shigeru; Tohoku University, Japan
- Ulrich, Tashiema L.; United States
- Unnikrishnan, Vinu; West Texas A&M University, United States
- Uwidia, Ita E.; University of Benin, Nigeria
- verma, Narendra Kumar; India
- Walsh, Brian; United Kingdom
- Walther, Frank; TU Dortmund University, Germany
- Wang, Kang; University of Virginia, United States
- Wang, Liancheng; Central South University, China
- Wang, Xin; University of California, Irvine, United States
- Wang, Yan; University of Nevada Reno, United States
- Wang, Yongjie; University of California, Berkeley, United States
- Wang, Yuechen; Nano and Advanced Materials Institute Limited, Hong Kong
- Ward, Al; United Kingdom
- Ward, Richard Wiltshire; United Kingdom

Waterton, Michael; United States

- Watson, Frank; Safe Labs, United States
- Wen, Wei; ATI Specialty Materials, United States
- Werner, Andreas; United Kingdom
- Weston, Nicholas Samuel; University of Sheffield, United Kingdom
- Whitaker, Iain Robert; United Kingdom
- Whiteman, Dean; Alcoa, Australia
- Williams, Adrienne D.; ADee Technologies LLC, United States
- Williams, Maureen; National Institute of Standards and Technology, United States
- Williams, Nigel R.; United Kingdom
- Wilson, Orla; John Hopkins University, United States
- Wilson, Paul; Boeing, United States
- Wint, Natalie; United Kingdom
- Winter, Thomas; Naval Nuclear Laboratory, United States
- Wolff, Sarah J.; Texas A&M University, United States
- Wolfrum, Ed; National Renewable Energy Laboratory, United States
- Wongsa-Ngam, Jittraporn; King Mongkut's Institute of Technology Ladkrabang, Thailand
- Woodfill, James C.; United States
- Wu, Jyh-Ming; National Tsing Hua
- Wyatt, Keith; United Kingdom

University, Taiwan

- Xenos, Epameinondas; Elval Halcor S.A., Greece
- Xiong, Frank F.; Heaptech, United States
- Xu, Changxue; Texas Tech University,
 - United States

- Xu, Xin; Imperial College London, United Kingdom
- Yamaguchi, Katsunori; Waseda University, Japan
- Yang, Judith; University of Pittsburgh, United States
- Yarnall, John Thomas; United Kingdom
- Young, George; United States
- Yury, Chumlyakov Ivanovitch; Tomsk State University, Russian Federation
- Yuryev, Pavel O.; Siberian Federal University, Russian Federation
- Zaid, Hicham; University of California, Los Angeles, United States
- Zaldivar Escola, Facundo; LHD, Argentina
- Zamborszky, Ferenc; Magnetec-Ungarn Kft., Hungary
- Zangari, Giovanni; University of Virginia, United States
- Zhang, Hao; University of Alberta, Canada
- Zhang, Yan; United Kingdom
- Zhao, Huan; Max-Planck-Institut für Eisenforschung GmbH, Germany
- Zheng, Leixia; Central South University, China
- Zhu, Jun; Sanhua Texas Technology Center, United States
- Zhu, Zhongping; China
- Zuback, James; Pennsylvania State University, United States
- Zuo, Jian Min J.; University of Illinois, United States

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

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

In Case You Missed It: Business News from the Field

Deharde Improves Sheet Metal Forming

Varel, Germany: Deharde-Maschinenbau Helmut Hoffmann GmbH (Deharde GmbH) advanced the technology for forming sheet metal at a higher quality, while reducing costs and production time. Called Polygon Forming, the technology applies to the production of curved, twisted, and conic skins to form doublers, straps, and other parts made of metallic materials. The aircraft manufacturing company's new process removes redundant production steps, uses less cost-intensive milling, and enables reject-free production. The process could cut the cost of roll forming in half.

Jingye Buys British Steel Assets

Shijiazhuang, China: Chinese steel producer Jingye Group Co. Ltd. closed on the British and Dutch assets of British Steel for approximately £50 million. British Steel had been controlled by the government's insolvency service since collapsing in May 2019. Jingye has agreed to invest £1.2 billion and has promised "a new chapter in British steelmaking." The sale expects to save thousands of jobs in



the British workforce at Scunthorpe, Skinningrove, and on Teesside. Jingye CEO Li Huiming said: "These steelworks have existed for around 150 years and we are excited about what we can collectively achieve at British Steel to build a successful future for many years to come."

Akron, Ohio, USA: The Goodyear Tire & Rubber Company introduced the idea of ReCharge, a futuristic tire that would regrow tread and eliminate the need for replacement tires. An advanced compound like synthetic spider silk would extrude from a canister inside the tire and set into new treads. Used as needed, the liquid compound could be optimized to handle regional road conditions. Although ReCharge is considered a "stretch concept" tire, Goodyear CTO Chris Helsel sees the underlying technologies becoming available within the decade. (Image courtesy of Goodyear.)

Sumitomo Acquires Metal Powder Company

New York City, USA: Sumitomo Corporation of Americas has invested in Elementum 3D Inc., an additive manufacturing (AM) R&D company for advanced metals, composites, and ceramics. Elementum holds a patent for a metal powder blended with ceramics that accelerates printing speed, strengthens mechanical properties, and broadens the use of metal grades when compared to other AM materials. Sumitomo's other recent acquisitions include Sintavia, an additive manufacturer for the aerospace and oil and gas industries, AREVO, a 3D printing company using carbon composite materials, and Shapeways, a 3D printing service company.

De Grey Advances Large Gold System

Sidney, Australia: De Grey Mining Limited detected an impressive gold system at the Hemi prospect in the Pilbara region of Western Australia (WA). Using reverse circulation drilling, the company confirmed strong mineralization at depth, with the sulphide zone expanding to 200 meters wide and the potential for more than 320 meters of strike. Results include 93 meters at 3.3 grams per ton from 39 meters. De Grey has three rigs onsite advancing the discovery.

Canadian Steelmakers Target 2050 for Net-Zero Goal

Ottawa, Canada: Members of the Canadian Steel Producers Association (CSPA) set a goal to achieve net-zero carbon dioxide emissions by 2050. The goal is a part of CSPA's Climate Call to Action that outlines five key conditions for success that include creating partnerships and research collaborations, adopting clean technologies, achieving operational excellence in manufacturing, supporting domestic use of Canadian steel, and aspiring to be an industry leader. Canadian producers have reduced emissions by 25% since 1990 by improving energy efficiency and by ensuring best practices across operations.

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2020 TMS President Tom Battle: Be a Part of TMS's Future

Thomas Battle



Tom Battle attends a mentoring event, as sharing his own experiences with young scientists and engineers to help nurture the next generation of the minerals, metals, and materials community has long been a passion of his.

"I don't remember many details of that meeting...but I was hooked."

—Tom Battle

It is hard to believe that I first attended a TMS annual meeting almost 40 years ago!

I was in graduate school at the Colorado School of Mines when my thesis advisor, John Hager, an active TMS volunteer, recommended that I attend the annual meeting. So, a number of us grad students drove from Denver, Colorado, to Dallas, Texas, in an unheated van in

mid-winter. I don't remember many details of that meeting—except the cold—but I was hooked.

I made my first presentation at another TMS meeting in New York City, this time encouraged to do so by my University of Michigan Ph.D. advisor, Robert Pehlke, 1983 TMS Fellow, and one of my instructors, Wayne Jones, 1999 TMS President. I have been involved in TMS ever since.

Like most of you, my volunteer involvement started at the technical committee level, in areas corresponding to my college interests-Solidification, Pyrometallurgy, what is now Process Modeling and Analysis, and later Titanium. Through these committees, I started becoming involved in the planning and running of technical symposia and other events that make the TMS experience special. As time went on, my involvement came at a higher and higher level, until I joined the Society's Board of Directors, first as chair of the Extraction & Processing Division ten years ago and now as part of the Presidential rotation. It really isn't all that difficult to progress to this level in the Society-it just requires you to do two things.

First, if you agree to a task, do it as well as you can, despite all the issues distracting you from your volunteer work (such as the requirements of a job, of raising a family, your social life, sleep...).

Second, forget how to say "no." If you're enthusiastic and do a decent job, someone on TMS staff or the volunteer leadership will notice and find something else for you to do, from technical committees to technical divisions, from functional and awards committees to the Board. Just persevere and keep saying "yes!"

I will be taking over the leadership of the Board of Directors and the Society at a good time. More than 1,000 volunteers have joined 2019 President Jim Foley to continue to make TMS and, in particular, our annual meeting, a special experience.

During my career, I have seen TMS become more broadly based, in terms of technology areas we cover and the members and attendees we attract. We have moved from a focus on minerals and metals to cover all materials, including polymers, ceramics, biomaterials, electronic materials, and composites. We have helped to improve the understanding of established technologies and embraced new ones, including additive manufacturing and integrated computational materials engineering (ICME).

Our membership base has expanded in all of our technical constituencies industry, academia, and government. It has also expanded to include a large contingent of members from other parts of the world. Our membership, volunteers, and volunteer leadership are more open than ever to working with any metals or materials scientist or engineer, regardless of gender, nationality, or area of expertise. In fact, we are actively *encouraging* more diversity in our volunteer and leadership ranks. Our goal now is to make diversity not something external and unique, but part of "Whoever you are, of whatever background, you are welcome to become part of the future of TMS..." —Tom Battle how we function all the time, as a Society. To that end, our 4th Summit on Diversity in the Minerals, Metals, and Materials Professions will not be a standalone event, but an integral part of the TMS 2021 Annual Meeting & Exhibition (TMS2021) next year in Orlando, Florida.

We will be hosting another event at TMS2021, as well: the 5th International Symposium on Nickel and Cobalt, which will be organized with our partner society in Canada, the Metallurgy & Materials Society (MetSoc) of the Canadian Institute of Mining, Metallurgy and Petroleum (CIM). Based on member needs, interests, and passions, we are involved more and more with our sister societies, both those based in the U.S. and around the world. This is evidenced, for example, by our hosting of the 9th International Symposium on Lead and Zinc Processing at TMS2020 last February. This event is now in its 50th year and recently expanded to include five organizations from the

United States, Canada, Germany, Japan, and China. Also at TMS2020, we hosted the 3rd International Symposium on Electrometallurgy with MetSoc.

This is where we currently stand, but how should we evolve going forward? That is up to you. TMS is an organization that is driven from the bottom up, so we rely on our volunteer members at the technical committee level to help the rest of the organization and the Board move forward.

Now is a great time for you to become more involved with the Society. Let us know how TMS can help your organization, but also how we can further *your* professional and personal development. Better yet, attend a few committee meetings, talk to your volunteer leaders and staff coordinators, and become part of the process! Whoever you are, of whatever background, you are welcome to become part of the future of TMS and the future of metals and materials science and engineering.

2020 TMS Board of Directors

Thomas Battle was officially installed as the 2020 TMS President at the TMS 2020 Annual Meeting & Exhibition in February. The following individuals join him on the TMS Board of Directors to lead the Society in the coming year:

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Thomas Battle Extractive Metallurgy Consultant

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The 14th International Symposium on Superalloys (Superalloys 2020) will take place September 13–17, 2020, at the Seven Springs Mountain Resort in Seven Springs, Pennsylvania. Held once every four years over a span of six decades, this international meeting celebrates the latest and most significant innovations in superalloys. This is a tremendous opportunity to interact and exchange ideas with other researchers working in the superalloys community—from across academia, industries, and government labs.

A keynote talk will begin the conference on Sunday evening, presented by **Christian Dumont**, chief of the materials and processing modeling department at Aubert & Duval, and **Arnaud Longuet**, an expert in the mechanics of high temperature materials at SAFRAN Aircraft Engines. They will provide a unique overview of how data and information generated from process modeling tools used by the supply chain have been integrated in lifing methodologies used by the engine's original equipment manufacturer (OEM).

Superalloys 2020 will continue to offer a program where presentations are scheduled through the morning and an extended afternoon break allows guests to network with others working within the international superalloys community, with attendees reconvening for evening presentations. Multiple interactive poster sessions also will be scheduled, so that attendees have ample opportunities to participate in technical discussions over various sessions.

Originality and academic or industrial relevance are the major criteria used by the program committee for evaluating the presented manuscripts and topics. This symposium will continue a longstanding tradition of having a peer-reviewed publication of all papers presented in a proceedings volume that will be available at the time of the conference. For many, the compiled collection of Superalloys Proceedings serves as the primary archival resource that documents the major trends and advances impacting the community. (Editor's note: The Superalloys Proceedings Archive, offering more than 1,000 papers from superalloys-related meetings since 1968, can be accessed at www.tms.org/SuperalloysArchive.)

Over the past 70-plus years, superalloys have served as key enabling technologies that have been critical to the development of ultra-efficient gas turbines with reduced fuel consumption and minimization of CO, and NO_{x} emissions. Superalloys offer a truly unique combination of mechanical and physical attributes at elevated temperatures that makes them ideal for use in hot section gas turbine components for propulsion and power generation applications. However, in many advanced gas turbines, superalloys are being used at temperatures and stresses that approach the limits of their current capabilities, and they often serve as design limiting materials.

In order to design turbines with even higher efficiencies, there is demand for innovative technologies that lead to both superalloys with increasing temperature capability and superalloys that possess equivalent properties to existing alloys but can be produced at significantly reduced costs. Addressing these challenges requires attaining knowledge of the underlying metal physics governing their characteristic behavior and the development of engineering solutions that overcome these limitations through the optimization of composition, microstructure, and processing routes. The images above represent a variety of superalloys applications. From left to right: a Merlin engine on a test stand from SpaceX; a ceramic-based aluminde coating made to protect steels and superalloys from Pacific Northwest National Laboratory; a SuperDraco rocket engine from SpaceX; and the Holloman AFB F-4 Phantom II from the U.S. Air Force.



Sammy Tin

"This is a tremendous opportunity to interact and exchange ideas with other researchers working in the superalloys community..." **—Sammy Tin** "Save your spot today...keep the tradition of improvement and innovation in superalloys going for generations to come." —Sammy Tin

In recent years, the superalloys community has benefited greatly from advances in the development of property models, computational tools, processing methods, and innovative characterization techniques that have contributed to an improved fundamental understanding of the material behavior. For example, 3D meso-scale through atomic scale characterization, machine learning algorithms, integrated computational materials engineering (ICME), and physics-based property models have all contributed to improve the processing and performance of existing materials, while accelerating the development of new allovs. These and other innovative technologies for lifecycle improvement of

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Register Today!

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Join one of the most established and impactful conferences on superalloys. Mark your calendar for the 14th International Symposium on Superalloys, September 13–17, 2020, and reserve your stay at Seven Springs Mountain Resort in scenic southwestern Pennsylvania.

Housing Deadline: August 12, 2020 Discount Registration Deadline: August 13, 2020

Additional opportunities for networking and learning include two short courses on Sunday, September 13—Vacuum Precision Investment Casting: An Overview and Manufacture of Ni-based Superalloys Forgings—and a tour of Fallingwater on Tuesday, September 15. Tour tickets and course registration may be purchased through the symposium registration form. More information and registration is available at www.tms.org/Superalloys2020.



superalloys will be a focus of Superalloys 2020.

The Superalloys 2020 symposium will continue to explore the traditional areas of alloy development, processing, coatings and environmental effects, and mechanical behavior, while incorporating innovative new technologies that have contributed to lifecycle improvements. Attendees will learn about relevant and timely findings from investigations on the development of novel classes of blade and disk alloys and original structure, chemistry, and property relationships that provide new insight into the behavior of these alloys. The significance of manufacturing processes, both conventional solidification and thermal-mechanical along with

> state-of-the-art advances in additive manufacturing of Ni-base superalloys, will be discussed. This is an area where the application of computational tools, modeling methodologies, "big data," and machine learning has successfully contributed to the optimization of processing routes that can be used to engineer the microstructure to produce desired properties.

Regular attendees speak highly of the conference's social events. Housed at Seven Springs Mountain Resort in southwestern Pennsylvania's Laurel Highlands region, the venue offers a refined backdrop to the welcome reception, networking mixer, and evening banquet. Tour tickets will be available through Superalloys 2020 registration for those interested in seeing Frank Lloyd Wright's Fallingwater, a world-renowned architectural masterpiece.

Registration is open for Superalloys 2020. Save your spot today as colleagues mark their calendars and prepare to keep the tradition of improvement and innovation in superalloys going for generations to come.

Sammy Tin is a professor of materials engineering at Illinois

engineering at lilinois Institute of Technology and the organizing chair of Superalloys 2020.





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TMS Foundation in 2019: Committed to the Future



Kaitlin Calva

In the last year, the TMS Foundation saw several exciting changes. In March 2019, the TMS Foundation Board of Trustees adopted a strategic plan and new program statement: *The TMS Foundation supports students and young professionals with meaningful financial assistance and impactful career-building experiences.* And, as you likely already know from previous *JOM* articles, communications from the Foundation, or perusing online, in August 2019 the Foundation enhanced its image with a fresh take on its logo and a newly designed website.

Beginning in November 2019 and running through December 31, the Foundation conducted its year-end appeal, which raised \$88,342. Overall, \$349,582 was raised in 2019 by a total of 321 donors, 69 of whom were new to the Foundation family. The names of each of these generous individuals can be found on the following pages, in the 2019 listing of the Lifetime Giving Honorific Societies and the Annual Giving Honor Roll, or in the Donor Recognition section of the Foundation website.

Another important endeavor was a retreat held at the TMS 2020 Annual Meeting & Exhibition in San Diego in February 2020. Here, both the Foundation Board of Trustees and TMS Board of Directors reaffirmed their commitment to the Foundation's mission.

Steadfast in its aim to make an impact on the future of the minerals, metals, and materials professions, the TMS Foundation's top priority is helping people. Through the support of each of the 321 donors who share its vision, the Foundation continues to advance the field by supporting deserving students and young professionals in the most critical stages of their career development. In addition to its core mission of providing indispensable scholarships, experiences, and training to the next generation of scientists and engineers, the Foundation also provides awards and recognition opportunities to established professionals to encourage the dissemination of knowledge and promote excellence in the field.

So, while 2019 has brought change, the TMS Foundation is enthusiastic for opportunities in 2020 and looks forward to making an impact on many more lives. The 2019 Light Metals Division (LMD) Young Leaders Professional Development Awards are presented during the TMS 2019 Annual Meeting & Exhibition (TMS2019). Pictured here, left to right, are: Alan Luo, past chair, LMD; Kristian Etienne Einarsrud, Norwegian University of Science and Technology and 2019 LMD Young Leader; Samuel Wagstaff, Novelis Inc. and 2019 LMD Young Leader; and Eric Nyberg, chair, LMD.



Katelyn Adkison, Pennsylvania State University, receives the 2019 Kaufman CALPHAD Scholarship award during the TMS-AIME Awards Ceremony at TMS2019.



Ashley Spear, University of Utah, speaks during the TMS Young Professionals Tutorial Lecture at TMS2019 as one of two 2019 Early Career Faculty Fellows.

The TMS Foundation 2019 Honor Roll

The TMS Foundation thanks the following TMS members and friends for their generous support in 2019. Their gifts are critical to the success of current and future TMS Foundation programs, and therefore critical to advancing the future of minerals, metals, and materials science and engineering community.

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To secure your place on the 2020 TMS Foundation Honor Roll, visit www.TMSFoundation.org/Contribute to make an online donation. You can also contact TMS Foundation staff at TMSFoundation@tms.org or 1-724-776-9000 with questions or to discuss your donation personally.

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Alexander Abboud

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TMS meeting headlines

Meeting dates and locations are current as of March 23. For the most up-to-date list of TMS-sponsored events, visit www.tms.org/Meetings.

Other Meetings of Note

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

The 6th World Congress on Integrated Computational Materials Engineering (ICME 2021) April 18–22, 2021 Lake Tahoe, Nevada, USA

The 12th International Conference on Magnesium Alloys and their Applications (Mg 2021) June 15–18, 2021 Montreal, Quebec, Canada

Additive Manufacturing Benchmarks (AM-Bench 2021) July 12–15, 2021 Bethesda, Maryland, USA

Materials in Nuclear Energy Systems (MiNES 2021) September 19–23, 2021 Pittsburgh, Pennsylvania, USA

Liquid Metal Processing & Casting (LMPC 2021) September 19–22, 2021 Philadelphia, Pennsylvania, USA



June 21–24, 2020 Philadelphia Marriott Downtown Philadelphia, Pennsylvania, USA Housing Deadline: May 29, 2020 www.SafetyCongress.org

- Two keynote talks, four plenary sessions, and 18 breakout sessions will introduce topics and allow attendees to explore safety issues in depth. View a list of confirmed invited speakers on the congress website.
- Professional development offerings include the Certified Mine Safety Professional (CMSP) exam and the Process Safety in Engineering and Industry Course.
- Attendees can explore local attractions, such as Independence Hall, Franklin Institute, and the Philadelphia Museum of Art, all of which are within walking distance from the congress location. Visit the Housing & Travel page of the website for more information.

The 5th International Congress on



3D Materials Science 2020 June 28–July 1, 2020 Hyatt Regency Washington on Capitol Hill Washington, D.C., USA Housing Deadline: June 5, 2020 www.tms.org/3DMS2020

- The 5th International Congress on 3D Materials Science (3DMS 2020) will showcase three plenary speakers and more than a dozen invited speakers, along with contributed presentations.
- Stay at the congress location, the Hyatt Regency Washington on Capitol Hill, for the most convenient experience.
- Registration is open until the start of the congress.

MS & T20

October 4–8, 2020 David L. Lawrence Convention Center Pittsburgh, Pennsylvania, USA www.matscitech.org/MST20

- Make your plans to be a part of Materials Science & Technology 2020 (MS&T20), home of the TMS Fall Meeting. MS&T20 will feature approximately 100 symposia in 14 technical tracks.
- Find customers at the meeting where materials innovations happens. Great spaces are still available on the exhibit hall floor—book your booth today!

TIMS 2021 150th Annual Meeting & Exhibition March 14–18, 2021 Orlando World Center Marriott Orlando, Florida, USA Submit an Abstract! www.tms.org/TMS2021

- Abstract submissions open this month in several topic areas. Visit the Program section of the website for details.
- Discounted rates are available at a selection of convenient, affordable Orlando hotels.
- Diversity in the Minerals, Metals, and Materials Professions 4 (DMMM4), colocated with TMS2021, will build upon work accomplished at previous summits as well as share new perspectives and insights. Summit programming will be included with TMS2021 registration.
- Get ready for the 2021 TMS Bladesmithing Competition! Prospective teams should submit their signed faculty acknowledgement letters to the TMS Bladesmithing Committee by November 1, 2020. More details are available at www.tms.org/Bladesmithing.



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call for papers

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



November 2020 Manuscript Deadline: June 1, 2020 Topic: Aluminum and Magnesium: Casting Technology and Solidification

Scope: This topic covers the formation of structure, defects, and properties during casting and solidification of aluminum and magnesium alloys, with technologies including shape, continuous, direct-chill casting, and rapid solidification. The topic also covers new technological approaches to improve the quality of cast metal through optimization or changing of casting hardware or procedures. **Editor:** Dmitry Eskin

Sponsor: Aluminum Committee

Topic: In Situ Synchrotron and Neutron Characterization of Additively Manufactured Alloys

Scope: This special topic focuses on the in situ characterization of additively manufactured alloys using synchrotron- and neutron-based scattering, diffraction, and imaging techniques. Papers are solicited in areas including phase transformation and microstructure evolution during post-build heat treatment or mechanical testing, timeresolved x-ray imaging or diffraction during the build stage, residual stress evolution, and defect monitoring. **Editors:** Fan Zhang, Dhriti Bhattacharyya, and Lianyi Chen **Sponsor:** Advanced Characterization, Testing, and Simulation Committee

Topic: Machine Learning Applications in Advanced Manufacturing Processes

Scope: This special topic focuses on reducing waste, energy usage and carbon emissions, and spurring innovation in materials development and production. Advances in digital manufacturing, process control, predictive maintenance, and automation can be realized by integration of data analytics and validated models to ensure product quality, optimize operations, enhance productivity, and improve efficiency. **Editors:** Donna Guillen, Edward Herderick, Judy Schneider, and Srikanth Patala

Sponsors: Energy Committee, Additive Manufacturing Committee, and Computational Materials Science and Engineering Committee

Topic: Nanomechanics of Low-dimensional Materials

Scope: Low-dimensional materials, such as nanoparticles, nanofibers, and nanotubes have at least one dimension small enough for their physical properties to lay between individual atoms and bulk material. The dimensional constraints of these materials result in a large surface-area-to-volume ratio that allows free surface and nanoscale structural features to dominate their physical response to mechanical deformation. Papers are invited on experimental fabrication, characterization and testing, and computational modeling of mechanical behaviors of low-dimensional materials. **Editors:** Jiyoung Chang and Wei Gao **Sponsor:** Nanomaterials Committee

Topic: Nanostructured Materials under Extreme Environments (By Invitation Only)

Scope: This invited topic focuses on the response of nanostructured metals, ceramics, and composite materials in extreme environments (radiation, temperature, and mechanical loading). Materials with designed micro- and nanostructures may have unusual responses to such extreme environments. The investigation of the microstructural evolution in nanostructured materials through combined experimentation and modeling/simulation has proven crucial in establishing the understanding and design of this novel class of materials for future engineering applications under extreme conditions. **Editors:** Youxing Chen and Jin Li **Sponsor:** Invited

Topic: Process Design and Materials Development for High-Temperature Applications

Scope: Due to their unique characteristics, refractory materials are of specific interest for functional and structural high-temperature applications. The focus of this topic includes the design, development, and processing of refractory metals, alloys, and compounds. Contributions are invited from authors working on high-temperature materials to share their experimental and theoretical results. **Editors:** Ravi Enneti and Chai Ren

Sponsor: Refractory Metals and Materials Committee



Topic: Silicon Production, Refining, Properties, and Photovoltaics (By Invitation Only)

Scope: This invitation-only topic focuses on silicon for solar cells, energy production, and other technologies. All technologies of Si production, refining, and characterization are covered. Life-cycle assessment of solar silicon processing, recycling of solar silicon components, solar cells and electronic components, and characterization of silicon materials for solar cells and other technologies are subjects of great interest for this collection.

Editor: Shadia Ikhmayies

Sponsors: Recycling and Environmental Technologies Committee and Materials Characterization Committee

December 2020 Manuscript Deadline: July 1, 2020 Topic: Additive Manufacturing for Energy Applications (By Invitation Only)

Scope: This invited topic will feature manuscripts based on experimental and computational approaches including the following topic areas: Processing-microstructureproperty relationship of AM fabricated materials for structural components in energy sectors; in-situ sensor development and in-situ processing and characterization; advances in AM design methodologies, new material designs and AM techniques; modeling and simulations for design of high-performance AM fabricated materials. Only papers presented at the Additive Manufacturing for Energy Applications II symposium at the TMS 2020 Annual Meeting & Exhibition will be considered for this topic. **Editor:** Isabella van Rooyen

Sponsors: Additive Manufacturing Committee and Nuclear Materials Committee

Topic: 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.

Editors: Tushar Borkar, Rajeev Kumar Gupta, Sandip Harimkar, and Arif Mubarok

Sponsor: Surface Engineering Committee

Topic: Augmenting Physics-based Models in ICME with Machine Learning and Uncertainty Quantification

Scope: This topic will include papers on modeling complex material behavior and failure characteristics at multiple scales, using ICME and physics-based simulation tools augmented by machine learning and uncertainty quantification. Machine learning using datasets from experiments and validated simulation tools can unravel novel material models and physical phenomena. It is necessary to couple these predictions with uncertainty quantification to understand levels of error and ways to mitigate uncertainty. **Editors:** Somnath Ghosh, David McDowell, and James Saal **Sponsor:** ICME Committee

Topic: Machine Learning and Other Emergent Paradigms in Computational Materials Research

Scope: Computational materials science has been applying essential concepts of machine learning such as guessing and iteratively optimizing solutions, interpolating functions in high-dimensional space, and manipulating patterns in data, since its inception. Recent developments in learning theory and practice, along with the proliferation of data and cheap computing, have resulted in other promising new methods and enhanced embodiments of established techniques. This special topic features papers presented at the Computational Thermodynamics and Kinetics Symposium during the TMS 2020 Annual Meeting & Exhibition.

Editors: Jorge A. Muñoz, Sara Kadkhodaei, and James R. Morris

Sponsor: Invited

Topic: Mesoscale Materials Science

Scope: This topic invites contributions in the area of advanced characterization techniques and computational approaches for understanding the nucleation and evolution of mesoscopic structures in varied class of materials. **Editors:** Saurabh Puri and Amit Pandey **Sponsor:** Invited

January 2021 Manuscript Deadline: August 1, 2020 Topic: Graphene-based Composite Materials and Applications

Scope: Graphene-based composite materials consist of an inorganic host solid, graphene, that is coupled with an assortment of one or more dissimilar materials. The beauty of the composite materials lies within the multifunctionality rendered by the novel design structures that often have improved properties that are not available in the original component materials. Manuscripts on recent developments of all aspects of preparation, characterization, and novel applications of advanced graphene-based composite materials are invited. **Editor:** Simona Hunyadi Murph **Sponsor:** Composite Materials Committee

Topic: Recent Advances in Functional Materials and 2D/3D Processing for Sensors and Electronic Applications

Scope: Additive manufacturing and direct-write printed electronics technologies employing metal, dielectric, polymer, and ceramic materials have the potential to enable new products and markets. This special topic will highlight emerging concepts for the processing of nanomaterials and custom 2D/3D structures. Invited and contributed papers will discuss advances in material synthesis and process technology. Topics related to functional materials, low-temperature processing, large area manufacturing, and electronic applications are within the scope of the focus issue.

Editors: Pooran Joshi, Nuggehalli M. Ravindra, Kostas Sierros, Tolga Aytug, and Sufian Abedrabbo **Sponsor:** Thin Films and Interfaces Committee

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