

TMS 2022 Annual Meeting & Exhibition Report

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When the minerals, metals, and materials scientists and engineers gathered in sunny San Diego for TMS2020 in February 2020, the COVID-19 pandemic was primarily reflected in the sinking financial market, with only a few cases in the continental United States. Most of its over 5000 attendees did not realize that it was a watershed moment for the scholarly societies to reconsider the academic conferences, one of their signature offerings. In the 2 years since TMS2020, we have witnessed and become part of experiments of virtual and hybrid meetings, large and small, and grown accustomed to meeting with colleagues over computer screens on a scale previously unimaginable. These virtual and hybrid conferences bring many benefits, including greater accessibility and flexibility for attendees, especially primary caregivers; lower cost for organizers, participants, and employers; and reduced carbon footprint. These benefits would undoubtedly ensure the long-term relevance of virtual and hybrid meetings.

Meanwhile, virtual meetings pose severe challenges to reaching several common and vital goals for attending an academic conference. The free flow of ideas, especially those clashing with ours and essential to the eureka moments, is bound by virtual meeting apps' limitations and rigid formats. Networking that usually occurs during coffee breaks, over meals, and during conference events becomes impossible. And the "right" structure to ask questions and seek answers after a presentation remains elusive. These challenges unevenly affect researchers at different stages of their careers, with lesser-known junior researchers facing more barriers to using these virtual conferences as a springboard for future opportunities, thus creating an equity issue.

The community-wide pursuit of identifying the right balance between virtual and in-person conferences will persist. But for those minerals, metals, and materials scientists and engineers yearning for in-person interactions to meet, reunite, and engage, TMS2022, held at the Anaheim Convention Center and Anaheim Marriott in Anaheim, California, between February 27 and March 3, 2022, represented an excellent opportunity.

TMS President Ellen Cerreta from Los Alamos National Laboratory, TMS Board of Directors, and TMS Programming Committee led the organization of this year's TMS Meeting. More than 2600 attendees participated in the meeting, and presented over 2000 invited and contributed talks in more than 100 symposia. These symposia covered many aspects of minerals, metals, and materials science and engineering. The word cloud in Figure 1 captures some of the main themes. Additive manufacturing (AM) continued its recent streak of being the trending topic with the most symposia with ten, with refractory metallic AM, powder processing, and large-scale components representing some emerging areas. Energy

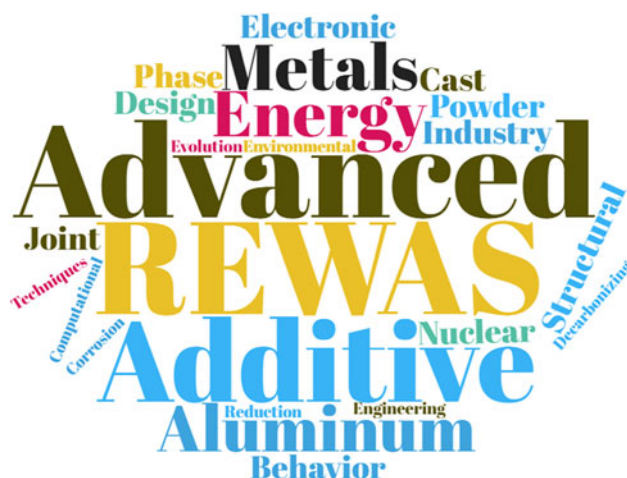


Figure 1. Word cloud describing the main themes of TMS 2022. The keywords are extracted from the titles of all symposia. The font size is proportional to the square root of the appearance frequency.

materials, nuclear materials, electronic materials, integrated computational materials engineering (ICME), and aluminum alloy development and processing were among the other focused themes of the meeting. TMS2022 also coincided with the 7th annual REWAS (Recycling and WASTe) conference, which brought together academia and industry to share and reflect on the latest technology development, process optimization, and community-wide outlook in waste management. The six REWAS symposia followed a common theme of "Developing Tomorrow's Technical Cycles." They emphasized the sustainability of production loops in the metals and materials industries regarding reuse and product upcycling from the perspective of a circular economy's raw material supply.

TMS2022 also included the Fourth Summit on Diversity in the Minerals, Metals, and Materials Profession (DMMM4). While the research world has never been as inclusive and diverse as it is now, we still have much work to tap into a larger talent pool and prepare those students and young professionals with sparkling eyes for science for tomorrow's success. The DMMM4 summit focused on four pillars to provide the attendees with a result-oriented experience, including inspiring, learning, doing, and sharing. Discussion leaders and attendees shared each other's journeys in overcoming adversity, experiences and lessons in making a positive impact in the community and workplace, and actionable strategies to implement diversity, equity, and inclusion. The discussions provided a perfect example of how diverse opinions, backgrounds, and perspectives can lead to creativity and broader skillsets.



On the technical side, diffraction methods of central interest of the readership of Powder Diffraction are well-represented, showcasing their applicability in a broad range of materials science, including materials discovery and development, process optimization, model validation, and advanced manufacturing. An exciting growth area is the integration of data-driven machine-learning approaches with rapid, advanced characterization tools, such as the X-ray diffraction beamlines at the synchrotron facilities, to automate, interrogate, and predict the processing–structure–properties relationships of advanced engineered materials. A second example is the second edition of the Advanced Characterization with Synchrotron, Neutron, and *In Situ* Laboratory-scale Techniques Symposium for Additive Manufacturing. In this four-day symposium, the conference room was often packed with a socially distanced audience. The exciting science presented in this symposium relies on the large user facility, where the instrumental availability and accessibility created many challenges caused by the pandemic. In the forms of *in situ* process monitoring and characterization at a speed and accuracy unavailable merely a few years ago, the stunning success told a tale of how scientific curiosity, collaboration, and determination can overcome all odds.

During the conference, TMS also welcomed its 2022 class of Fellows. TMS Fellow is the highest technical distinction bestowed to TMS members. This year, the ten newly inducted Fellows are Eduard Arz of Leibniz Institute for New Materials, Jiann-Yang (Jim) Hwang of Michigan Technological University, John Lewandowski of Case Western Reserve University, Ju Li of the Massachusetts Institute of Technology, Zi-Kui Liu of the Pennsylvania State University, Kathy Lu of the Virginia Polytechnic Institute and State University, Jan D. Miller of the University of Utah, Amit Misra of the University of Michigan, Anil Sachdev of General Motors Global Research and Development, and Patrice Turchi of Lawrence Livermore National Laboratory.

The 2022 TMS-AIME Awards Ceremony took place on Wednesday, March 2, 2022, in Anaheim Marriott. Over 20 TMS/AIME Awards and 36 TMS Divisional Awards were presented to the award recipients. Two awardees this year built their respective careers using synchrotron X-ray techniques. Tao Sun of the University of Virginia is recognized for his work in keyhole dynamics by the Young Innovator in the Materials Science of Additive Manufacturing Award and Yu-Chen Karen Chen-Wiegart of Stony Brook University and Brookhaven National Laboratory was recognized by the 2022 Frontiers of Materials Award.

Thirty-four technical committees, including Additive Manufacturing Bridge Committee, across four TMS divisions

(Extraction & Processing Division, Functional Materials Division, Light Metals Division, Materials Processing & Manufacturing Division, and Structural Materials Division), held their committee meetings virtually or in-person during and before TMS 2022. The typical agenda included a review of symposium proposals for TMS 2022, selection of symposia for TMS 2023 and MS&T 2022, and election of new committee leaderships.

Over 43 exhibitors arrived at TMS2022 to celebrate the return of the in-person events as part of the TMS-AIME 150th anniversary year. These exhibitors displayed their latest products from Monday, February 28, to Wednesday, March 2. These exhibitors included vendors of scientific instruments, publishers, software and database producers, and universities seeking to hire the best and brightest. The poster sessions, also held in the exhibit hall, were a big draw for attendees to engage in in-depth discussions and networking.

As a component of a hybrid conference, the TMS2022 registrants (in-person or virtual) have access to over 1300 on-demand, pre-recorded presentations using the TMS2022 conference platform through April 30, 2022. Once made available to attendees, the data from the virtual experience will assist the organizers and attendees to evaluate the potential and practicability of the new, internet-based platforms to supplement the traditional in-person annual meetings.

As TV shows such as “Big Bang Theory” illustrate, scientists draw a stereotype of being smart, awkward, and unsocial. This pandemic proves to every one of us that *Homo sapiens* are a social species, no matter how awkward we are. In TMS2022, the first TMS meeting in 2 years, we witnessed many forms of greetings, from nervous bumping of elbows, firm shaking of hands, to enthusiastic hugging and embracing of old friends. I think of Louis Armstrong’s “What a Wonderful World” when I see these. After a long winter of the COVID-19 pandemic, when we meet our friends in person, it provides us an opportunity to celebrate and appreciate who we have in our lives.

We are still in the middle of the COVID-19 pandemic, a health crisis that we have not seen in over 100 years. We still face many uncertainties about the different variants of the coronavirus. But as we eventually emerge from it, we shall all remind ourselves that this is a wonderful world, and by working together, we shall prevail.

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