

# THE WORLD COMES HERE TMS 2019 148<sup>th</sup> Annual Meeting & Exhibition

## FORGING AND REINFORCING CONNECTIONS AT TMS2019

Kelly Zappas and Kaitlin Calva



At the heart of the TMS 2019 Annual Meeting & Exhibition (TMS2019) were the social and networking events that brought together scientists and engineers from around the world to discuss common interests, offer advice, and build friendships.

From the Meet a Mentor event, where professional relationships take root, to division luncheons where those with like interests can meet and learn about common topics, to diversity and inclusion gatherings, which provide safe spaces for honest discussion, networking events bring people together to form lasting personal connections.

Nowhere was this more powerfully on display than at the 2019 TMS-AIME Honors & Awards Ceremony on Wednesday, March 13, which included presentation of awards by the American Institute of Mining, Metallurgical, and Petroleum Engineers (AIME), of which TMS is a member society. More than 50 individuals were recognized for their significant achievements over the course of the evening. The event took a more personal turn when it was time for the TMS Fellows, the highest honorees of the evening, to take the stage and accept their awards.

This year, their number included **Thomas Bieler**, who thanked God for the chance to be curious for a living and his wife, a historian, for helping him to see more broadly than his microscopic career; **Grace Burke**, who recalled

the impact of a letter she received in high school from Julia Weertman; **Dennis Dimiduk**, who acknowledged the many professionals he has met through TMS who have guided him throughout his career; **Roderick Guthrie**, who called TMS a force for the global good; **Elizabeth Holm**, who thanked a long list of influential women in the materials community for providing both inspiration and awe; **Nack Joon Kim**, who expressed hope that more international members like himself would be added to the prestigious list of TMS Fellows in the future; and **Alan Taub** and **Dan Thoma**, who reflected on their early days at TMS, their first Society meetings and early presentations, and the distance they had come since then.



Three of the recipients of the AIME Champion H. Mathewson Award (from left): Patrick Villechaise, Damien Texier, and Jonathan Cormier.



Four of the night's honorees (from left): Ashley Spear, Elsa Olivetti, Jennifer Carter, and Saryu Fensin



Desne Crossley accepts the TMS Fellow Award on behalf of her father, Frank Crossley.



From left: Christina Meksters, Henry Colorado, Gwen Bailey, and Luca Masi.

Perhaps the most moving speech of the night came from someone outside of the materials community, when Desne Crossley accepted the Fellow award on behalf of her father, **Frank Crossley**, who passed away on April 15, 2018, at the age of 93.

“He’d be over the moon happy to have his career recognized in this way,” she said, noting that she had learned things about her father that she hadn’t known by reading the letters written by his nominators. “Through this process with TMS, I came to know my father in a new way.”

She reminded the audience that Crossley, the first African American to receive a Ph.D. in metallurgy, had been working at a time when the science and engineering disciplines did not permit recognition of black scientists. “None of us can comprehend the magnitude of his achievements under such circumstances.”

Her speech was met with a standing ovation.

After the close of the ceremony, awardees and their guests enjoyed a banquet dinner and dessert reception.

The awards ceremony was just one of many networking events held at TMS2019. The following pages provide an overview of additional events that connected attendees throughout the week.

## Diversity and Inclusion Events

New for TMS2019 was the **LGBTQ+ and Allies Networking Mixer**, held on Sunday evening and open to all TMS2019 attendees. More than 150 people participated in this event, which was designed to provide an evening of informal networking in a safe space to celebrate shared experiences as TMS LGBTQ+ (lesbian, gay, bisexual, transgender, and queer/questioning) individuals and allies. The event was sponsored by TMS Pride, a new group formed by the TMS Diversity Committee in October 2018 to advocate for and facilitate the inclusion, recognition, and networking of LGBTQ+ students and professionals in the minerals, metals, and materials fields. GE Research and the National Institute of Standards and Technology were Champion-Level sponsors for this event, with Case Western Reserve University sponsoring at the Advocate level.



On Wednesday morning, attendees gathered for **Fresh Coffee, Fresh Ideas: Diversity and Inclusion Breakfast**, now an established event at the TMS Annual Meeting. This year, participants at each table engaged in discussion on a variety of topics, including best practices, unconscious bias, intersectionality, breaking barriers for physical disabilities, international members, gender and sexual minorities, the importance of allies, anxiety issues, and the TMS Diversity Summit. These discussions will be used to shape directions for future Diversity Committee initiatives, as well as to provide insights to TMS staff and leadership on how to continue to advance diversity, inclusion, and engagement within the Society and the professional community at large.

**TMS  
PRIDE**

For more information about TMS Pride, contact [TMSPrize@tms.org](mailto:TMSPrize@tms.org)

## Student Events



The Colorado School of Mines took home their seventh **Materials Bowl** championship on Sunday, March 10, at TMS2019. Their team, the Orediggers (pictured, right), competed against the University of Tennessee Knoxville team, The VOL-ymer Blends (pictured, left), in the final round of the 2019 TMS Materials Bowl, following a day of elimination rounds. 2018 TMS president Kevin Hemker (pictured, center) presented the trophy to the winning team from Colorado.

The TMS Materials Bowl, held each year at the TMS Annual Meeting, is a materials-themed knowledge and trivia competition for university students. A dozen university teams, made up of undergraduate and graduate students, competed in this year's event, which was sponsored by Goodfellow.



Upon introducing themselves, each of the panelists at the **Student Career Forum** on Tuesday, March 12, noted how their own career paths have taken “the long and winding road” to where they are now. “Don’t get fixed on a certain path. Be open to other opportunities, or at least seeing what that might be like,” said Jonathan Zimmerman, Sandia National Laboratories.

Six individuals, joined by moderator Kyle Johnson of the Young Professionals Committee, drew from their own experiences as an audience of undergraduate and graduate students sought advice on a variety of subjects—from avoiding common interview or resume mistakes, to making a career switch between sectors, to networking in order to move forward.

On that last point, Veronica Livescu, Los Alamos National Laboratory, noted that “it’s good to make contact directly with the people you want to work for.” “And if you don’t want to contact someone directly,” added Raul Rebak, GE Global Research, “see if you have a common connection who would be willing to recommend you or pass along your resume.”

Panelists encouraged students to utilize all available resources and opportunities, such as attending a TMS annual meeting, to meet new people and find mentors. “You should be building a mentor network and reaching out to them,” said Tori Miller, North Carolina State University, “because it’s not just one mentor, it’s a whole network. Don’t expect one person to be everything.”

The Student Career Forum was organized by the Young Professional Committee.

Panel participants included (left to right): Raul Rebak, GE Global Research; Douglas Stauffer, Bruker Nano Inc.; Veronica Livescu, Los Alamos National Laboratory; Tori Miller, North Carolina State University; Jonathan Zimmerman, Sandia National Laboratories; Robert Maass, University of Illinois at Urbana-Champaign; and Kyle Johnson, Young Professionals Committee vice chair and Sandia National Laboratories.

## Young Professional Events

The **Young Professional Tutorial Luncheon Lecture** on Tuesday, March 12, featured presentations from both of the 2019 TMS Early Career Faculty Fellow award recipients.

Ashley Spear, assistant professor and director of the Multiscale Mechanics & Materials Laboratory at the University of Utah, presented “Data-Driven Materials Science: Successes, Challenges, and Opportunities.” Spear talked about the emergence of a fourth paradigm in materials science, citing specific examples of success in the fatigue community.

“We really now have access to a lot of data,” Spear said, “which leads us to step back and ask, ‘What can we do with data?’; ‘How can we learn from it...and predict?’”

She explained how in the last thousand or so years, science has evolved from experimental, to theoretical, to computational—all leading to today’s age of data-intensive science. “Scientists can get overwhelmed, with data sets coming from many different sources,” Spear noted.

When looking to the future, Spear addressed the need to combine data science with materials science, really moving into the era of knowledge so that practitioners can learn from the many different data sources and make meaningful predictions from their findings, and answer those questions she first posed. However, the task is easier said than done.

“If we want to go from heterogeneous materials databases all the way up to knowledge, there are a lot of steps in between.”

Elsa Olivetti, the Atlantic Richfield Associate Professor of Energy Studies at the Massachusetts Institute of Technology, followed Spear with a talk entitled, “Data Mining towards Resource-Effective Materials, Processes, and Systems.”

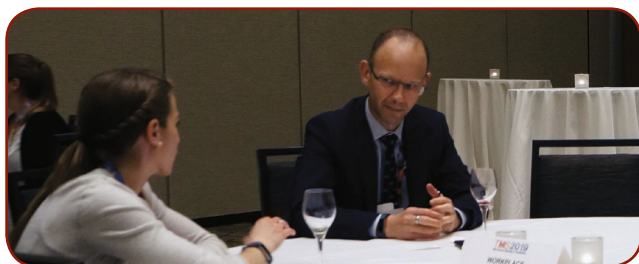
Olivetti first compared the availability of materials data to other data residing on the internet—looking at Amazon, Netflix, or cat videos, as examples. “In comparison, we don’t have a lot of data. It’s actually very scarce,” she said. “Our biggest challenge is that we have to continue to remind ourselves that we are not big data.”

To address this challenge, Olivetti suggests three things: “we need to continue to build up our data sets”; “find clever ways to augment our data”; and master transfer learning, where you take knowledge from one system and transfer it to another where there is less knowledge. When these things can be accomplished, computational learning can be used to help accelerate the pace of identifying advanced materials for commercial use—a process that is still very much limited by trial-and-error.

Even more challenges exist, however, when considering how to accomplish these tasks. Data volume and representation, prediction tasks, uncertainty in models, sample bias, establishing domain knowledge, and interpretability are all often barriers to creating a successful predictive synthesis system to aid in materials design and processing. Above all, Olivetti said, “we need to be able to interpret to know whether the models are valuable at all.”



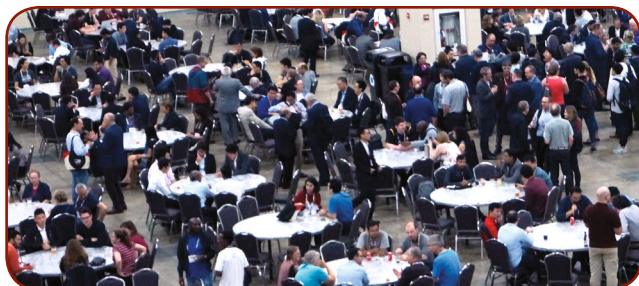
Ashley Spear (top), University of Utah, and Elsa Olivetti (bottom), Massachusetts Institute of Technology, both 2019 TMS Early Career Faculty Fellows, gave presentations during the Young Professional Tutorial Lecture.



Finding a work-life balance, navigating workplace communications, and transitioning from a student to a professional were among the topics discussed at the 2019 TMS **Meet a Mentor** event, held on Monday evening, March 11. This annual event provides young professionals the opportunity to engage in discussion with more experienced TMS members about issues of importance to their careers.

## Networking Receptions

On Sunday, March 10, TMS2019 attendees kicked off the meeting with the **President’s Welcome Reception** (below), where they could socialize, become acquainted with other attendees, and enjoy light refreshments before the start of technical programming on Monday.



The **TMS Fellows Reception** (below), also held on Sunday evening, offered distinguished TMS members and their invited guests an opportunity to catch up with old friends and make new acquaintances in a relaxed setting.



## Luncheons Bring Divisions Together

Division luncheons offer TMS members the chance for a meal with colleagues working in fields closely related to their own and also provides the opportunity to bestow division-level awards, including scholarships, young leaders professional development awards, and scientific achievements. Each luncheon is topped off by a presentation from an invited speaker.



### SMD Luncheon Lecture

Stephen M. Foiles, distinguished member of the technical staff at Sandia National Laboratories, posed the nontraditional questions about molecular dynamics (MD) during his Structural Materials Division (SMD) Luncheon lecture, “Molecular Dynamics: With Great Power Comes Great Responsibility,” on Monday, March 11.

“We’re going to predict stuff, but do we really believe it?” he asked, noting that people increasingly want to use MD to predict materials properties and fundamental atomic-scale mechanisms, but that as a field, “we need to quantify how accurate our predictions are.” Additionally, Foiles stated that the problem of quantification uncertainty within MD is a challenging one. “We need quantitative prediction with error bias,” he said, recalling a simple, yet troubling question once asked of him—“what are the error bars on your calculation?”

Foiles continued that if MD intends to become a predictive tool for making real impacts, not just a qualitative one, problems such as these need to be addressed. “It has always bugged me that as a field, we don’t know how to answer those questions. And as we become more relevant to the engineering field, we need to answer those questions.”

### EPD/MPMD Luncheon Lecture

Toru Okabe, vice president of the University of Tokyo, delivered the talk “Recycling Precious Metals and Rare Metals from Scraps” at the TMS Extraction & Processing Division (EPD)/Materials Processing & Manufacturing Division (MPMD) Luncheon on Tuesday, March 12. In his talk, Okabe identified three bottlenecks to rare metal supplies: resource supply restrictions, technology restrictions, and environmental restrictions.

“Most people don’t know that serious environmental destruction occurs when mining or smelting,” said Okabe, who discussed the naturally occurring radioactive materials that can be produced in waste when extracting material from ore and the harmful byproducts produced when extracting useful elements, such as the arsenic that comes along with copper extraction.

Okabe is currently working on processes for recycling of rare earth metals, which don’t generate these types of harmful wastes. “When you factor in the value of nature and the cost of dealing with waste, recycling is less expensive than mining new materials,” said Okabe. “Harmful wastes generated from natural ore can be avoided by recycling.”

### LMD Luncheon Lecture

Kevin Anderson, senior technical fellow in the Brunswick Corporation in the Mercury Marine Division, presented the featured lecture, “Technological Advancements on the Secondary Aluminum Industry,” during the Light Metals Division (LMD) Luncheon on Wednesday, March 13. During his talk, Anderson discussed the increasing role of secondary aluminum and reasons why it’s valuable to the economy, such as, weight reduction, cost reduction, energy savings, and better, more sustainable products.

While covering global themes and advancing technologies in secondary aluminum production, Anderson noted that “the old stereotypes of secondary having poor compositional control, poor metal quality, and inferior mechanical properties... those days are gone.” New technologies, he said, are being introduced to plants to eliminate the “old stereotypes” and produce aluminum that is “a highly recyclable, sustainable material with excellent properties.”

Recyclability is key, Anderson concluded, noting that educating every part of the value chain is an important step in this effort. “When you start to think about the design of a product, you also have to think about end of life,” he said. “It really all starts with design, and then everyone along the value chain has to pay attention.”

