Inaugural Congress to Focus on Artificial Intelligence

Taylor Sparks

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Ten years have passed since the Materials Genome Initiative provided the jolt the materials community needed to begin exploring how data science techniques could disrupt and revolutionize the traditional materials science paradigm. Artificial intelligence techniques, including machine learning, have proven to be tremendously powerful in complementing the traditional suite of tools used to establish relationships between material structure and properties. The field is on its way toward the goal of developing materials faster and cheaper.

The time is right for the first World Congress on Artificial Intelligence in Materials and Manufacturing (AIM 2022)!

Over the last decade a growing number of symposia have been directed at artificial intelligence for materials and manufacturing, but this meeting will be the first full conference on the topic sponsored by TMS.

What can you expect to see at AIM 2022? For one thing you'll find an excellent conference venue in beautiful Pittsburgh, Pennsylvania. The Pittsburgh Marriott City Center is a premier hotel located downtown near all the top attractions in the city, including PPG Paints Arena, home of the National Hockey League's Pittsburgh Penguins; the Cultural District, the central hub of downtown's theater and arts scene; and the Strip District, a boutique shopper's paradise filled with a variety of dining options.

Next, you'll find an intimate, dedicated meeting with narrowed focus allowing for a deep dive into the current state of the art for artificial intelligence in materials and manufacturing. As opposed to much larger meetings, like the TMS Annual Meeting & Exhibition, with thousands of participants, in this smaller setting, a few hundred meeting attendees from industry, national labs, academia, and government will be able to focus in on the specific challenges and research areas in this field. The format is conducive to discussions and dialogue that sometimes get lost in large meetings

with numerous parallel symposia.

In terms of materials informatics success stories, you'll see presentations where machine learning has enabled discoveries and learning across all classes of materials, ranging from ceramics to metals to semiconductors to polymers and even composites. The diversity of talks also ranges from property prediction to structure classification, algorithm development, and autonomous experimentation and characterization.

In addition to success stories, research in artificial intelligence has also opened up a slew of new questions and challenges. For instance, how can researchers develop features or descriptors to best represent materials effectively at the crystal, micro-, and meso-scale using domain knowledge? Similarly, how should we encode

Leadership in an Emerging Field

TMS offers valuable new learning opportunities related to artificial intelligence. Check out the following resources to stay informed:

Webinars
Artificial Intelligence in Materials: Research, Design, and Manufacturing Webinar Series
Ankit Agrawal, Northwestern University; David Blondheim Jr., Mercury Marine; Benji Maruyama, Air Force Research Laboratory; and Marius Stan, Argonne National Laboratory
Free for TMS members, $100 for nonmembers

Bring Artificial Intelligence to Your Materials Organization
Adam Kopper, Mercury Marine; and James Warren, National Institute of Standards and Technology
Free for TMS members, $50 for nonmembers
Watch both programs at: www.tms.org/WebinarLibrary

Online Course
Artificial Intelligence in Materials Science and Engineering
Recordings of the modules delivered November 2–4, 2021
Register at: www.tms.org/AIcourse

New Science and Technology Accelerator Report
Employing Artificial Intelligence to Accelerate Development and Implementation of Materials and Manufacturing Innovations
Publication Date: April 2022
Sign up to receive an alert when the free report is available at: www.tms.org/AIstudy

processing details for subsequent analysis? Which algorithms should be utilized for pattern recognition within data sets and do different algorithms offer advantages for different tasks or conditions? What additional data and information exists in industry related to manufacturing? Are complete structure-property-processing linkages possible by using artificial intelligence in manufacturing of advanced materials?

A key aspect of this conference is industrial participation and involvement in order to advance artificial intelligence in manufacturing. Whereas academics tend to focus on structure-property relationships and, at times, pay attention to processing relationships, they do not always have access to the large-scale manufacturing facilities needed to develop industrially relevant structure-property-processing relationships. At the same time, advances in Internet-of-Things have led to the ability to capture data from manufacturing processes in ways never before thought possible. Attendees will hear talks on additive manufacturing, extrusion, photolithography, thin film deposition, crystal growth, casting, annealing, and more.

As I am writing this article, the organizing committee is in the process of confirming speakers and planning technical sessions. The plan accommodates three plenary speakers, a roundtable, 18 invited speakers, and a robust set of contributed talks and posters, on topics of interest to industry, government, and academia that will engage attendees at every stage of their careers. Keep an eye on the Technical Program page of the congress website for program and speaker updates as they are announced.

I hope you'll join me in attending AIM 2022 this spring. Register and learn more about the artificial intelligence revolution that's transforming materials science at www.tms.org/AIM2022.

Taylor Sparks is an associate professor and associate chair of the University of Utah's Materials Science and Engineering Department. A TMS member since 2014, Sparks is the chair of the AIM 2022 organizing committee.