Technical Meeting and Exhibition



ADVANCE PROGRAM



WHERE MATERIALS INNOVATION HAPPENS

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PLENARY SESSION



TMS PLENARY SPEAKER

Alan Luo, Professor of Materials Science and Engineering and Integrated Systems Engineering at The Ohio State University (OSU) in Columbus, OH, and Director of OSU Lightweight Materials and Manufacturing Research Laboratory and Advanced Casting Research Center

TUESDAY 2:00 - 4:40 P.M.

OCTOBER 3, 2023

Lightweight Materials and Sustainable Manufacturing: The Role of Integrated Computational Materials Engineering (ICME)

Lightweight materials including aluminum, magnesium, titanium, and metal matrix composites are increasingly being used in the transportation and manufacturing industries to reduce energy consumption and carbon footprint. Emerging materials including high entropy alloys, bioresorbable magnesium alloys, and densified

superwood materials are also promising in new engineering and biomedical applications. Integrated Computational Materials Engineering (ICME) is defined as the integration of materials information, captured in computational tools, with engineering product performance analysis and manufacturing-process simulation. This talk presents some examples of lightweight material design and development using a CALPHAD-based ICME approach. The presentation will also discuss some of the latest innovations in sustainable casting, extrusion, sheet forming, and multi-material manufacturing processes. Microstructure models for light alloys have been developed based on computational thermodynamics and kinetics, coupled with manufacturing process models. These ICME models are integrated to predict location-specific mechanical properties, based on location-specific microstructure of solidification (casting, welding, and additive manufacturing) products.



ACERS EDWARD ORTON JR. MEMORIAL

Sergei V. Kalinin, Weston Fulton Chair Professor at the University of Tennessee, Knoxville

Microscopy is All You Need: The Rise of Autonomous Science

Making microscopes automated and autonomous is a North Star goal for areas ranging from materials and ceramics science to condensed matter physics – with the dream applications of discovering structure-property relationships, exploring physics of nanoscale systems, and building matter on nanometer and atomic scales. Over the last several years, increasing attention has been attracted to the use of AI interacting with physical system as a part of active learning – including materials discovery and optimization, chemical synthesis, and physical measure-

ments. For these active learning problems, microscopy arguably represents an ideal model application combining aspects of materials discovery via observation and spectroscopy, physical learning with relatively shallow priors and small number of exogenous variables, and modifications. In this presentation, I illustrate the examples of fully autonomous microscopy systems for exploring grain boundary transport behavior in polycrystalline materials, discovering the origins of non-linearity, nucleation biases, and work of switching in ferroelectric materials, and discovery of the ferroelectric domain growth laws. The same algorithms can be deployed on the electron microscopes for the discovery of the regions of interest based on their EELS signatures. These workflows are further developed to allow for explainable AI and human in the loop interventions. Overall, the development of advanced ML methods now opens a pathway to complete overhaul of classical operational concepts in microscopy, enhancing its potential for scientific discovery across multiple disciplines.





AIST ADOLF MARTENS MEMORIAL STEEL LECTURE

Keith Allen Taylor, Principal Research Engineer with SSAB Americas' R&D Department

Practical Applications of Physical Metallurgy to Industrial Steel Product Development

Product development is something not taught in most university materials science programs, but is available as a professional pursuit during employment after graduation. For a product development to be a commercial success (i.e., profitable), there has to be demand for the product, processing requirements for the product must be compatible with production facilities, and the margin between selling price and production cost should be above some suitable threshold. This presentation will highlight some metallurgical aspects of steel product development, including heat-treated martensitic steel plate products, based on the presenter's own experiences in this area. Topics include alloy design considerations and tools, laboratory heat treatment simulation, alloy enrichment at grain boundaries, product testing, and microstructural characterization.

PROGRAM AT A GLANCE

Materials Science & Technology (MS&T) is where materials innovation happens! Each year, MS&T's long-standing, recognized forum brings together scientists, engineers, students, suppliers, and business leaders to discuss current research and technology to shape the future of materials science and technology.

The event's unmatched technical program fosters technical innovation at the intersection of materials science, engineering, and application—addressing structure, properties, processing, and performance across the materials community.

Join other materials science experts from three leading materials societies to discuss the latest advancements in your field.

TMS FALL MEETING

Exploring the intersections of development, synthesis, and application

ACERS 125TH ANNUAL MEETING

Advancing the industry with the latest research in ceramics and glass

AIST STEEL PROPERTIES AND APPLICATIONS

Technical developments related to ferrous metallurgy and the steel manufacturing



LECTURES & AWARDS



ACERS/EPDC ARTHUR L. FRIEDBERG CERAMIC ENGINEERING TUTORIAL AND LECTURE | 9:00 – 10:00 a.m.

Kathy Lu, University of Alabama at Birmingham

ACERS RICHARD M. FULRATH AWARD SESSION | 2:00 – 4:40 p.m. AMERICAN ACADEMIC Nicola Perry, University of Illinois at Urbana-Champaign AMERICAN INDUSTRIAL Amjad Almansour, NASA Glenn Research Center JAPANESE ACADEMIC Yukio Sato, Kyushu University JAPANESE INDUSTRIALS Fuminori Mizuno, Toyota Motor Corporation and Sanshiro Aman, TDK Corporation

OCTOBER 3, 2023

ACERS ALFRED R. COOPER AWARD SESSION | 8:00 - 10:40 a.m.

2023 COOPER DISTINGUISHED LECTURE Lothar Wondraczek, OSIM, University of Jena

2023 ALFRED R. COOPER YOUNG SCHOLAR AWARD PRESENTATION Winners will be announced after selection by the Cooper Award Committee

ACERS BIOCERAMICS AWARDEES | 9:40 a.m. - 12:00 p.m.

LARRY L. HENCH LIFETIME ACHIEVEMENT AWARD Cato T. Laurencin, University of Connecticut

TADASHI KOKUBO AWARD Ashutosh Goel, Rutgers University

GLOBAL YOUNG BIOCERAMICIST AWARD Saurabh Kapoor, Sterlite Technologies

BIOCERAMICS YOUNG SCHOLAR Srimanta Barui, University of Connecticut

ACERS FRONTIERS OF SCIENCE AND SOCIETY - RUSTUM

ROY LECTURE | 1:00 – 2:00 p.m. Mrityunjay Singh, Ohio Aerospace Institute

MS&T23 PLENARY SESSION | 2:00 - 4:40 p.m.

TMS PLENARY SPEAKER

Alan A. Luo, Professor of Materials Science and Engineering and Integrated Systems Engineering at The Ohio State University (OSU) and Director of OSU Lightweight Materials and Manufacturing Research Laboratory and Advanced Casting Research Center *Lightweight Materials and Sustainable Manufacturing: The Role of Integrated Computational Materials Engineering (ICME)*

ACERS EDWARD ORTON JR. MEMORIAL LECTURE Sergei V. Kalinin, Weston Fulton Chair Professor at the University of Tennessee, Knoxville Microscopy is All You Need: The Rise of Autonomous Science

AIST ADOLF MARTENS MEMORIAL STEEL LECTURE Keith Taylor, Principal Research Engineer with SSAB Americas' R&D Department Practical Applications of Physical Metallurgy to Industrial Steel Product Development





ACERS NAVROTSKY AWARD | 8:00 - 8:40 p.m.

Kyle Brinkman, Clemson University Thermodynamic Stability, Radiation Damage and Leaching Effects in Tunnel Structured Hollandite Materials



ACERS BASIC SCIENCE DIVISION ROBERT B. SOSMAN LECTURE | 1:00 – 2:00 p.m. Elizabeth Dickey, Carnegie Mellon University Defect Disorder in Electronic Ceramics: Designing Functionality

TECHNICAL PROGRAM

Check the MS&T website for the preliminary technical program available July 2023.

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



SPECIAL EVENTS



ADDITIVE MANUFACTURING MATERIALS AND PROCESSES WORKSHOP (HOSTED BY TMS)* | 1:00 – 5:30 p.m. NEW TEACHERS WORKSHOP (HOSTED BY TMS)* | 1:00 – 5:30 p.m.

MS&T DIVERSITY IN SCIENCE RECEPTION | 5:00 - 6:00 p.m.



ACERS YOUNG PROFESSIONALS BREAKFAST CLUB | 7:30 – 9:00 a.m. NETWORK LIKE A PRO PANEL DISCUSSION PRESENTED BY TMS

EMERGING PROFESSIONALS | 12:45 - 2:00 p.m.

ACERS 125TH ANNUAL MEMBERSHIP MEETING | 1:00 - 2:00 p.m.

NAVIGATING THE PATENT PROCESS: TRANSFORMING INNOVATION TO INVENTION, HOSTED BY TMS | 4:00 – 5:30 p.m.

AIST STEEL TO STUDENTS RECEPTION | 6:00 - 8:00 p.m.

ACERS ANNUAL HONOR AND AWARDS BANQUET* | 6:00 - 9:00 p.m.

ACERS 125TH ANNIVERSARY AFTERGLOW | 9:00 – 11:00 p.m.

ACERS BASIC SCIENCE DIVISION CERAMOGRAPHIC EXHIBIT & COMPETITION | Various Hours - October 2 through October 4

OCTOBER 3, 2023

POSTER SESSION VIEWING | 2:00 – 4:30 p.m.

POSTER PRESENTATIONS | 4:40 - 6:00 p.m.

OCTOBER 4, 2023

POSTER SESSION VIEWING | 9:00 a.m. - 2:00 p.m.

OCTOBER 5, 2023

MECHANICAL PROPERTIES OF CERAMICS AND GLASSES SHORT COURSE (HOSTED BY ACERS)* | 8:30 a.m. – 5:00 p.m.

OCTOBER 6, 2023

MECHANICAL PROPERTIES OF CERAMICS AND GLASSES SHORT COURSE (HOSTED BY ACERS)* | 8:30 a.m. – 5:00 p.m.

*Additional registration required



STUDENT ACTIVITIES

Visit the MS&T Student Activities web page to see complete description of all student events, including details for applying for Material Advantage chapter grants and individual travel grants.

- + ACerS Student Tour
- + AIST Student Plant Tour
- + AIST Steel to Students Recruiting Reception
- + Undergraduate Student Poster Contest
- + Graduate Student Poster Contest
- + Undergraduate Student Speaking Contest
- + Student Networking Mixer
- + Ceramic Mug Drop Contest
- + Ceramic Disc Golf Contest
- + Resume Coaching Workshop
- + Student Awards Ceremony
- + Chapter Officers Workshop





HOTEL INFORMATION

HOTEL RESERVATION DEADLINE: SEPTEMBER 7, 2023

For best availability and immediate confirmation, make your reservations online at matscitech.org/mst23. Rates listed below are for single or double occupancy.



TO BOOK HOTEL RESERVATIONS

Online: https://book.passkey.com/e/50551687 for new reservation OR to modify or cancel an existing hotel reservation.

U.S. Government Rate: Rooms are extremely limited; proof of federal government employment must be shown at check-in or higher rate will be charged. U.S. Government rate is the prevailing government rate.

Credit Card Deposit: All reservation requests must be accompanied by a credit card guarantee for a deposit of one night's room and tax for each room reserved. Your credit card WILL NOT BE CHARGED during this initial stage and will be held as a GUARANTEE only.

Acknowledgments: Experience Columbus/Passkey will send reservation acknowledgements within 24 hours via email. Please check spam/junk mail and if you do not receive your acknowledgement in this time frame, contact Experience Columbus. You will not receive a written confirmation from the hotel.

PLEASE DO NOT CALL THE HOTELS TO BE SURE, THEY WILL NOT HAVE ACCESS TO THE RESERVATIONS UNITL AFTER THE RESERVATION SITE CLOSES.

Cancellations & Changes: Any reservation cancelled within 72 hours of arrival date will be charged one night's room and tax. Please refer to your reservation acknowledgement for your individual hotel cancellation policy. Through September 21, changes and cancellations can be made online or by contacting Experience Columbus via e-mail at Housing@ExperienceColumbus.com After 5:00 p.m., September 21, contact your hotel to make changes and/or cancellations.

Questions or Special Requests? For questions or special requests, please contact Experience Columbus at Housing@ExperienceColumbus.com Special requests are not guaranteed. Hotels will assign specific room types upon check-in, based on availability.





October 3 - 4, 2023 / Greater Columbus Convention Center, Columbus (OH), USA

EXHIBITION

The Advanced Materials Show, partnered with MS&T23, is a free-to-attend exhibition dedicated to end-users, product developers, OEM's and the entire material manufacturing supply chain. Spread over two days, the show will give visitors attending a unique insight into current and future materials development. Leaders in R&D, materials science and engineering will use the show to source the latest advanced materials, along with the scientific instruments and processing equipment necessary for the development, manufacture, and processing of advanced materials. Those who visit will have a shared focus on seeking the latest materials, innovations, and technology and will find new products, suppliers, and partners all under one roof.

The Advanced Materials Show will be hosting a Technology Showcase on both days of the exhibit. Exhibitors will have the chance to introduce themselves on the stage in front of a prestigious and engaging audience for fifteen minutes, where they can share new products, ideas, and latest technologies within their company and industry.

Visit www.advancedmaterialsshowusa.com to find out more and register for free.

EXHIBITION HOURS



SHOW HOURS 9:00 a.m. – 6:00 p.m.

TECHNOLOGY SHOWCASE 10:00 a.m. – 4:30 p.m.

NETWORKING RECEPTION

4:30 p.m. – 6:00 p.m.

*Times are tentative and subject to change

OCTOBER 4, 2023

SHOW HOURS 9:00 a.m. – 3:00 p.m.

TECHNOLOGY SHOWCASE

10:00 a.m. – 2:30 p.m.

EXHIBITOR MOVE-OUT 3:30 p.m. – 10:00 p.m.

ADDITIONAL INFORMATION

For additional information about exhibiting, sponsoring, or advertising at at The Advanced Materials Show and MS&T, visit the Exhibits web page www.matscitech.org/MST/MST23/Exhibits or contact:

Zak Towner, Event Partners, +44 (0) 1273 286398

zak.towner@event-partners.com

RESERVE YOUR BOOTH TODAY! SPACES ARE FILLING UP FAST!



REGISTRATION

REGISTRATION CATEGORIES	RATE BEFORE SEPT. 7, 2023	RATE AFTER SEPT. 7, 2023
Member	\$725	\$875
Non-member	\$925	\$1,075
Undergraduate Student Member	\$25	\$75
Undergraduate Student Non-Member	\$25	\$75
Graduate Student Member	\$150	\$205
Graduate Student Non-Member	\$185	\$240
Expo Visitor	\$0	\$0



FOR MORE INFORMATION, VISIT MATSCITECH.ORG/MST23