Michigan Materials Research Institute (MMRI) Annual Summit
May 30th – 31st 2024

University of Michigan North Campus Research Complex, NCRC Building 18 - Dining Hall 2800 Plymouth Rd, Ann Arbor, MI 48105, USA

Workshop organizers:
Amit Misra, Director, MMRI and (MC)
Max Shtein, Associate Director, MMRI
Bobby Kerns, (MC) Center Manager
Workshop admin: Shelley Fellers
IT support: Mayne Mei, CSE; Kevin Worth

Thursday, May 30th

8:30 AM: Continental Breakfast / Registration.

9:00 - 9:10 AM: Welcome remarks: Eric Michielssen, Louise Ganiard Johnson Professor of EECS; Associate Dean for Research, Michigan Engineering.

9:10 - 9:30 AM: Michigan Materials Research Institute (MMRI) overview: Amit Misra, Director, MMRI; Edward DeMille Campbell Collegiate Professor of MSE.

Session I: Functional and Nanomaterials
Session Chair: Lu Li, Professor, Physics.

9:30 – 10:00 AM: Overview of the Center for Materials Innovation, the new NSF Materials Research Science and Engineering Center (MRSEC) at the University of Michigan, Rachel Goldman, Director, NSF MRSEC CMI and Director, DToP MURI

Maria Goeppert Mayer Collegiate Professor of MSE, Physics, EECS.

10:00-10:30 AM: NSF STC Center of Complex Particle Systems (COMPASS) overview: Complex materials combining order and disorder: Nick Kotov, Director, NSF STC COMPASS, Joseph B. and Florence V. Cejka Professor of Chemical Engineering, Irving Langmuir Distinguished University Professor of Chemical Sciences and Engineering.

10:30 – 11:00 AM: Nanoscale and quantum engineering of (ultra)wide bandgap semiconductors for next-generation optoelectronics, Zetian Mi, Professor, Electrical and Computer Engineering, Director, ARO MURI Polaritronics.
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Session II: Materials and Manufacturing for Medicine
Session Chair: Max Shtein, Professor, MSE.
11:00 – 11:30 AM: Discovery and Engineering of Natural Product Molecules for Drug Discovery David Sherman, Hans W Vahlteich Professor of Medicinal Chemistry, Professor of Microbiology & Immunology, Professor of Chemistry.

11:30 am – 12 PM: Scientific and regulatory challenges in developing complex drug products Anna Schwendeman, Co-Director, Center for Research on Complex Generics, H.W. Vahlteich Professor and Professor of Pharmaceutical Sciences.

12- 1 PM Working lunch / interactions boxed lunch available for registered attendees]

Session III: Computation, AI and Data-driven Materials and Manufacturing
Session Chair: Max Shtein, Professor, MSE.

1:00-1:20 PM Employing Artificial Intelligence to Accelerate Development and Implementation of Materials and Manufacturing Innovations, TMS-ONR-NIST study, Elizabeth Holm, Richard F. and Eleanor A. Towner Professor of Engineering; Chair, Department of Materials Science and Engineering.

1:20 – 1:40 PM MMRI Funded Project #1: EMERGE: Eutectic Materials dEsign through Rational Generative Engineering, Venkat Viswanathan (Aerospace Engineering); Timothy Cernak (Chemistry/Pharmacy); Vikram Gavini (Mechanical Engineering).

1:40 – 2:00 PM MMRI Funded Project #2: Early-Stage Evolution of Implanted Helium in Laser-Processed Metastable Grain Boundaries in Alloys - Integrated Time and Space Resolved Experimental and Computational Study, Yue Fan (Mechanical Engineering); Kevin Field and Yang Zhang (Nuclear Engineering and Radiological Sciences).

2:00 – 2:20 PM MMRI Funded Project #3: Generative AI for Materials and 3D Printing (3DP) Co-Design: Towards a Center for Additive Manufacturing and Material Advancements in Construction (CAMMAC), Mania Aghaei Meibodi (Architecture); Kira Barton (Robotics).

Session IV: Electronic, Photonic and Functional Materials
Session Chair: P. Ferdinand Poudue, Professor, MSE.


2:45 – 3:05 PM MMRI Funded Project #5: Integrating intermetallic cobalt phthalocyanine (CoPc)-PtZn electrocatalysts with colloidal graphene quantum dots towards highly selective CO₂ upgrading into methanol Joshua Jack (Civil & Environmental Engineering); Albert Liu (Chemical Engineering).

3:05 – 3:25 PM First Solar Materials R&D Overview: Bill Huber, Director of Technology, First Solar

3:25-3:45 PM Overview of Procter & Gamble R&D and Materials Interests, Peter C. Ellingson, R&D Director: Open Innovation.
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3:45 – 5:45 PM Poster Session [Refreshments available]

**Session chairs:** Kai Sun, Research Scientist, (MC), MSE. 
Zhongrui (Jerry) Li, Research Scientist, Central Campus Electron Microbeam Analysis Laboratory, 
Jing Tang, Assistant Professor, Mechanical Engineering. 
Yang Zhang, Professor, Nuclear Engineering and Radiological Sciences. 
Jinsang Kim (Director, Macromolecular Science & Engineering, Professor, MSE)

Poster presenters should put up their posters between 8:30-9 am or during morning coffee break or during lunch break.

Friday May 31st

8:30 AM: Continental Breakfast
**Session V: Functional Soft and Biomaterials**
**Session chair:** Zhan Chen, Michael D. Morris Collegiate Professor of Chemistry.

9:00 -9:30 AM *Controlling Ice Induction, Inhibition, and Adhesion*, Anish Tuteja, Professor, MSE.


9:50 – 10:10 AM MMRI Funded Project #7: *Control of Lung Cancer by Magnesium Alloy Implants*, Claudia Loebel (Materials Science & Engineering); Kiran Lagisetty (Surgery).

10:10 – 10:30 AM MMRI Funded Project #8: *Organoid Digital Twins for Personalized Drug Responses*, Geeta Mehta (Materials Science & Engineering; Biomedical Engineering); Analisa Difeo (Pathology).

**Session VI: Structural Materials & Manufacturing**
**Session chair:** Ashley Buscek, Assistant Professor, Mechanical Engineering.

10:40 – 11:00 AM *Center for PRedicive Integrated Structural Materials Science (PRISMS) Overview*: John Allison, William F Hosford Collegiate Professor of Materials Science and Engineering; Director, PRISMS Center.


11:20-11:45 AM *Physics-Informed and AI-enabled Design of Alloys*, Liang Qi, Associate Professor, MSE.

11:45 AM -12:00 PM *ASM Materials Solution Network Overview*, Carola Sekreter, Director, Business Development (ASM-MSN).

12- 1 PM Poster Awards Poster Session chairs: Kai Sun, Zhongrui (Jerry) Li, Jing Tang, Yang Zhang, Jinsang Kim
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Working lunch / interactions

Session VII: Materials Characterization

Session chair: Alan Taub, Director, Electric Vehicle Center; Robert H. Lurie Professor of Engineering.

1:00 - 1:20 PM Michigan Center for Materials Characterization, (MC)^2: Bobby Kerns, Center Manager.

1:20 – 1:50 PM Capturing the emergence of hierarchical microstructures in metallic materials
Ashwin Shahani, Associate Professor, MSE.

1:50 – 2:20 PM Understanding Interfacial Phenomena in Solid-State Batteries, Neil Dasgupta,
Miller Faculty Scholar, Associate Professor, Mechanical Engineering.

2:20 – 2:40 PM Materials in 3D/4D: X-ray Microscopy as a Means to Connect Morphology, Microstructure, and Performance, Dr. Will Harris, ZEISS Research Microscopy Solutions, Carl Zeiss Microscopy, LLC

2:40 – 3:00 PM Probing electrolyte-driven failure in anode-free cells via x-ray microscopy,
Dr. Jeff Lowe, General Motors: Virtual Propulsion Engineer – Battery Cell Electrochemistry.

3:00 PM Closing Remarks, Open Discussion

≈ 3:30 PM Adjourn