

# Michigan Materials Research Institute (MMRI) Annual Summit

May 30<sup>th</sup> – 31<sup>st</sup> 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)<sup>2</sup>

[Max Shtein](#), Associate Director, MMRI

[Bobby Kerns](#), (MC)<sup>2</sup> Center Manager

Workshop admin: Shelley Fellers

IT support: Mayne Mei, CSE; Kevin Worth

## Thursday, May 30<sup>th</sup>

**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 Poudeu](#), Professor, MSE.

**2:25 – 2:45 PM MMRI Funded Project #4:** *Hybrid photonic integration: Enabling nonlinear molecular crystals on chip*, [Chris Noel Giebink](#) and [Di Liang](#) (Electrical Engineering & Computer Science).

**2:45 – 3:05 PM MMRI Funded Project #5:** *Integrating intermetallic cobalt phthalocyanine (CoPc)-PtZn electrocatalysts with colloidal graphene quantum dots towards highly selective CO<sub>2</sub> 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)<sup>2</sup>, 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 31<sup>st</sup>

**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.

**9:30 – 9:50 AM MMRI Funded Project #6:** *Mycelium Bonding to Fibers for Stronger, Stiffer, and Integrated Biomaterials*, [Evgueni T. Filipov](#) (Civil & Environmental Engineering); [Glenn Wilcox](#) (Architecture).

**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 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 PRedictive Integrated Structural Materials Science (PRISMS) Overview:*

[John Allison](#), William F Hosford Collegiate Professor of Materials Science and Engineering; Director, PRISMS Center.

**11:00-11:20 AM** *Eaton Advanced Materials & Processes: Driving organic growth, sustainability, cost improvement & supply assurance through advanced materials development.* [Jason Carroll](#), VP, Global Technology, Eaton.

**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)<sup>2</sup>:* [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