# IPRIME ANNUAL MEETING 2018

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SPECIAL EVENTS & PPB/TAC MEETINGS

Student/Industry Meet & Greet sponsored by Abbot and Ecolab
Tues, May 29, 5:00 – 5:45 PM, McNamara Alumni Center, Johnson Great Room

Poster Session 1
Tues, May 29, 5:45 – 7:15 PM, McNamara Alumni Center, Memorial Hall

Plenary Luncheon
Wed, May 30, 11:45- 1:00 PM, McNamara Alumni Center, Johnson Great Room

Faculty- Industry Meet & Greet
Wed, May 30, 5:00-5:45 PM, McNamara Alumni Center, Johnson Great Room

Poster Session 2 and Awards
Wed, May 30, 5:45 – 7:30 PM, McNamara Alumni Center, Memorial Hall

Planning and Policy Board Breakfast (PPB representatives only)
Thu, May 31, 7:00-8:15 AM, the Graduate Hotel

Technical Advisory Committee (TAC) Meetings & Luncheons (TAC representatives only)
Thu, May 31, 12:00-1:45 PM, Coffman Memorial Union, 4th Floor, Campus Club

Meeting rooms in Coffman:
BB TAC Room 410
BPM TAC Room 411
CPF TAC Room B/C
PPB Reps Amundson 151D
EMD TAC Room 409
MP TAC Dale Shepherd Room
NMP TAC Room A

Planning and Policy Board Meeting
Thu, May 31, 2:00-3:30 PM, Amundson Hall room 151D

Characterization Facility Tour
Thu, May 31, ~3:30-4:00 PM, Shepherd Labs
(Tour starts after the Planning and Policy Board meeting-meet in Amundson Hall room 151D)

WI-FI Network Guest Access at the University of Minnesota
To connect to the U of M Free Wi-Fi, log in using the “U of M Guest” SSID and enter your active email address. Please note that this service offers no encryption and is limited in bandwidth and capacity.
Partnership Program Names and Abbreviations

Biocatalysis and Biotechnology (BB)
Conceive and apply biological technologies and products, with structures and functionalities fine-tuned at molecular, micro, cellular and reactor scales. These include biosynthesis for biofuels, polymers, and specialty chemicals; design and engineering of enzymes, proteins, biochemicals and microbes; metabolic and pathway engineering; functional genomics for enzyme discovery; interfacial and micro-environmental interactions, assembling and activation; and biotechnologies for smart materials, biosensors, bioremediation, and surface-active ingredients.

Biomaterials and Pharmaceutical Materials (BPM)
Synthesis and characterization of novel hard and soft materials and composites for biomedical and pharmaceutical applications; dynamics of mechanical, chemical and transport properties of biomaterials; evaluation and elucidation of materials interactions with biological tissues and media, and with pharmaceuticals.

Coating Process Fundamentals (CPF)
Research aimed at the fundamentals of liquid-applied coating and printing processes, including liquid flow, interfacial phenomena, solidification and structure development, and employing process visualizations, microcopies, nanotesting, spectroscopies, and microstructure probes combined with theory and computational methods.

Electronic Materials and Devices (EMD)
Focuses on synthesis, structural and chemical characterization, and a plethora of electronic, optical and magnetic characterization techniques. Particular emphasis is placed on the understanding of the fundamentals of electronic structure and transport in electronic and magnetic materials in addition to the materials science, physics and chemistry of the interfaces and nanostructures that play such a vital role in devices.

Flexible Electronics and Photovoltaics (FEP)
Flexible electronics have the potential to revolutionize how we interact with our surroundings, with new applications in areas including energy conversion, information display, and life-science technology. The Flexible Electronics and Photovoltaics (FEP) program is committed to defining and addressing challenges to the realization of these emerging technologies. Activities are centered on the study of both organic and hybrid organic-inorganic semiconductor materials and their application in discrete devices and broader electronic systems. Research activities and expertise in FEP spans all aspects of organic and hybrid organic-inorganic electronics, including material and thin film synthesis, device design, characterization and modeling, and materials processing (both solution-based and vapor-based).

Microstructured Polymers (MP)
Design and synthesis of novel polymers, characterization of their structural and mechanical properties, and investigation of their rheology and processing behavior for both commodity and high value-added polymer products.

Nanostructural Materials and Processes (NMP)
Identifying key molecular parameters and principles governing the assembly and properties of molecular thin films, surfactants, and ordered molecular phases of molecular systems for synthesis of specialty materials in agricultural, cosmetics, pharmaceuticals, personal care, and other businesses.
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WORKSHOPS

Tuesday afternoon and Wednesday morning

Tuesday PM

- Droplet-Based Coating and Printing 1 (CPF)  p. 7
- Polymer Nanocomposites: Preparation, Structure and Properties 1 (MP)  p. 8

Wednesday AM

- Biorenewable Polymers and Materials (BB)  p. 9
- Preparation & Processing of Biomedical & Pharmaceutical Materials (BPM)  p. 10
- Droplet-Based Coating and Printing 2 (CPF)  p. 11
- Advances in Flexible Electronics and OLED Displays (FEP)  p. 12
- Polymer Nanocomposites: Preparation, Structure and Properties 2 (MP)  p. 13
- Characterization-focused Industrial Fellow Collaborative Projects: Examples, Opportunities, & Challenges (NMP)  p. 14
- Material Options for Transparent Conductive Oxides (EMD)  p. 15
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This workshop addresses the science and engineering of droplet-based coating and printing processes, including spray coating, aerosol jet printing, and inkjet printing. Presentations from industrial and academic speakers will cover a range of topics from the science of liquid droplet formation and impact to processing fundamental and engineering applications.

**AGENDA**

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Authors</th>
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</thead>
<tbody>
<tr>
<td>1:15</td>
<td>Welcome and Overview</td>
<td>Lorraine Francis, UMN</td>
</tr>
<tr>
<td>1:20</td>
<td>Fluid Dynamics of Drop-Based Printing, Coating, and Manufacturing</td>
<td>Osman Basaran, Purdue University</td>
</tr>
<tr>
<td>2:10</td>
<td>How the Selection of Raw Materials Can Impact Print Speeds in Digital Printing</td>
<td>Charlie Hsu, BASF</td>
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<tr>
<td>2:50</td>
<td>Break</td>
<td></td>
</tr>
<tr>
<td>3:20</td>
<td>CaBER Indexing of Cobwebbing Failure in Liquid Printing Inks: Characterization of Extensional Viscosity in Apparently Newtonian Fluids</td>
<td>Matthew Gebhard, DSM</td>
</tr>
<tr>
<td>4:00</td>
<td>Additives for Inkjet Inks and Other Droplet-Based Coating and Graphic Arts Applications</td>
<td>Ingrid Meier, Evonik</td>
</tr>
</tbody>
</table>
This workshop will focus on nanoparticle-based composites including their preparation, structure and properties. Appropriately tailored nanocomposite systems can exhibit significant enhancements in thermal and electrical conductivity, mechanical properties, transport properties and optical performance compared to their neat polymer counterparts. As a result, this important class of materials impacts a broad range of application areas.

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<tbody>
<tr>
<td>1:15</td>
<td>Tailoring Polymer Grafted Nanoparticles to Control Structure and Thermodynamics in Polymer Nanocomposites</td>
<td>Arthi Jayaraman, University of Delaware</td>
</tr>
<tr>
<td>1:55</td>
<td>Nano-Inorganic Modified Polymers for Mechanical Benefit</td>
<td>Brett Beiermann, 3M</td>
</tr>
<tr>
<td>2:15</td>
<td>Nanoparticles in Polymers: Rheology, Assembly, and Properties</td>
<td>YuanQiao Rao, Dow Chemical</td>
</tr>
<tr>
<td>2:55</td>
<td>Break</td>
<td></td>
</tr>
<tr>
<td>3:15</td>
<td>Strategies to Impart Electrical Conductivity to Polymer Composites</td>
<td>Sam Dahman, RTP</td>
</tr>
<tr>
<td>3:55</td>
<td>Elastic Reduced Graphene Oxide Aerogels: Processing and Applications</td>
<td>Chris Ellison, Han Xiao, UMN; Josh Pender, UT Austin; Heonjoo Ha, UMN; C. Buddie Mullins, UT Austin</td>
</tr>
</tbody>
</table>
Biorenewable Polymers and Materials
Biocatalysis and Biotechnology (BPM)
Ping Wang, Kechun Zhang, Coordinators

Novel products and processing technologies utilizing renewable resources will be examined. Presentations from both academic and industrial experts in the area will review products development, processing technologies and potential applications of biorenewable products.

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<tr>
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<tbody>
<tr>
<td>8:30</td>
<td>Biorefinery for Production of Fuels, Chemicals, and Biopolymers from Renewable Biomass</td>
<td>Shang-Tian Yang, Ohio State</td>
</tr>
<tr>
<td>9:10</td>
<td>Bio polymers at 3M</td>
<td>Jason Bjork, 3M</td>
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<tr>
<td>9:50</td>
<td>Break</td>
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</tr>
<tr>
<td>10:10</td>
<td>Synthetic Approaches to Bio-based Polymers</td>
<td>Kechun Zhang, UMN</td>
</tr>
<tr>
<td>10:40</td>
<td>Polymeric Materials with very High Levels of Lignin</td>
<td>Simo Sarkanen, UMN</td>
</tr>
<tr>
<td>11:10</td>
<td>Activated Carbon Fibers from Cellulosic Biomass</td>
<td>Ping Wang, UMN</td>
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</tbody>
</table>
Wednesday, May 30
8:30-11:40 AM | Keller 3-111

Preparation & Processing of Biomedical & Pharmaceutical Materials
Biomaterials and Pharmaceutical Materials
Ron Siegel, Program Leader

While synthesis and characterization of novel polymers and other materials for biomedical and pharmaceutical applications continues to excite researchers at the discovery level, all such materials must be processed into forms that are suitable for their industrial application. This workshop will focus on such processing techniques, including blending, extrusion, and coating, as applied to biomedical devices and pharmaceutical products.

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<th>Authors</th>
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<tbody>
<tr>
<td>8:30</td>
<td>Welcome</td>
<td>Ron Siegel, Program Leader</td>
</tr>
<tr>
<td>8:35</td>
<td>How Twin-Screw Extrusion is Reshaping Pharmaceutical Manufacturing</td>
<td>Feng Zhang, University of Texas</td>
</tr>
<tr>
<td>9:15</td>
<td>Manufacturing of Controlled Release Powders for Patient-Friendly Dosage Forms</td>
<td>Cory Berkland, University of Kansas</td>
</tr>
<tr>
<td>9:55</td>
<td>Break</td>
<td></td>
</tr>
<tr>
<td>10:15</td>
<td>Processing and Assembly for Medical Devices</td>
<td>SuPing Lyu, Medtronic</td>
</tr>
<tr>
<td>10:55</td>
<td>Design of Coatings for Medical Devices</td>
<td>Nathan Lockwood, Surmodics</td>
</tr>
</tbody>
</table>
This workshop addresses the science and engineering of droplet-based coating and printing processes, including spray coating, aerosol jet printing, and inkjet printing. Presentations from industrial and academic speakers will cover a range of topics from the science of liquid droplet formation and impact to processing fundamental and engineering applications.

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<td>8:30</td>
<td>Welcome and Overview</td>
<td>Lorraine Francis, UMN</td>
</tr>
<tr>
<td>8:35</td>
<td>Drops on Surfaces: Effect of Air Flow</td>
<td>Sungyon Lee, UMN</td>
</tr>
<tr>
<td>9:15</td>
<td>Rheological Properties of Sprayable Coatings</td>
<td>Hao Sun, PPG</td>
</tr>
<tr>
<td>9:45</td>
<td>Break</td>
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<tr>
<td>10:15</td>
<td>Wanhua and Its Technologies for Surface and Interface Applications</td>
<td>Tao Yu, Wanhua Chemical</td>
</tr>
<tr>
<td>10:55</td>
<td>Fluorocarbon-Free Oil and Grease Barrier Coatings for Paper and Paperboard</td>
<td>Andy Hejl, Dow Chemical</td>
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</table>
Flexible electronics continue to find integration into practical devices, with even greater potential on the horizon. In this workshop, we will consider questions related to the materials design and processing, as well as how to realize a broader manufacturing base to enable this exciting technology. Organic light-emitting devices (OLEDs) have realized a near-ubiquitous level of commercialization with their use in a variety of mobile technologies, televisions, and lighting. In this workshop, we will see how further innovations in device design, manufacture and processing will enable even broader future applications for OLEDs.

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<tr>
<td>8:30</td>
<td>Welcome</td>
<td>Russell Holmes, UMN</td>
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<tr>
<td>8:35</td>
<td>NextFlex: Building a Manufacturing Ecosystem for Flexible Hybrid Electronics</td>
<td>Benjamin Leever, Air Force Research Laboratory &amp; NextFlex</td>
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<tr>
<td>9:45</td>
<td>Break</td>
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<tr>
<td>10:15</td>
<td>Designing Nanostructures for Color Shift Improvement in OLED Displays</td>
<td>Nick Erickson, Display Materials and Systems Division, 3M</td>
</tr>
<tr>
<td>10:50</td>
<td>Designing Displays for Consumer Electronics</td>
<td>Andy Cady, Microsoft</td>
</tr>
</tbody>
</table>
This workshop will focus on nanoparticle-based composites including their preparation, structure and properties. Appropriately tailored nanocomposite systems can exhibit significant enhancements in thermal and electrical conductivity, mechanical properties, transport properties and optical performance compared to their neat polymer counterparts. As a result, this important class of materials impacts a broad range of application areas.

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<tr>
<td>9:00</td>
<td>Gas Transport Through Mixed Matrix Membranes</td>
<td>Sanat Kumar, Columbia University</td>
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<td>9:40</td>
<td>Polymeric Composites for Electronics Thermal Management</td>
<td>Sanjay Misra, Querelle-Halvorson, Sarrah, Henkel</td>
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<tr>
<td>10:20</td>
<td>Break</td>
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<tr>
<td>10:40</td>
<td>Processable Multiple Network Composite Design Using Insights from Sequential IPNs</td>
<td>Meredith Wiseman, Pepels, Mark; Hensen, Guido; Driessen, Marco; Steeman, Paul; Bulters, Markus, DSM</td>
</tr>
<tr>
<td>11:20</td>
<td>Soft “Nanoparticle” Toughened Thermoplastics</td>
<td>Jun Xu, UMN</td>
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</table>
Wednesday, May 30
8:30-11:40 AM | Amundson Hall, Room 162

Characterization-focused Industrial Fellow Collaborative Projects:
Examples, Opportunities, & Challenges
Nanostructural Materials and Processes Program (NMP)
Alon McCormick, Program Leader

AGENDA
Collaborators from member-companies will give short (10-25 min) presentations that help all to launch and conduct successful industrial fellow projects addressing the following areas:

- broad overview of interest
- summarizing challenges from their perspective
- describing lessons learned from recent projects in how to launch and conduct an industrial fellow project
- thoughts to help shape future possible industrial fellow projects

Collaborative projects that focus on challenges in interfacial characterization include for instance:

- functional surfaces,
- interfacial phenomena related to cleaning,
- nanodispersions,
- green/sustainable/low-carbon-footprint nanomaterials/nanoprocesses,
- dynamics at liquid/liquid and liquid/gas interfaces
- biomedical applications
- analysis of nanomaterials within composites or complex formulations

**BASF, Novel concept to achieve a rainbow-type holographic effect that can be scaled-up economically:**
Urs Stadler

**Boston Scientific, Tradeoffs in surface properties when optimizing catheter coating cure:**
Maggie Zeng, Greg Haugstad

**Ecolab, How to approach characterizing superhydrophobic, superoleophobic, and superomniphobic coatings:**
Stephan Hubig, Rachel Rahn, Bing Luo, Greg Haugstad

**ExxonMobil, Challenge: Assess chemical and mechanical changes on the micro to nanoscale in complex mixtures of multiple polymers and fillers, during or following compounding or post-reactor derivatization:**
Jason Mann

**Nanocopoeia, Drug/polymer/surfactant composites:**
Bob Hoerr, Greg Haugstad

**Sherwin-Williams, New methods to characterize adhesion of coatings using AFM:**
Gunnar Duner, Greg Haugstad

**Medtronic, Characteristics of a successful collaborative industrial fellow project:**
Carl Schu, Phil Buhlman, Andreas Stein
Material Options for Transparent Conductive Oxides
Electronic Materials and Devices (EMD)
Steve Koester and Bharat Jalan, Co-Program Leaders

For transparent conducting applications, a material must possess simultaneously high electrical conductivity and optical transparency in the visible spectrum. Among common candidates, indium tin oxide (ITO), metal grids, carbon nanotube, graphene, nanowire meshes and ultra-thin metal films have been widely discussed. More recent work has witnessed emerging interest in alternative indium-free oxides based on perovskite crystal structures such as doped BaSnO3. This workshop will discuss various materials technologies, and their potential and limitations for applications in liquid-crystal displays, OLEDs, touchscreens and photovoltaics.

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<tr>
<td>8:30</td>
<td>Indium Tin Oxide Transparent Conducting Oxides</td>
<td>David Rowe, 3M</td>
</tr>
<tr>
<td>9:00</td>
<td>Novel Indium-free Transparent Conducting Oxide Materials</td>
<td>Bharat Jalan, UMN</td>
</tr>
<tr>
<td>9:30</td>
<td>Transparent Conductors Based upon Two-Dimensional Conductors</td>
<td>Steven Koester, UMN</td>
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<tr>
<td>10:00</td>
<td>Break</td>
<td></td>
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<tr>
<td>10:30</td>
<td>β-Ga2O3, A New Contender for Transparent Conducting Applications</td>
<td>Andrei Osinsky, Agnitron</td>
</tr>
<tr>
<td>11:00</td>
<td>Plasma Synthesis of Highly Conductive Wide Bandgap Semiconductor Nanocrystal Films</td>
<td>Uwe Kortshagen, UMN</td>
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POSTER SESSION 1

TUESDAY EVENING

5:45 PM to 7:15 PM
MCNAMARA, MEMORIAL HALL

For a complete list of posters for both days please see pages 31-43

The posters will also be on display Wednesday at the same times. Poster awards will be announced at 7:30 PM Wednesday Night.
Guest Speaker
Russell Holmes
Department of Chemical Engineering and Materials Science
University of Minnesota

"How materials and interfacial engineering have enabled the commercialization of organic light-emitting devices (OLEDs) in next generation displays”

Organic light-emitting devices (OLEDs) have realized broad commercialization as a display platform in mobile applications and televisions. Emerging applications in solid-state white lighting, flexible displays, and augmented/virtual reality suggest that we have only begun to unlock the exciting potential of this technology. The commercialization of organic semiconductors in OLEDs has involved innovation on numerous fronts, ranging from the design and optimization of active materials and device architectures, to the continual refinement of scaled-up processing methods. In this talk, we will examine how active materials design enabled the commercialization of this technology, and consider the crucial role played by carefully engineered interfaces in realizing high efficiency and long-lifetime operation. We will further consider existing challenges for the broader commercialization of this technology, and discuss where materials engineers can contribute to further expand the application space for OLEDs.
PROGRAM REVIEWS

Wednesday

Biocatalysis and Biotechnology p. 19
Biomaterials and Pharmaceutical Materials p. 20
Coating Process Fundamentals 1 p. 21
Electronic Materials and Devices p. 22
Flexible Electronics and Photovoltaics p. 23
Microstructured Polymers 1 p. 24-25
Nanostructural Materials and Processes 1 p. 26-27

Thursday

Coating Process Fundamentals 2 p. 27-28
Microstructured Polymers 2 p. 28-29
Nanostructural Materials and Processes 2 p. 29-30
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## Biocatalysis and Biotechnology Program Review
Ping Wang, Mikael Elias, Coordinators

### AGENDA

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<tr>
<td>1:15</td>
<td>Biocatalysis for Health and Agriculture</td>
<td>Larry Wacket, UMN</td>
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<tr>
<td>1:40</td>
<td>Enzymatic Production of Protein-conjugates for Biomedical Applications</td>
<td>Mark Distefano, UMN</td>
</tr>
<tr>
<td>2:05</td>
<td>Controlling Bacteria and Editing Communities using Engineered Enzymatic Signal Quenchers</td>
<td>Mikael Elias, Celine Bergonzi, Michael Schwab, UMN</td>
</tr>
<tr>
<td>2:30</td>
<td>Interfacially-Active Proteins for Use as Bio-surfactants and Material Additives</td>
<td>Natalia Mancipe, Ping Wang, UMN</td>
</tr>
<tr>
<td>2:55</td>
<td>Break</td>
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<tr>
<td>3:20</td>
<td>Improvement of Proteins by Continuous, Focused, Accelerated Mutageneisis of Selected Genes in Microorganisms.</td>
<td>Xiao Yi, Romas Kazlauskas, UMN</td>
</tr>
<tr>
<td>3:45</td>
<td>A New Bio-based Route to Isoprene</td>
<td>Jilong Wang, Kechun Zhang, UMN</td>
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<tr>
<td>4:10</td>
<td>Microfluidic Approach to Evaluate the Pathogenic-commensal Microbe Interactions with Human Epithelial Cells</td>
<td>Pranav Agrawal, Wei-Shou Hu, UMN</td>
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<td>Welcome</td>
<td>Ron Siegel, UMN</td>
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<tr>
<td>1:20</td>
<td>Biodegradable Semi-solid Polymers for Drug Delivery</td>
<td>Chun Wang, UMN</td>
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<tr>
<td>1:40</td>
<td>Engineering of Biomaterials Using Biomimetic Strategies and Intelligent Biopolymers</td>
<td>Wei Shen, UMN</td>
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<td>2:00</td>
<td>Relationship Between Molecular Mobility and Physical Stability in Amorphous Pharmaceuticals</td>
<td>Kweku Amponsah-Elah, Raj Suryanarayanan, UMN</td>
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<tr>
<td>2:20</td>
<td>A Particle Engineering Approach for Enabling Tablet Development of Celecoxib</td>
<td>Shubajit Paul, Calvin Sun, UMN</td>
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<td>3:00</td>
<td>Tissue-engineered TAVI Valve with Matrix-embedded Stent</td>
<td>Zeeshan Syedain, Robert Tranquillo, UMN</td>
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<td>3:40</td>
<td>Polymeric Nanoparticles Encapsulating TLR7/8 agonist for NK cell-mediated Cancer Immunotherapy</td>
<td>Hyunjoon Kim, Thomas Griffith, David Ferguson, Jayanth Panyam, UMN</td>
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<td>4:00</td>
<td>Elasticity, Plasticity, and Failure of Biodegradable Polymers: Prelude to Biodegradable Osmotic Delivery Pumps</td>
<td>Ronald A. Siegel, Krutika Harish Jain, UMN</td>
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<td>1:15</td>
<td>Coating Process Fundamentals: Progress and Plans</td>
<td>Lorraine Francis, UMN</td>
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<td>1:30</td>
<td>Effect of Viscoelasticity on Stability of Curtain Coating</td>
<td>Alireza Mohammad Karim, Wieslaw J. Suszynski, UMN; William B. Griffith, Saswati Pujari, Dow Chemical C; Lorraine F. Francis, UMN; Marcio S. Carvalho; UMN and PUC-Rio</td>
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<td>1:50</td>
<td>Dynamic Wetting Failure in non-Newtonian Liquids</td>
<td>Vasileios Charitatos, Satish Kumar, UMN</td>
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<td>2:10</td>
<td>Breakup Dynamics of Non Newtonian Thin Liquid Sheets</td>
<td>Marisa Bazzi, Marcio Caralho, PUC-Rio, UMN</td>
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<td>2:30</td>
<td>Effect of Non-Newtonian Rheology on Coating Window in Tensioned-Web-over-Slot-Die Coating</td>
<td>Koichi Nakano, Dai Nippon Printing</td>
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<td>2:50</td>
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<tr>
<td>3:10</td>
<td>Roll-to-Roll Micromolding of UV Curable Coatings</td>
<td>Yuyang Du, Lorraine Francis, Alon McCormick, UMN</td>
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<td>3:30</td>
<td>Understanding and Mitigating Defects in Roll-to-Roll UV Micromolding for the Fabrication of Printed Metal Conductors</td>
<td>Krystopher Jochem, Lorraine Francis, Daniel Frisbie, UMN</td>
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<td>3:50</td>
<td>Capillary Flow and Evaporation in Open Microchannels</td>
<td>Panayiotis Kolliopoulos, Satish Kumar, UMN</td>
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<td>4:10</td>
<td>3D Printing and Mechanical Performance of Silicones</td>
<td>Noah Holzman, Lorraine Francis, UMN</td>
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# Electronic Materials and Devices Program Review

Steve Koester and Bharat Jalan, Co-Program Leaders

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<tr>
<td>1:15</td>
<td>Introduction</td>
<td>Steven Koester, UMN</td>
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<td>1:40</td>
<td>Buffer and Barrier Layers for Cu(In,Ga)Se2 (CIGS) Based Tandem Photovoltaics</td>
<td>Timothy Bontrager, Sehyun Hwang, Mandip Sipakoti, Stephen, Campbell, UMN</td>
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<td>2:05</td>
<td>Mobility Optimization in High-pressure-oxygen-sputtered Epitaxial Ba1-xLaxSnO3 Thin Films</td>
<td>William Postiglione, Koustav Ganguly, Hwanhui Yun, Jong Seok Jeong, Andre Mkhoyan, Bharat Jalan, Chris, Leighton, UMN</td>
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<td>2:30</td>
<td>Quantifying Disorder in CVD Graphene Induced by Ripples from Thermal Expansion Mismatch</td>
<td>Qun Su, Yao Zhang, Xue Zhen, Philippe Buhlmann, Steven Koester, UMN</td>
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<td>3:25</td>
<td>Dielectric Response in Hybrid Molecular Beam Epitaxy-grown Ba(Ti1-xSnx)O3 Films</td>
<td>William Nunn, Abhinav Prakash, Ryan Haislmaier, Jin Yue, Hanlin Gu, Richard James, Bharat Jalan, UMN; Arghya Bhowmik, Juan Maria Garcia Lastra, Tech U Denmark</td>
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<td>4:15</td>
<td>Electrical and Optical Characterization of b-Ga2O3 Thin Films</td>
<td>Sandhaya Koirala, UMN</td>
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<td>1:15</td>
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<td>Russell Holmes, UMN</td>
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<td>1:20</td>
<td>New Strategies to Printed Electronics</td>
<td>Motao Cao, Lorraine Francis, Daniel Frisbie UMN</td>
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<td>1:35</td>
<td>Electrolyte Gated Transistors Based on Single Crystals of Rubrene</td>
<td>Xinglong Ren, Daniel Frisbie, UMN</td>
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<td>1:50</td>
<td>Enhancing the Performance of Electrolyte Gated Transistors</td>
<td>Fazel Zare Bidoky, Daniel Frisbie, UMN</td>
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<td>2:05</td>
<td>Synthetic Studies Toward Conjugated Carbon Nanobelts</td>
<td>Zhuoran Zhang, Christopher Douglas, UMN</td>
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<tr>
<td>2:50</td>
<td>Introduction</td>
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<td>3:10</td>
<td>Engineering Donor-Acceptor Interface for Suppression of Recombination in Organic Photovoltaic Cells</td>
<td>Tao Zhang, Russell Holmes, UMN</td>
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<td>Vapor-Deposition for Lead-Free Perovskite Optoelectronics</td>
<td>Catherine Clark, Eray Eydil, Russell Holmes, UMN</td>
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<td>Photonic Structures for Luminescent Solar Concentrators</td>
<td>Ryan Connell, Christian Pinnell, Vivian Ferry, UMN</td>
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<td>3:55</td>
<td>Measuring the Optical Constants of Quantum Dot Thin Films</td>
<td>Dana Dement, Mayank Puri, Vivian Ferry, UMN</td>
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# Microstructured Polymers Program Review 1

**Chris Ellison, Program Leader**

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<tbody>
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<td>Welcome and Introduction</td>
<td><strong>Chris Ellison, UMN</strong></td>
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<td>1:20</td>
<td>Research in the Dorfman Group</td>
<td><strong>Kevin Dorfman, UMN</strong></td>
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<tr>
<td>1:50</td>
<td>Complex Spheres Phases in Diblock Polymer Lyotropic LiquidCrystals</td>
<td><strong>Ashish Jayaraman, UMN</strong>; Diana Zhang, UT Austin; Beth Dewing, Mahesh Mahanthappa, UMN</td>
</tr>
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<td>2:10</td>
<td>PCS with Anisotropic Scattering: Analysis of a BCC-forming Diblock Copolymer</td>
<td><strong>Ronald Lewis III, Grayson Jackson, Kyungtae Kim, Michael Maher, Haley Beech, UMN; Suresh Narayanan, Argonne Nat’l Laboratories; Timothy Lodge, Mahesh Mahanthappa, Frank Bates, UMN</strong></td>
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<tr>
<td>2:30</td>
<td>Conformations of Polymers in Ionic Liquids by Small-angle Neutron Scattering</td>
<td><strong>Aakriti Kharel, UMN</strong></td>
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<td>2:50</td>
<td>Break</td>
<td><strong>Kailong Jin, UMN</strong></td>
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<td>3:10</td>
<td>Recyclable Cross-linked Network Polymers with Reversible Bonds: Polymer Synthesis and Processing</td>
<td><strong>Ingrid Haugan, Michael; Maher, UMN; Alice Chang, Tzu-Pin Lin, Robert Grubbs; CalTech; Marc Hillmyer, Frank Bates, UMN</strong></td>
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<td>3:30</td>
<td>Consequences of Grafting Density on the Rheology of Graft Polymers</td>
<td><strong>Ingrid Haugan, Michael; Maher, UMN; Alice Chang, Tzu-Pin Lin, Robert Grubbs; CalTech; Marc Hillmyer, Frank Bates, UMN</strong></td>
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<td>3:50</td>
<td>Design and Characterization of Sustainable Acrylates Based on Natural Phenolics for Stereolithography 3D Printing</td>
<td><strong>Rui Ding</strong>, Yuyang Du, Lorraine Francis, Theresa Reineke, UMN</td>
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<td>4:10</td>
<td>Catalyst-Promoted Reactive Compatibilization of Immiscible Polymers</td>
<td><strong>Kunwei Liu</strong>, Davis Dew, Chris Ellison, Chris Macosko, UMN</td>
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<td>4:30</td>
<td>Polydopamine-Graphene Oxide Flame Retardant Nanocoating Applied via an Aqueous Liquid Crystalline Scaffold</td>
<td><strong>Hanim Kim</strong>, Daewoo Kim, UMN; Vivek Vasagar, U of Southern Mississippi; Heonjoo Ha, UMN; Sergei Nazarenko, U of Southern Mississippi; Christopher Ellison, UMN</td>
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**Wednesday, May 30**  
1:15-4:45 PM | Keller Hall, Room 3-230

**Nanostructural Materials and Processes Program Review 1**  
Alon McCormick, Program Leader

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<tbody>
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<td>Welcome and Overview</td>
<td>Alon McCormick, UMN</td>
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<td>1:20</td>
<td>Penn Research Group Overview</td>
<td>Lee Penn, UMN</td>
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<td>1:25</td>
<td>Suppressing Competing Mechanisms during the Growth of Silver Nanoparticles in Polyol Solvents</td>
<td>Suyue Chen, Hong Bok Lee, Jake Drehmel, Lee Penn, UMN</td>
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<td>Tsapatsis Research Group Overview</td>
<td>Michael Tsapatsis, UMN</td>
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<td>1:50</td>
<td>Synthesis and Applications of Self-pillared Zeolite Nanosheets</td>
<td>Dandan Xu, Michael Tsapatsis, UMN</td>
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<td>2:05</td>
<td>Vapor Phase Processing of Zeolitic Imidazolate Framework Membranes</td>
<td>Xiaoli Ma, Prashant Kumar, Nitish Mittal, Alexandra Khlyustova, Prodomos Daoutidis, Andre Mkhoyan, Michael Tsapatsis, UMN</td>
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<td>2:20</td>
<td>Composite Thermochemical Approach to Tin Alkyl Precursors in Hybrid Molecular Beam Epitaxy</td>
<td>Robin Harkins, Abhinav Prakash, Tianqi Wang, Bharat Jalan, Chris Cramer, Wayne Gladfelter, UMN</td>
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<tr>
<td>2:35</td>
<td>Break</td>
<td>Andreas Stein, UMN</td>
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<tr>
<td>3:00</td>
<td>Stein Research Group Overview</td>
<td>Wenyang Zhao, Veerappan Balasubramanian, Prashant Kumar, Michael Tsapatsis, Andreas Stein, UMN</td>
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<td>3:05</td>
<td>CuO -based Solid Adsorbent for the Selective Removal of Dilute H2S from Claus Process Tail gas</td>
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<td>3:20</td>
<td>Nanocasting in metal organic frameworks: scope and applications</td>
<td>Zhao Wang, Andreas Stein, UMN</td>
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<td>3:40</td>
<td>Frisbie Research Group Overview</td>
<td>Dan Frisbie, UMN</td>
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<td>3:45</td>
<td>Gate-Tunable Electrochemistry of 2D Materials</td>
<td>Yan Wang, Daniel Frisbie, UMN</td>
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<td>4:00</td>
<td>Surface Charge and Capacitance Effects in Floating Gate Electrolyte-Gated Transistor Biosensors</td>
<td>Matthew Thomas, Kevin Dorfman, Daniel Frisbie, UMN</td>
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<td>4:20</td>
<td>CharFac Overview</td>
<td>Greg Haugstad, UMN</td>
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<td>4:25</td>
<td>Multifrequency AFM as a probe of soft matter and interfaces</td>
<td>Greg Haugstad, UMN</td>
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## Thursday, May 31
8:30-11:40 AM | Keller Hall, Room 3-180

### Coating Process Fundamentals Program Review 2
Lorraine Francis Program Leader

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<tr>
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<td>Electrostatic Assist of Liquid Transfer Between Plates and Cavities</td>
<td>Chung-Hsuan Huang, Satish Kumar, UMN</td>
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<td>8:50</td>
<td>Emptying of Gravure Cavities Containing Shear-Thinning and Shear-Thickening Liquids</td>
<td>Jyungting Wu, Lorraine Francis, Satish Kumar, UMN; Marcio Carvalho, PUC-Rio</td>
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<td>9:10</td>
<td>Imbibition of Volatile Droplets of Colloidal Suspensions on Rough Substrates</td>
<td>Truong Pham, Xiang Cheng, Satish Kumar, UMN</td>
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<td>9:30</td>
<td>Impact Force and Pressure Distribution of Drop Impacts</td>
<td>Ting-Pi Sun, Leonardo Gordillo, Xiang Cheng, UMN</td>
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<td>10:10</td>
<td>Three-Dimensional Surfactant-Covered Flows of Thin Liquid Films on Rotating Cylinders</td>
<td>Satish Kumar (for Weihua Li), UMN</td>
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<td>10:30</td>
<td>Coating and Drying of Discrete Objects</td>
<td>Chance Parrish, Satish Kumar, UMN</td>
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<td>10:50</td>
<td>Flows of Particle Suspensions: Model and Experiments</td>
<td>Bruna Leopercio, Ivan Siqueira, Marcio Carvalho, PUC-Rio</td>
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<td>Drying and Cracking in Nanoparticle Coatings</td>
<td>Lorraine Francis, (for Yan Wu), UMN</td>
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Thursday, May 31
8:30-11:40 AM | Keller Hall, Room 3-210

Microstructured Polymers Program Review 2
Chris Ellison, Program Leader

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<td>Polyolefin Interfaces: Role of Molecular Architecture and Crystallization on Adhesion Strength</td>
<td>Kyungtae Kim, Alex Jordan, Frank Bates, Chris Macosko, UMN; Shaffiq Jaffer, Olivier Lhost, Total</td>
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<td>8:50</td>
<td>Chain Exchange Kinetics of Triblock Copolymer Micelles: Effect of Core and Corona Block Asymmetry</td>
<td>En Wang, Timothy Lodge, Frank Bates, UMN</td>
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<td>9:10</td>
<td>Controlling Ordering of a Block Polymer in an Ionic Liquid with Light</td>
<td>Cecilia Hall, Timothy Lodge, UMN</td>
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<td>9:30</td>
<td>Morphology/Conductivity Relationships in Lithium Salt-Doped Polydisperse Triblock Polymers</td>
<td>Hongyun Xu, Mahesh Mahanthappa, UMN</td>
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<td>10:10</td>
<td>Guanidinium Polycations Promote High Cellular Internalization of Plasmid but Trigger Apoptosis in HepG2 Cells</td>
<td>Zhe Tan, Yogesh Dhande, Theresa Reinke, UMN</td>
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<td>10:30</td>
<td>Simulations of Methylcellulose Fibril Formation</td>
<td>Vaidyanathan Sethuraman, Kevin Dorfman, UMN</td>
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Microstructured Polymers Program Review 2 Continued

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<td>Sequence-Dependent Persistence Length of Long DNA</td>
<td>Hui-Min Chuang, UMN, Jeffery Reifenberger, Han Cao, BioNano Genomics, Kevin Dorfman, UMN</td>
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<td>Precision Polymers by Ring-Opening Metathesis Polymerization</td>
<td>Sebla Onbulak, Marc Hillmyer, UMN</td>
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Thursday, May 31
8:30-11:40 AM | Keller Hall, Room 3-230

Nanostructural Materials and Processes Program Review 2
Alon McCormick, Program Leader

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<td>Alon McCormick, UMN</td>
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<td>Amorphous Solid Dispersions: Relevance of drug/polymer Miscibility to Physical Stability</td>
<td>Seema Thakral, Robert Hoerr, Greg Haugstad, UMN</td>
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<td>8:55</td>
<td>How Micelles Influence Dynamics of Surfactant Adsorption</td>
<td>Josh Mysona, David Morse, Alon McCormick, UMN</td>
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<td>9:15</td>
<td>Siepmann Research Group Overview</td>
<td>Ilja Siepmann, UMN</td>
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<td>Adsorption of Hexane and H2S at the Liquid-Vapor Interface of Water</td>
<td>Mona Minkara, Ilja Siepmann, UMN</td>
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<td>The Unusual Adsorption of Alpha,Omega-Diols from Aqueous Solution in Zeolites</td>
<td>Rob DeJaco, Michael Tsapatsis, Ilja Siepmann, UMN</td>
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<td>10:20</td>
<td>Haynes Research Group Overview</td>
<td>Christy Haynes, UMN</td>
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<td>10:40</td>
<td>Using an Environmentally-relevant Panel of Gram-negative Bacteria to Assess the Toxicity of Polyelectrolyte-wrapped Gold Nanoparticles</td>
<td>Joseph Buchman, UMN, Ali Rahnamoun, Johns Hopkins; Kaitlin Landy, UMN; Xi Zhang, Ariane Vartanian, Lisa Jacob, Catherine Murphy, U of I Champaign-Urbana; Rigoberto Hernandez, Johns Hopkins; Christy Haynes, UMN</td>
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<td>10:55</td>
<td>Transformations and Environmental Impacts of CZTS Nanoparticles and Thin-films</td>
<td>Sunipa Pramanik, Nancy Trejo, Eray Aydil, Christy Haynes, UMN</td>
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<td>Zasadzinski Research Group Overview</td>
<td>Joe Zasadzinski, UMN</td>
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<td>Theoretical and Experimental Descriptions of Dilatational Moduli on Curved Monolayer Interfaces</td>
<td>Sourav Barman, Cari Dutcher, Joe Zasadzinski, UMN</td>
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POSTER SESSIONS

Tue, May 29, 5:45-7:15 PM & Wed, May 30, 5:45-7:30 PM
McNamara Alumni Center, Memorial Hall

In numerical order by IPRIME Partnership Program
IPRIME Poster Session Layout
McNamara Alumni Center, Memorial Hall, May 29 & May 30, 5:45-7:30p

Posters follow numerically

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### Poster Sessions

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<td>Sustainable Route to Isoprene</td>
<td>Wu, Yuxiao; Zhang, Kechun; UMN</td>
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<td>2</td>
<td>BB</td>
<td>Quorum Sensing and Lactonases Engineering</td>
<td>Bergonzi, Celine; UMN</td>
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<td>BB</td>
<td>Activated Carbon Fibers from Cellulosic Biomass for use as Functional Materials</td>
<td>Wang, Yu-Hsiang; Frigo-Vaz, Benjamin; Wang, Ping; UMN</td>
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<td>Engineering Bacterial Phosphate Uptake System Towards Sustainable Agriculture</td>
<td>Shaw, Sudipta; Elias, Mikael; UMN</td>
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<td>Hydrophobin-based Interfacially-active Proteins for Use as Bio-surfactants and Material Additives</td>
<td>Calixto Mancipe, Natalia; Wang, Ping; UMN</td>
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<td>Bio-strip for Rapid Testing of Nitrate in Water</td>
<td>Aukema, Kelly; Wackett, Larry; UMN</td>
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<td>7</td>
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<tr>
<td>118</td>
<td>MP</td>
<td>Entropically-Driven Polymerizations of Macrolactones Towards the Synthesis of Alternating Co-Polymers</td>
<td>Amador, Adrian; Watts, Annabelle; Neitzel, Angelika; Hillmyer, Marc; UMN</td>
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<tr>
<td>119</td>
<td>MP</td>
<td>Influence of Charge Sequence on the Overcharging of Polyelectrolyte Brushes</td>
<td>Sethuraman, Vaidyanathan; McGovern, Michael; Dorfman, Kevin; UMN</td>
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<tr>
<td>120</td>
<td>MP</td>
<td>Poly(acrylic acid)-Based Block Copolymers: Effect of Solution State Morphology and pH on Drug Supersaturation Maintenance</td>
<td>Purchel, Anatolii; Boyle, William; Reineke, Theresa; UMN</td>
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<tr>
<td>121</td>
<td>MP</td>
<td>Nanoporous Materials With Percolating Domains From Block Polymers Photocross-linked Above The Order-Disorder Transition</td>
<td>Hampu, Nicholas; Vidil, Thomas; UMN</td>
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### Microstructured Polymers (MP) Continued

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<tr>
<td>122</td>
<td>MP</td>
<td>Multiblock Copolymers for Recycling Polyolefin-Polyester Multilayer Film</td>
<td>Nomura, Keiichiro; Toray; Kim, Hanim; Kim, Hee Joong; UMN; Bratton, Abby; Miller, Kevin; Murray State U; Ellison, Christopher; UMN</td>
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<tr>
<td>123</td>
<td>MP</td>
<td>Characterization of Graphene Based PC/PET Systems</td>
<td>Esnaashari, Catherine; Mun, Sung Cik; Bai, Lian; Macosko, Chris; Cheng, Xiang; UMN</td>
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<tr>
<td>124</td>
<td>MP</td>
<td>Polymerization of Quinine for Applications in Gene Delivery</td>
<td>Van Bruggen, Craig; Ting, Jeffrey; Dhande, Yogesh; Linn, Samantha; Reineke, Theresa; UMN</td>
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<tr>
<td>126</td>
<td>NMP</td>
<td>Surface Charge and Capacitance Effects in Floating Gate Electrolyte-Gated Transistor Biosensors</td>
<td>Thomas, Mathew; Dorfman, Kevin; Frisbie, Daniel; UMN</td>
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<td>127</td>
<td>NMP</td>
<td>Gate-Tunable Electrochemistry of Two-Dimensional Materials</td>
<td>Wang, Yan; Frisbie, Daniel; UMN</td>
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<tr>
<td>128</td>
<td>NMP</td>
<td>Suppressing Competing Mechanisms during the Growth of Silver Nanoparticles in Polyol Solvents</td>
<td>Chen, Suyue; Lee, Hong Bok; Drehmel, Jake; Penn, Lee; UMN</td>
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<td>129</td>
<td>NMP</td>
<td>CuO-Based Solid Adsorbent for the Selective Removal of Dilute H2S from Claus Process Tail Gas</td>
<td>Zhao, Wenyang; Balasubramanian, Veerappan; Kumar, Prashant; Tsapatsis, Michael; Stein, Andreas; UMN</td>
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<tr>
<td>130</td>
<td>NMP</td>
<td>Synthesis and Applications of Self-pillared Zeolite Nanosheets</td>
<td>Xu, Dandan; Abdelrahman, Omar; UMN; Ahn, Sang Hyun, POSTECH; Liu, Dongxia, UMD; Hong, Suk Bong, POSTECH; Daenhauer, Paul, Tsapatsis, Michael; UMN</td>
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<td>131</td>
<td>NMP</td>
<td>Tuning The Melting Point of Phase Change Materials for Thermal Energy Storage Applications</td>
<td>Tran, Nam; Carlson, Fletcher; Anderson, Kelly; Siepmann, Ilja; Davidson, Jane; Stein, Andreas; UMN</td>
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<td>132</td>
<td>NMP</td>
<td>Toxicity evaluation of boron- and phosphorous- doped Si NCs towards Shewanella oneidensis MR-1</td>
<td>Zhi, Bo; Mishra, Sadhana; Hudson-Smith, Natalie; Kortshagen, Uwe; Haynes, Christy; UMN</td>
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<tr>
<td>133</td>
<td>NMP</td>
<td>Optimization of Liposome-Hollow Gold Nanoparticles for mRNA Delivery</td>
<td>Veeren, Anisha; Osborn, Mark; Merkel, Sarah; Shin, Jeong-Eun; Zasadzinski, Joseph; UMN</td>
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<td>134</td>
<td>NMP</td>
<td>Investigating Contributions of Metal Release and Reactivity in Bacterial Toxicity of a Nanoscale Multiphase Lithiated Cobalt Phosphate</td>
<td>Clement, Peter; UMN; Kuether, Joshua; Augsburg U; Borgatta, Jaya; U of Wisconsin; Buchman, Joseph; Cahil, Meghan; Qiu, Autumn; UMN; Hamers, Robert; U of Wisconsin; Feng, Vivian; Augsburg Univ; Haynes, Christy; UMN</td>
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<tr>
<td>135</td>
<td>NMP</td>
<td>Characterizing UV-crosslinked PVP Coatings with AFM: Structure and Properties</td>
<td>Haugstad, Greg; Colling, Connor; UMN; Zeng, Maggie; Boston Scientific; McCormick, Alon; UMN</td>
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<tr>
<td>136</td>
<td>NMP</td>
<td>Vapor Phase Processing of Zeolitic Imidazolate Framework Membranes</td>
<td>Ma, Xiaoli; Kumar, Prashant; Mittal, Nitish; Khlyustova, Alexandra; Daoutidis, Prodromos; Mkhoyan, Andre; Tsapatsis, Michael; UMN</td>
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<td>137</td>
<td>NMP</td>
<td>Modified-Graphene-Oxide-Containing Styrene Masterbatches for Thermosets</td>
<td>He, Siyao; UMN; Qian, Yuqiang; Adama Materials; Liu, Kunwei; Macosko, Chris; Stein, Andreas; UMN</td>
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<td>138</td>
<td>NMP</td>
<td>Oil Dispersion-- Insights into Effective Dispersion from Phase Equilibrium and Nanostructure</td>
<td>Corcoran, Louis; Balderrama, Maria; Penn, R. Lee; McCormick, Alon; UMN</td>
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<td>139</td>
<td>NMP</td>
<td>SEM Characterization of Composites: Applications in Microstructured Solid Reactants that Enable Lower Pressure Ammonia Production</td>
<td>Liu, Chen-Yu; Malmali, Mahdi; Seaton, Nicholas; McCormick, Alon; Cussler, Ed; UMN</td>
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<tr>
<td>140</td>
<td>NMP</td>
<td>Controlling Dissolution and Transformation of Zeolitic Imidazolate Frameworks using Electron Beam-Induced Amorphization</td>
<td>Conrad, Sabrina; Kumar, Prashant; Xue, Feng; Ren, Limin; Mkhoyan, Andre; Tsapatsis, Michael; UMN</td>
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<td>141</td>
<td>NMP</td>
<td>Fast Reciprocal Space Mapping at the U of M CharFac: Full Characterization of Epitaxial/Textured Thin Films</td>
<td>Garcia-Barriocanal, Javier; Guichuan, Yu; Chaturvedi, Vipul; UMN; Leighton, Chris; UMN</td>
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<td>142</td>
<td>NMP</td>
<td>Understanding Nanoparticle Coating Properties on Hard Surfaces</td>
<td>Rahn, Rachel; Ecolab; Lee, Hanseung; Haugstad, Greg; UMN; Hubig, Stephan; Ecolab; Luo, Bing; Meleen, Hailey; McCormick, Alon; UMN</td>
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<tr>
<td>143</td>
<td>NMP</td>
<td>Durable Superhydrophobic Coatings for Textile Surfaces</td>
<td>Rahn, Rachel; Ecolab; Lee, Hanseung; Haugstad, Greg; UMN; Hubig, Stephan; Ecolab; Luo, Bing; Meleen, Hailey; McCormick, Alon; UMN</td>
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<tr>
<td>144</td>
<td>NMP</td>
<td>Multimodal AFM imaging of superhydrophilic films consisting of inorganic nanoparticles in organic matrices</td>
<td>Haugstad, Greg; UMN; Rahn, Rachel; Hubig, Stephan; Ecolab; Lee, Han Seung; Meleen, Hailey; McCormick, Alon; UMN</td>
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Presentations by Date & Time
TUESDAY, MAY 29
AFTERNOON SESSIONS | 1:15 – 4:45 PM

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<thead>
<tr>
<th>Time</th>
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<th>Title</th>
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<tbody>
<tr>
<td>1:15 PM</td>
<td>MP</td>
<td>Workshop</td>
<td>Tailoring Polymer Grafted Nanoparticles to Control Structure and Thermodynamics in Polymer Nanocomposites</td>
<td>Jayaraman, Arthi; U of Delaware</td>
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<tr>
<td>1:15 PM</td>
<td>CPF</td>
<td>Workshop</td>
<td>Welcome and Overview</td>
<td>Francis, Lorraine; UMN</td>
</tr>
<tr>
<td>1:20 PM</td>
<td>CPF</td>
<td>Workshop</td>
<td>Fluid Dynamics of Drop-Based Printing, Coating, and Manufacturing</td>
<td>Basaran, Osman; Purdue University</td>
</tr>
<tr>
<td>1:55 PM</td>
<td>MP</td>
<td>Workshop</td>
<td>Nano-Inorganic Modified Polymers for Mechanical Benefit</td>
<td>Beiermann, Brett; 3M</td>
</tr>
<tr>
<td>2:10 PM</td>
<td>CPF</td>
<td>Workshop</td>
<td>How the Selection of Raw Materials Can Impact Print Speeds in Digital Printing</td>
<td>Hsu, Charlie; BASF</td>
</tr>
<tr>
<td>2:15 PM</td>
<td>MP</td>
<td>Workshop</td>
<td>Nanoparticles in Polymers: Rheology, Assembly, and Properties</td>
<td>Rao, YuanQiao; Dow Chemical</td>
</tr>
<tr>
<td>3:15 PM</td>
<td>MP</td>
<td>Workshop</td>
<td>Strategies to Impart Electrical Conductivity to Polymer Composites</td>
<td>Dahlman, Sam; RTP</td>
</tr>
<tr>
<td>3:20 PM</td>
<td>CPF</td>
<td>Workshop</td>
<td>CaBER Indexing of Cobwebbing Failure in Liquid Printing Inks: Characterization of Extensional Viscosity in Apparently Newtonian Fluids</td>
<td>Gebhard, Matthew; DSM</td>
</tr>
<tr>
<td>3:55 PM</td>
<td>MP</td>
<td>Workshop</td>
<td>Elastic Reduced Graphene Oxide Aerogels: Processing and Applications</td>
<td>Ellison, Christopher; Xiao, Han; UMN; Pender, Josh; UT Austin; Ha, Heonjoo; UMN; Mullins, C. Buddie; UT Austin</td>
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<tr>
<td>4:00 PM</td>
<td>CPF</td>
<td>Workshop</td>
<td>Additives for Inkjet Inks and Other Droplet-Based Coating and Graphic Arts Applications</td>
<td>Meier, Ingrid; Evonik</td>
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See you at the poster session!
McNamara Memorial Hall
5:45 – 7:15 PM
### Wednesday, May 30
**Morning Sessions | 8:30 – 11:40 AM**

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<tr>
<td>8:30 AM</td>
<td>NMP</td>
<td>Workshop</td>
<td>Characterization-Focused Industrial Fellow Collaborative Projects: Examples, Opportunities, and Challenges</td>
<td>McCormick, Alon; UMN</td>
</tr>
<tr>
<td>8:30 AM</td>
<td>EMD</td>
<td>Workshop</td>
<td>Indium Tin Oxide Transparent Conducting Oxides</td>
<td>Rowe, David; 3M</td>
</tr>
<tr>
<td>8:30 AM</td>
<td>CPF</td>
<td>Workshop</td>
<td>Welcome and Overview</td>
<td>Francis, Lorraine; UMN</td>
</tr>
<tr>
<td>8:30 AM</td>
<td>FEP</td>
<td>Workshop</td>
<td>Welcome</td>
<td>Holmes, Russell; UMN</td>
</tr>
<tr>
<td>8:30 AM</td>
<td>BB</td>
<td>Workshop</td>
<td>Biorefinery for Production of Fuels, Chemicals, and Biopolymers from Renewable Biomass</td>
<td>Yang, Shang-Tian; Ohio State</td>
</tr>
<tr>
<td>8:30 AM</td>
<td>BPM</td>
<td>Workshop</td>
<td>Welcome</td>
<td>Siegel, Ron; UMN</td>
</tr>
<tr>
<td>8:35 AM</td>
<td>FEP</td>
<td>Workshop</td>
<td>NextFlex: Building a Manufacturing Ecosystem for Flexible Hybrid Electronics</td>
<td>Leever, Benjamin; Air Force Research Laboratory and NextFlex</td>
</tr>
<tr>
<td>8:35 AM</td>
<td>CPF</td>
<td>Workshop</td>
<td>Drops on Surfaces: Effect of Air Flow</td>
<td>Lee, Sungyon; UMN</td>
</tr>
<tr>
<td>8:35 AM</td>
<td>BPM</td>
<td>Workshop</td>
<td>How Twin-Screw Extrusion is Reshaping Pharmaceutical Manufacturing</td>
<td>Zhang, Feng; U of Texas</td>
</tr>
<tr>
<td>9:00 AM</td>
<td>EMD</td>
<td>Workshop</td>
<td>Novel Indium-free Transparent Conducting Oxide Materials</td>
<td>Jalan, Bharat; UMN</td>
</tr>
<tr>
<td>9:00 AM</td>
<td>MP</td>
<td>Workshop</td>
<td>Gas Transport through Mixed Matrix Membranes</td>
<td>Kumar, Sanat; Columbia U</td>
</tr>
<tr>
<td>9:00 AM</td>
<td>MP</td>
<td>Workshop</td>
<td>Gas Transport Through Mixed Matrix Membranes</td>
<td>Sanat Kumar, Columbia University</td>
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<tr>
<td>9:10 AM</td>
<td>FEP</td>
<td>Workshop</td>
<td>Electroninks: A Materials Centric Approach to Printed Electronics</td>
<td>Walker, S. Brett; Electroninks Inc.</td>
</tr>
<tr>
<td>9:10 AM</td>
<td>BB</td>
<td>Workshop</td>
<td>Bio polymers at 3M</td>
<td>Bjork, Jason; 3M</td>
</tr>
<tr>
<td>9:15 AM</td>
<td>CPF</td>
<td>Workshop</td>
<td>Rheological Properties of Sprayable Coatings</td>
<td>Sun, Hao; PPG</td>
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<tr>
<td>9:15 AM</td>
<td>BPM</td>
<td>Workshop</td>
<td>Manufacturing of Controlled Release Powders for Patient-Friendly Dosage Forms</td>
<td>Berkland, Cory; U of Kansas</td>
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<tr>
<td>9:30 AM</td>
<td>EMD</td>
<td>Workshop</td>
<td>Transparent Conductors Based upon Two-Dimensional Conductors</td>
<td>Koester, Steven; UMN</td>
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<tr>
<td>9:40 AM</td>
<td>MP</td>
<td>Workshop</td>
<td>Polymeric Composites for Electronics Thermal Management</td>
<td>Misra, Sanjay; Sarrah, Querelle-Halvorson, Henkel</td>
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<tr>
<td>Time</td>
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<tr>
<td>10:10 AM</td>
<td>BB</td>
<td>Workshop</td>
<td>Synthetic Approaches to Bio-based Polymers</td>
<td>Zhang, Kechun; UMN</td>
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<tr>
<td>10:15 AM</td>
<td>FEP</td>
<td>Workshop</td>
<td>Designing Nanostructures for Color Shift Improvement in OLED Displays</td>
<td>Erickson, Nick; 3M</td>
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<tr>
<td>10:15 AM</td>
<td>CPF</td>
<td>Workshop</td>
<td>Wanhua and Its Technologies for Surface and Interface Applications</td>
<td>Yu, Tao; Wanhua Chemical</td>
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<tr>
<td>10:15 AM</td>
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<td>Workshop</td>
<td>Processing and Assembly for Medical Devices</td>
<td>Lyu, SuPing; Medtronic</td>
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<tr>
<td>10:30 AM</td>
<td>EMD</td>
<td>Workshop</td>
<td>β-Ga2O3, A New Contender for Solar Blind Transparent Conducting Applications</td>
<td>Osinsky, Andrei; Agnitron</td>
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<tr>
<td>10:40 AM</td>
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<td>Workshop</td>
<td>Polymeric Materials with very High Levels of Lignin</td>
<td>Sarkanen, Simo; UMN</td>
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<tr>
<td>10:40 AM</td>
<td>MP</td>
<td>Workshop</td>
<td>Processable Multiple Network Composite Design Using Insights from Sequential IPNs</td>
<td>Wiseman, Meredith; Pepels, Mark; Hensen, Guido; Driessen, Marco; Steeman, Paul; Bulters, Markus; DSM</td>
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<tr>
<td>10:50 AM</td>
<td>FEP</td>
<td>Workshop</td>
<td>Designing Displays for Consumer Electronics</td>
<td>Cady, Andy; Microsoft</td>
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<tr>
<td>10:55 AM</td>
<td>CPF</td>
<td>Workshop</td>
<td>Fluorocarbon-Free Oil and Grease Barrier Coatings for Paper and Paperboard</td>
<td>Heji, Andy; Dow Chemical</td>
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<tr>
<td>10:55 AM</td>
<td>BPM</td>
<td>Workshop</td>
<td>Design of Coatings for Medical Devices</td>
<td>Lockwood, Nathan; Surmodics</td>
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<tr>
<td>11:00 AM</td>
<td>EMD</td>
<td>Workshop</td>
<td>Plasma Synthesis of Highly Conductive Wide Bandgap Semiconductor Nanocrystal Films</td>
<td>Kortshagen, Uwe; UMN</td>
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<tr>
<td>11:10 AM</td>
<td>BB</td>
<td>Workshop</td>
<td>Carbonization and Fabrication of Cellulosic Fibers for use as Functional Materials</td>
<td>Wang, Ping; UMN</td>
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<tr>
<td>11:20 AM</td>
<td>MP</td>
<td>Workshop</td>
<td>Soft “Nanoparticle” Toughened Thermoplastics</td>
<td>Xu, Jun; UMN</td>
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</table>

Plenary Lunch and Presentation by Russell Holmes
Johnson Great Room, McNamara Center
11:45 – 1:05 PM
# Wednesday, May 30
## Afternoon Sessions | 1:15 – 4:45 PM

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<tr>
<td>1:15 PM</td>
<td>BB</td>
<td>Program Review</td>
<td>Biocatalysis for Health and Agriculture</td>
<td>Wackett, Larry; UMN</td>
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<tr>
<td>1:15 PM</td>
<td>BPM</td>
<td>Program Review</td>
<td>Welcome</td>
<td>Siegel, Ron; UMN</td>
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<tr>
<td>1:15 PM</td>
<td>CPF</td>
<td>Program Review</td>
<td>CPF: Progress and Plans</td>
<td>Francis, Lorraine; UMN</td>
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<tr>
<td>1:15 PM</td>
<td>EMD</td>
<td>Program Review</td>
<td>Introduction</td>
<td>Koester, Steven; UMN</td>
</tr>
<tr>
<td>1:15 PM</td>
<td>FEP</td>
<td>Program Review</td>
<td>Welcome</td>
<td>Holmes, Russell; UMN</td>
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<tr>
<td>1:15 PM</td>
<td>MP</td>
<td>Program Review</td>
<td>Welcome and Introduction</td>
<td>Ellison, Chris; UMN</td>
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<tr>
<td>1:15 PM</td>
<td>NMP</td>
<td>Program Review</td>
<td>Welcome and Overview</td>
<td>McCormick, Alon; UMN</td>
</tr>
<tr>
<td>1:20 PM</td>
<td>BPM</td>
<td>Program Review</td>
<td>Biodegradable Semi-solid Polymers for Drug Delivery</td>
<td>Wang, Chun; UMN</td>
</tr>
<tr>
<td>1:20 PM</td>
<td>FEP</td>
<td>Program Review</td>
<td>New Strategies to Printed Electronics</td>
<td>Cao, Matao; Francis, Lorraine; Frisbie, Daniel; UMN</td>
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<tr>
<td>1:20 PM</td>
<td>MP</td>
<td>Program Review</td>
<td>Research in the Dorfman Group</td>
<td>Dorfman, Kevin; UMN</td>
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<tr>
<td>1:25 PM</td>
<td>NMP</td>
<td>Program Review</td>
<td>Suppressing Competing Mechanisms during the Growth of Silver Nanoparticles in Polyol Solvents</td>
<td>Mohammad Karim, Alireza; Suszynski, Wieslaw; UMN; Griffith, William B.; Dow Chemical; Pujari, Saswati; Dow Chemical; Francis, Lorraine; UMN; Carvalho, Marcio S; UMN and PUC-Rio</td>
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<tr>
<td>1:30 PM</td>
<td>CPF</td>
<td>Program Review</td>
<td>Effect of Viscoelasticity on Stability of Curtain Coating</td>
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<tr>
<td>1:35 PM</td>
<td>FEP</td>
<td>Program Review</td>
<td>Electrolyte Gated Transistors Based on Single Crystals of Rubrene</td>
<td>Ren, Xinglong; Frisbie, C. Daniel; UMN</td>
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<tr>
<td>1:40 PM</td>
<td>EMD</td>
<td>Program Review</td>
<td>Buffer and Barrier Layers for Cu(In,Ga)Se2 (CIGS) Based Tandem Photovoltaics</td>
<td>Bontrager, Timothy; Hwang, Sehyun; Sipakoti, Mandip; Campbell, Stephen; UMN</td>
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<tr>
<td>1:40 PM</td>
<td>BPM</td>
<td>Program Review</td>
<td>Engineering of Biomaterials Using Biomimetic Strategies and Intelligent Biopolymers</td>
<td>Shen, Wei; UMN</td>
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<tr>
<td>1:40 PM</td>
<td>BB</td>
<td>Program Review</td>
<td>Enzymatic Production of Protein-conjugates for Biomedical Applications</td>
<td>Distefano, Mark; UMN</td>
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<tr>
<td>1:45 PM</td>
<td>NMP</td>
<td>Program Review</td>
<td>Michael Tsapatsis overview</td>
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<td>Mobility Optimization in High-pressure-oxygen-sputtered Epitaxial Ba1-xLaxSnO3 Thin Films</td>
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<td>XPCS with Anisotropic Scattering: Analysis of a BCC-forming Diblock Copolymer</td>
<td>Lewis III, Ronald M.; Jackson, Grayson L.; Kim, Kyungtae; Maher, Michael J.; Beech, Haley K.; , UMN; Narayanan, Suresh; , Argonne National Laboratories; Lodge, Timothy P.; Mahanthappa, Mahesh K.; Bates, Frank S.; UMN</td>
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<td>Composite Thermochemical Approach to Tin Alkyl Precursors in Hybrid Molecular Beam Epitaxy</td>
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<td>Quantifying Disorder in CVD Graphene Induced by Ripples from Thermal Expansion Mismatch</td>
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<td>Dielectric Response in Hybrid Molecular Beam Epitaxy-grown Ba(Ti1-xSnx)O3 Films</td>
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<td>Design and Characterization of Sustainable Acrylates Based on Natural Phenolics for Stereolithography 3D Printing</td>
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<td>Limits on Magnetization Damping in Heusler Alloy Thin Films</td>
<td>Qu, Tao; Peterson, Tim. A; Peria, William, UMN; Mcfadden, Tony, Univ of California, Santa Barbara; Victoria, Randall H, UMN; Palmstrom, Chris J, Univ of California, Santa Barbara; Crowell, Paul A.; UMN</td>
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<td>Surface Charge and Capacitance Effects in Floating Gate Electrolyte-Gated Transistor Biosensors</td>
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<td>Elasticity, Plasticity, and Failure of Biodegradable Polymers:Prelude to Biodegradable Osmotic Delivery Pumps</td>
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<td>3D Printing and Mechanical Performance of Silicones</td>
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<td>Electrical and Optical Characterization of b-Ga2O3 Thin Films</td>
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<td>Multifrequency AFM as a probe of soft matter and interfaces</td>
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<td>Polydopamine-Graphene Oxide Flame Retardant Nanocoating Applied via an Aqueous Liquid Crystalline Scaffold</td>
<td>Kim, Hanim; Daewoo Kim; UMN; Vivek Vasagar; U of Southern Mississippi; Heonjoo Ha; UMN; Sergei Nazarenko; , U of Southern Mississippi; Christopher Ellison; UMN</td>
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<td>Electrostatic Assist of Liquid Transfer between Plates and Cavities</td>
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<td>Polyolefin Interfaces: Role of Molecular Architecture and Crystallization on Adhesion Strength</td>
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<td>Amorphous solid dispersion- relevance of drug-polymer miscibility to physical stability</td>
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<td>Chain Exchange Kinetics of Triblock Copolymer Micelles: Effect of Core and Corona Block Asymmetry</td>
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<td>How Micelles Influence Dynamics of Surfactant Adsorption</td>
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Polymer in an Ionic Liquid with Light

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<td>Assessment of Options for Determining the Total Adsorption Uptake from Liquid Solution: Alkane-α, ω-Diols/(Water or Ethanol) onto Silicalite-1</td>
<td>DeJaco, Robert F; De Mello, Matheus; Elyassi, Bahman; Tsapatsis, Michael; Siepmann, Ilja; UMN</td>
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<td>Guanidinium Polycations Promote High Cellular Internalization of Plasmid but Trigger Apoptosis in HepG2 Cells</td>
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<td>Perfluorocarbon-Loaded Nanoparticles for Sensing Applications</td>
<td>Lee, Amani; Ring, Hattie; UMN; Nguyen, Huan; College of Wooster; Lee, Sang-Hyuk; Gee, Clifford; Weegman, Bradley; Einstein, Samuel; Juelfs, Adam; Hurley, Katie; Egger, Sam; Swindlehurst, Garrett; Garwood, Michael; Pomerantz, William; Haynes, Christy; UMN</td>
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<td>Assess the Toxicity of Polyelectrolyte-wrapped Gold Nanoparticles</td>
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<td>Program Review</td>
<td>Sequence-Dependent Persistence Length of Long DNA</td>
<td>Chuang, Hui-Min; UMN; Reifenberger, Jeffrey G.; Cao, Han; BioNano Genomics; Dorfman, Kevin D.; UMN</td>
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<td>10:55 AM</td>
<td>NMP</td>
<td>Program Review</td>
<td>Flows of Particle Suspensions: Model and Experiments</td>
<td>Leopercio, Bruna; Siqueira, Ivan; Carvalho, Marcio; PUC-Rio</td>
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<td>10:55 AM</td>
<td>NMP</td>
<td>Program Review</td>
<td>Transformations and Environmental Impacts of CZTS Nanoparticles and Thin-films</td>
<td>Pramanik, Sunipa; Trejo, Nancy; Aydil, Eray; Haynes, Christy; UMN</td>
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<td>11:10 AM</td>
<td>MP</td>
<td>Program Review</td>
<td>Precision Polymers by Ring-Opening Metathesis Polymerization</td>
<td>Onbulak, Sebla; Hillmyer, Marc A.; UMN</td>
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<td>11:10 AM</td>
<td>CPF</td>
<td>Program Review</td>
<td>Drying and Cracking in Nanoparticle Coatings</td>
<td>Francis, Lorraine; Wu, Yan; UMN</td>
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<td>11:15 AM</td>
<td>NMP</td>
<td>Program Review</td>
<td>Joe Zasadzinski overview</td>
<td>Zasadzinski, Joseph; UMN</td>
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<td>11:20 AM</td>
<td>NMP</td>
<td>Program Review</td>
<td>Theoretical and Experimental Descriptions of Dilatational Moduli on Curved Monolayer Interfaces</td>
<td>Barman, Sourav; Dutcher, Cari; Zasadzinski, Joseph; UMN</td>
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</table>

Thursday TAC & PPB Events

TAC Meetings
Coffman Union, Campus Club | 4th Floor
12:00 PM – 1:45 PM
NOTE ROOM CHANGES THIS YEAR

PPB Luncheon
Amundson Hall Room 151
12:00 PM – 1:45 PM

PPB Meeting
Amundson Hall | Room 151
2:00 PM – 3:30 PM

CharFac Tour
Amundson Hall | Room 151
Starts right after the PPB Meeting ~ 3:30 PM

BUILDING INFORMATION
SEE MAP
Coffman Memorial Union (CMU)
300 Washington Avenue SE

Keller Hall (KH)
200 Union Street SE

McNamara Alumni Center (MAC)
200 Oak Street SE

Amundson Hall
421 Washington Avenue SE

The Graduate Hotel
615 Washington Avenue SE

WI-FI Network Guest Access at the University of Minnesota

To connect to the U of M Free WiFi, log in using the “U of M Guest” SSID and enter your active email address. Please note that this service offers no encryption and is limited in bandwidth and capacity.