

"The Food, Energy, and Water Nexus: Challenging Scientists and Engineers in the 21st Century"



Macromolecules
Innovation Institute
At the intersection of science, engineering, and society

FINAL PROGRAM

Holtzman Alumni Center at Virginia Tech

MONDAY, October 10, 2016

10:00 AM—1:00 PM **Conference Check-In**

SESSION I: Accelerating Materials Discovery, Training, and Partnership

Session Chair: Prof. Garth L. Wilkes

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| 1:00 PM—1:05 PM | Introductory Remarks —Prof. Timothy E. Long, Director, MII |
| 1:05 PM—1:10 PM | Welcome to Virginia Tech — Dr. Theresa S. Mayer, Vice President Research |
| 1:10 PM—1:30 PM | <i>"MII Integrating Science & Engineering,"</i> Prof. Timothy E. Long (MII) |
| 1:30 PM—1:50 PM | <i>"Molecules to Manufacturing,"</i> Prof. Christopher B. Williams (Mechanical Engineering) |
| 1:50 PM—2:10 PM | <i>"Overview of the MACR Degree Program,"</i> Prof. Robert B. Moore (Chemistry) |
| 2:10 PM—2:15 PM | Introduction of Dr. Sonya Benson, Pepsico (MII Alumni) — <i>Prof. Robert B. Moore (Chemistry)</i> |
| 2:15 PM—2:55 PM | Plenary Lecture: <i>"The Next Frontier of Pepsico' Performance with Purpose Vision for Packaging Sustainability: Intensive Integration of Sustainable Thinking as a Global Citizen And Environmental Steward,"</i> Dr. Sonya Benson, Pepsico |
| 2:55 PM—3:05 PM | <i>Break</i> |
| 3:05 PM—3:30 PM | <i>"Multidimensional Design-Assisted Enhancement of Material Properties,"</i> Mr. Susheel Kumar Sekhar (Mechanical Engineering PostDoc) |
| 3:30 PM—3:55 PM | <i>"Center for Performance Packaging Systems at Virginia Tech: A Case Study,"</i> Prof. Laszlo Horvath (Sustainable Biomaterials) |
| 3:55 PM—4:20 PM | <i>"Molecular Dynamics Simulations of Water Evaporation,"</i> Prof. Shengfeng Cheng (Physics) |
| 5:30 PM—7:00 PM | Poster / Reception (Latham Ballroom - AB) - (Dinner on your own) - Sponsored by Owens Corning & Braskem |

TUESDAY, October 11, 2016

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| 7:00 AM—8:00 AM | Conference Check-In (Breakfast on your own) |
| 8:00 AM—9:00 AM | Tour of the Institute for Critical Technology and Applied Science II and the DREAMS Additive Manufacturing Facilities, Goodwin Hall (Profs. Tim Long, Chris Williams, and Bob Moore) |

SESSION II: Advanced Manufacturing and Processing Polymers

Session Chair: Prof. Donald G. Baird

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| 9:15 AM—9:20 AM | Introductory Remarks – Prof. Donald G. Baird (Chemical Engineering) |
| 9:20 AM—9:45 AM | <i>"Additive Manufacturing of Lightweight, High Performance Materials,"</i> Prof. Xiaoyu (Rayne) Zheng (Mechanical Engineering) |
| 9:45 AM—10:10 AM | <i>"Expanding the Polymer Toolbox for Additive Manufacturing: Synthesis and Printing of a Photocurable Biodegradable Polyester,"</i> Mr. Nicholas A. Chartrain (Materials Science & Engineering Student) |
| 10:10 AM—10:35 AM | <i>"A Unique Approach Towards Transparent Conductive Materials Using Cellulose Nanocrystal Templates,"</i> Prof. Michael J. Bortner (Chemical Engineering) |
| 10:35 AM—10:45 AM | <i>Break</i> |
| 10:45 AM—11:10 AM | <i>"Exploring Print Orientation Effects On Integrity Of Multi-Material Interfaces In Polyjet Additive Manufactured Materials,"</i> Prof. David A. Dillard (Biomedical Engineering and Mechanics) |
| 11:10 AM—11:15 AM | Introduction of Dr. Slade Gardner, Lockheed Martin Space Systems - <i>Prof. Christopher B. Williams (Mechanical Engineering)</i> |
| 11:15 AM—11:55 AM | Plenary Lecture: <i>"Architectonics and Multi-Materials in Big Additive Manufacturing Clusters,"</i> Dr. Slade Gardner (Lockheed Martin Space Systems)
(Posters up at 10 AM - Latham Ballroom - AB) |
| 11:55 PM—2:00 PM | <i>Lunch (on your own)</i> |

SESSION III: Designing Macromolecules

Session Chair: Prof. John B. Matson

2:00 PM—2:05 PM	Introductory Remarks — Prof. John Matson (Chemistry)
2:05 PM—2:30 PM	<i>"Synthesis and Properties of Ionic Poly(arylene ether)s for Membrane Applications in Water,"</i> Prof. Judy S. Riffle (Chemistry)
2:30 PM—2:55 PM	<i>"Synthesis of Biosourced, Isocyanate-free Polyureas,"</i> Mr. Joseph Dennis (MACR Student)
2:55 PM—3:05 PM	Break
3:05 PM—3:10 PM	Introduction of Dr. Edmund M. Carnahan, Dow Chemical – Prof. Steve Martin (Chemical Engineering)
3:10 PM—3:50 PM	Plenary Lecture: <i>"The Invention and Commercialization of Olefin Block Copolymers,"</i> Dr. Edmund M. Carnahan (Dow Chemical)
3:50 PM—4:15 PM	<i>"Design of Sustainable Polysaccharide Derivatives to Enhance Human Health,"</i> Prof. Kevin J. Edgar (Sustainable Biomaterials)
4:15 PM—4:40 PM	<i>"Synthesis of Aliphatic Polyketones using Ring-opening Metathesis Polymerization and Their Use in Photodegradable Thermoplastic Elastomers,"</i> Prof. John B. Matson (Chemistry)
4:40 PM—5:05 PM	<i>"Nature-Inspired Materials Exhibiting Novel Mass Transport Phenomena,"</i> Prof. Jonathan B. Boreyko (Biomedical Engineering and Mechanics)
5:05 PM—5:30 PM	<i>"Cyclopentadiene Chemistry for Reversible Polymerization,"</i> Prof. Paul A. Deck (Chemistry)
5:30 PM—7:00 PM	Poster Session / Reception (Latham Ballroom - AB) – Sponsored by Owens Corning & Braskem
7:00 PM—9:00 PM	Conference Banquet (Latham Ballroom - AB) - Guest Speaker

WEDNESDAY, October 12, 2016

SESSION IV: Probing Macromolecular and Nanoscale Structures

Session Chair: Prof. Stephen M. Martin

8:00 AM—8:05 AM	Introductory Remarks —Prof. Stephen M. Martin (Chemical Engineering)
8:05 AM—8:30 AM	<i>"Functionalized Nanocomposite Membranes for Water Desalination,"</i> Steve Martin (Chemical Engineering)
8:30 AM—8:55 AM	<i>"Combining a Kevlar-Like Polymer with Ionic Liquids to Enable Safer and Higher Density Batteries,"</i> Prof. Louis A. Madsen (Chemistry)
8:55 AM—9:20 AM	<i>"Toward Understanding Electron and Energy Transfer in Complex Assemblies for Solar Energy Harvesting and Conversion,"</i> Prof. Amanda J. Morris (Chemistry)
9:20 AM—9:45 AM	<i>"Block Copolymers and Plamonic Metal Nanoparticles: A New Materials Platform for Energy, Water, and Sensing,"</i> Prof. Guoliang Liu (Chemistry)
9:45 AM—9:55 AM	Break
9:55 AM—10:20 AM	<i>"Design and Fabrication of Polymeric Nanoparticles for Therapeutic and Diagnostic Applications,"</i> Prof. Richey M. Davis (Chemical Engineering)
10:20 AM—10:45 AM	<i>"Non-Random Sulfonation of Poly(Ether Ether Ketone) Via Functionalization of Thermoreversible Gels,"</i> Ms. Lindsay Anderson (Chemistry Student)
10:45 AM—10:50 AM	Introduction of Dr. Karen Winey (University of Pennsylvania) – Prof. Robert B. Moore
10:50 AM—11:30 AM	Plenary Lecture <i>"Precise Polymers that Control Nanoscale Morphologies & Properties,"</i> Dr. Karen Winey (University of Pennsylvania)
11:30 AM—1:30 PM	Lunch (on your own) MII Advisory Board Meeting (lunch will be provided for Advisory Board – Preston's)

SESSION V: Bio-interface

Session Chair: Prof. Timothy E. Long

1:30 PM—1:35 PM	Introduction of Dr. Chris Wohl (NASA) – Prof. Timothy E. Long (MII/Chemistry)
1:35 PM—2:15 PM	Plenary Lecture: <i>"Materials Research at NASA: Extending Capabilities and Expanding Possibilities,"</i> Dr. Chris Wohl (NASA)
2:15 PM—2:40 PM	<i>"Toward Targeting the Physical Hallmarks of Tumors with Pulsed Electric Field Ablation Therapy,"</i> Prof. Scott Verbridge (Biomedical Engineering and Mechanics)
2:40 PM—3:05 PM	<i>"Light-triggered Nanoparticles for Cancer Nanomedicine,"</i> Prof. Rong Tong (Chemical Engineering)
3:05 PM—3:30 PM	<i>"Biopolymers - from Nature to Nanotechnology,"</i> Prof. Tijana Z. Grove (Chemistry)
3:30 PM—3:55 PM	<i>"3D Printed Neural Interfaces,"</i> Prof. Blake N. Johnson (Industrial and Systems Engineering)
3:55 PM—4:20 PM	<i>"Engineering Implants Using Cellulose Nanocrystals,"</i> Prof. E. Johan Foster (Materials Science and Engineering)
4:20 PM —4:30 PM	Concluding Remarks – Prof. Timothy E. Long (MII/Chemistry)