

# 2023 Organic Materials Chemistry Program Review (OMC PR)

Dr. Kenneth Caster | June 12-16, 2023 | Dayton, OH

(WBI) Wright Brothers Institute Dayton [444]

444 E. 2<sup>nd</sup> Street

Dayton, OH 45402

## Agenda Day One – Monday, June 12, 2023

TIME	TOPIC	SPEAKER
8:00–8:10	Registration/Admin/Speaker Set-up	
8:10-8:30	Welcome and Introductory Remarks	<b>Ken Caster</b> Air Force Office of Scientific Research
8:30-10:00	Session 1	<b>Matthew Dickerson</b> Materials & Manufacturing Directorate
8:30-9:00	Structural and Architectural Control of Order in Block Copolymers	<b>Thomas Russell; Javid Rzayev</b> University of Massachusetts, Amherst; State University at Buffalo, SUNY
9:00-9:30	Hybrid Nanostructured Polymer Materials Exhibiting Responsive Nonlinear Optical and Photonic Band Gap Properties	<b>Rob Hickey, Rob Mathers</b> Pennsylvania State University
9:30-10:00	Molecular Design of Viscoelasticity and Damping Properties in Vitrimers	<b>Chris Evans</b> University of Illinois, Urbana-Champaign
10:00-10:15	BREAK	
10:15-11:45	Session 2	<b>Roneisha Haney</b> Materials & Manufacturing Directorate
10:15-10:45	Stretchable Polymer Semiconductors	<b>Zhenan Bao</b> Stanford University
10:45-11:15	Mechanisms of Elasticity in Semiconducting Polymers	<b>Darren Lipomi</b> University of California, San Diego
11:15-11:45	Soft Hybrid Materials for Flexible, Stretchable, Patternable Electronics	<b>Tobin Marks, Antonio Facchetti</b> Northwestern University
11:45-13:15	LUNCH	
13:15-14:45	Session 3	<b>Kam Ghiassi</b> Propulsion Directorate–Edwards AFB
13:15-13:45	Mechanisms of Elasticity in Semiconducting Polymers	<b>Bryan Boudouris; Brett Savoie</b> Purdue University
13:45-14:15	(YIP) Harnessing Photo-induced Phase Transition of Organic Materials for Catalyst Recycling	<b>Grace Han</b> Brandeis University
14:15-14:45	(Special Topic) Radiation Damage Mechanisms in Organic Materials - Electron-Beam Methods	<b>Larry Drummy</b> Materials & Manufacturing Directorate
14:45-14:55	BREAK	
14:55-17:00	Session 4	<b>Thomas Gray</b> Case Western Reserve University

<b>14:55-15:25</b>	(YIP) Dinuclear Polymerization and Self-Assembly of Conjugated Polymer Nanowire Heterojunctions Toward Structure Photodetection Relationships	<b>Aleksandr 'Alex' Zhukhovitskiy</b> University of North Carolina, Chapel Hill
<b>15:25-15:55</b>	(LRIR) Graphene-Polymer Multilayers for Simultaneous IR-RF Detection	<b>Jarrett Vella</b> Sensors Directorate
<b>15:55-16:25</b>	Compositionally Tunable Stimuli-Responsive Nanoparticles Having Uniform Sizes, Shapes, and Core-Shell Architectures	<b>T. Randall Lee</b> University of Houston
<b>16:25-16:55</b>	(LRIR) Mechanically Robust and Reconfigurable Epoxy Nanocomposite by Dynamic Covalent Reactions	<b>Dhriti Nepal, Luke Baldwin, Ajit Roy</b> Materials & Manufacturing Directorate
<b>17:00</b>	<b>ADJOURN FOR THE DAY</b>	

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## Agenda Day Two – Tuesday, June 13, 2023

TIME	TOPIC	SPEAKER
8:00–8:10	Registration/Admin/Speaker Set-up	
8:10-8:30	Welcome and Introductory Remarks	<b>Ken Caster</b> Air Force Office of Scientific Research
8:30-10:00	Session 5	<b>Kara Martin</b> Propulsion Directorate-WPAFB
8:30-9:00	(HBCU-MSI) Optical Control of Charge and Energy Transfer in Molecular Wires	<b>Kirk Schanze</b> University of Texas, San Antonio
9:00-9:30	Understanding the Relationships Between the Structural, Optical, Electronic and Spintronics Properties of Chiral Organic Semiconducting and Conducting Materials	<b>Seth Marder; Valy Vardeny</b> University of Colorado, Boulder; University of Utah
9:30-10:00	Photocontrolled Synthesis and Properties of $\pi$ -Conjugated Polymers	<b>Julia Kalow</b> Northwestern University
10:00-10:15	<b>BREAK</b>	
10:15-11:45	Session 6	<b>Bryan Boudouris</b> Purdue University
10:15-10:45	Late Transition Metal Organometallics as Nonlinear Optical Materials	<b>Thomas Gray</b> Case Western Reserve University
10:45-11:15	(EOARD) Machine-Learning Aided Screening of Organic-Inorganic Perovskites as Efficient Photoabsorbers	<b>Gabor Csanyi, Gabor; Chris Sutton</b> University of Cambridge; University of South Carolina
11:15-11:45	(LRIR) Soft Semiconductor Structures and Metastructures for Optoelectronics	<b>Michael Durstock, Josh Kennedy</b> Materials & Manufacturing Directorate
11:45-13:15	<b>LUNCH</b>	
13:15-15:15	Session 7	<b>Joy Haley</b> Materials & Manufacturing Directorate
13:15-14:00	High Contrast Molecular Electrochromism	<b>John Reynolds, Aime'e Tomlinson</b> Georgia Tech; University of North Georgia
14:00-14:30	Narrow Bandgap Conjugated Polymers with Strong Correlations and Open-Shell Electronic Structures	<b>Jason Azoulay</b> University of Southern Mississippi
14:30-15:15	Collaboration Discussion Panel	<b>Thomas Gray, Tod Grusenmeyer, Rob Hickey, Jason Azoulay, Jarrett Vella, Zak Page, Parag Deotare</b>
	<b>Poster Session</b>	
15:15-16:55	(NDSEG) Tuning Single-Molecule Transport via Chemical Gating	<b>Claudia Pringle</b> Columbia University

	(NDSEG) Exploiting Molecular Chirality for Designing Qubits in the Solid State	<b>James O'Connor</b> Northwestern University
	High-Temperature Liquid-Crystalline and Semi-Crystalline Polyimide-Based Thermosetting Systems with Improved Melt-Rheology and Enhanced Interfacial Interactions Enhancement	<b>Zhenning Yu; Loon Seng Tan; Chris Crouse</b> Materials & Manufacturing Directorate
	Synthesis and Properties of Twisted Cyclopyrroles	<b>Abdusalom A. Suleymanov, Timothy M. Swager</b> Massachusetts Institute of Technology
	Pyrrolic Molecules for Applications in Faraday Rotation	<b>Daniel Martinez, Léo Delage-Laurin</b> Massachusetts Institute of Technology
	Cooperative Liquid Crystal Photo-Polymerization and -Alignment for Facile and Substrate Independent Patterning of Optical Anisotropy	<b>Joy Zhou, Zak Page</b> University of Texas, Austin
	Single-Source Chemical Vapor Deposition of ZrB <sub>2</sub> and HfB <sub>2</sub> : Early Stages of the Mechanism	<b>Sergei Prokvolit, Thomas Gray</b> Case Western Reserve University
	Elucidating the Relationship Between DNA Function and Biofluid Composition	<b>Alyssa Cramer, Monica Wolfe, Sean Webb, Eva Goorskey, Yaroslav Chushak, Peter Mirau, Jorge Chavez</b> AFRL 711-Human Performance Wing
	Design and Development of RNA Nanoparticles for Temporal Regulation of Performance-Associated Genes	<b>Svetlana Harbaugh, Ashley Brown, Jorge Chavez</b> AFRL 711-Human Performance Wing
	Sensing Cortisol at the Tip of Microneedles in Human Skin	<b>Trevor Tilly, Victoria Coyle, Irina Drachuk, Sarah McDonald, Thomas Leary, Matthew Dalton, Steve Kim, Jorge Chavez</b> AFRL 711-Human Performance Wing
<b>16:55</b>	<b>End of Poster Session</b>	
<b>17:00</b>	<b>ADJOURN FOR THE DAY</b>	

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## Agenda Day Three – Wednesday, June 14, 2023

TIME	TOPIC	SPEAKER
8:00–8:10	Registration/Admin/Speaker Set-up	
8:10-8:30	Welcome and Introductory Remarks	<b>Ken Caster</b> Air Force Office of Scientific Research
8:30-10:00	Session 8	<b>Levi Moore</b> Propulsion Directorate–Edwards AFB
8:30-9:00	(LRIR) Hybrid Inorganic/Organic Liquid Crystalline Materials for Low Cost Infrared Optics	<b>Nick Godman, Mike McConney; Scott Iacono</b> Materials & Manufacturing Directorate; US Air Force Academy
9:00-9:30	(YIP) Polarization-Specific Photocatalysis for Materials Chemistry	<b>Zachariah ‘Zak’ Page</b> University of Texas, Austin
9:30-10:00	Structural Chirality Derived from Polymer Stabilized Networks in Hierarchically Organized Liquid Crystal Phases	<b>Tim White</b> University of Colorado, Boulder
10:00-10:15	<b>BREAK</b>	
10:15-11:45	Session 9	<b>Tim Pruyn</b> Materials & Manufacturing Directorate
10:15-10:45	Materials Chemistry of Bullvalene	<b>Will Gutekunst</b> Georgia Institute of Technology
10:45-11:15	(HBCU/MSI) Structurally Controlled Synthesis of BCN Materials	<b>Aleksandrs ‘Alex’ Prokofjevs</b> North Carolina A&T State Univ
11:15-11:45	(AOARD) Polymers Incorporating Low-Valent/Low Coordination Number Main Group Centres	<b>Cameron Jones</b> Monash University
11:45-13:15	<b>LUNCH</b>	
13:15-14:45	Session 10	<b>Nick Godman</b> Materials & Manufacturing Directorate
13:15-13:45	(LRIR) Synthesis of Fluorinated Polymers for High-Performing Energetic Binders	<b>Alex Lonnecker; Kamran Ghiassi</b> AFRL Propulsion Directorate–Edwards
13:45-14:15	Compatibilization of Polyolefin Blends through Chemo- and Regioselective Radical Relay C–H Functionalization	<b>Frank Leibfarth</b> University of North Carolina, Chapel Hill
14:15-14:45	(LRIR) The Design, Synthesis and Conversion of Preceramic Polymers using Modular Chemistry	<b>Tim Pruyn, Matt Dickerson</b> Materials & Manufacturing Directorate
14:45-15:15	Silicon Diamondoid Nanoclusters: Precision Synthesis and Quantum Transport Properties	<b>Timothy Su</b> University of California, Riverside
15:30-17:00	National Museum of the USAF, 1100 Spaatz St., Dayton, OH 45433 <a href="https://www.nationalmuseum.af.mil">https://www.nationalmuseum.af.mil</a> Free entrance and free parking	

<b>18:30-20:00</b>	No Host Dinner	<b>The Wandering Griffin Brewery</b> 3725 Presidential Drive, Beavercreek, OH, ( <a href="https://wanderinggriffin.com/">https://wanderinggriffin.com/</a> )
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<b>Agenda Day Four – Thursday, June 15, 2023</b>		
<b>TIME</b>	<b>TOPIC</b>	<b>SPEAKER</b>
<b>8:00–8:10</b>	Registration/Admin/Speaker Set-up	
<b>8:10-8:30</b>	Welcome and Introductory Remarks	<b>Ken Caster</b> Air Force Office of Scientific Research
<b>8:30-10:00</b>	Session 12	<b>Alex Lonnecker</b> Propulsion Directorate–Edwards AFB
<b>8:30-9:00</b>	(LRIR) Improved Mechanical Properties of Additively-Manufactured Elastomers through Polymer Modification and Thiol-ene Curing Chemistry	<b>Levi Moore; Kam Ghiassi</b> Propulsion Directorate–Edwards AFB
<b>9:00-9:30</b>	(YIP) Vicinal Frustrated Lewis Pair Polymers for Dynamic, Stimuli-Responsive, and Energy-Dissipating Materials	<b>Nathan Romero</b> University of California, San Diego
<b>9:30-10:00</b>	New Electronic Topologies in Organic Electronic Materials	<b>Tim Swager</b> Massachusetts Institute of Technology
<b>10:00-10:15</b>	<b>BREAK</b>	
<b>10:15-11:45</b>	Session 13	<b>Randy Lee</b> University of Houston
<b>10:15-10:45</b>	Materials for Nonlinear Chiral Polymer Photonics: Multi-scale-modeling-guided Design and Development	<b>Paras Prasad</b> University of Buffalo
<b>10:45-11:15</b>	(International) The Role of Chirality in Energy Transfer	<b>Jessica Wade; Matthew Fuchter</b> Imperial College London
<b>11:15-11:45</b>	(MURI) Electron Spin Selectivity of Chiral Matter, from Molecules and Supramolecular Assemblies to Life	<b>David Waldeck</b> University of Pittsburgh
<b>11:45-13:00</b>	<b>LUNCH</b>	
<b>13:00-14:45</b>	Session 14	<b>Larry Drummy</b> Materials & Manufacturing Directorate
<b>13:00-13:30</b>	(MURI) Elucidating Interplays of Chirality and Spin in Chiral Assemblies	<b>Dali Sun</b> North Carolina State University
<b>13:30-14:00</b>	Design, Characterization, and Dynamical Response of Bespoke Detection Materials for the Short Wavelength Infrared Spectral Regime	<b>Michael Therien</b> Duke University
<b>14:00-14:30</b>	Deciphering Thermalization of Hybrid Charge Transfer States	<b>Parag Deotare</b> University of Michigan

<b>14:30-14:45</b>	<b>BREAK</b>	
<b>14:45-16:45</b>	Session 15	<b>Jorge Chavez</b> 711-Human Performance Wing
<b>14:45-15:15</b>	(LRIR) Covalent Organic Framework Sensors and Electronics	<b>Nick Glavin; Luke Baldwin</b> Materials & Manufacturing Directorate
<b>15:15-15:45</b>	(LRIR) Low Temperature Sintering of Polycrystalline Hybrid Organic-Inorganic Perovskites	<b>Tod Grusenmeyer</b> Materials & Manufacturing Directorate
<b>15:45-16:15</b>	Polymer-grafted Nanoparticles (PGN) for Single Component Hybrid Nanocomposites and Inorganic-Inorganic Nanocomposite Materials	<b>Chris Ober</b> Cornell University
<b>16:15-16:45</b>	Ultrafast Transformations for Materials Synthesis and Mechanisms of Formation	<b>Jim Tour</b> Rice University
<b>16:45-17:00</b>	Concluding Comments – Adjourn Meeting	<b>Ken Caster</b> Air Force Office of Scientific Research
<b>17:00</b>	<b>ADJOURN</b>	