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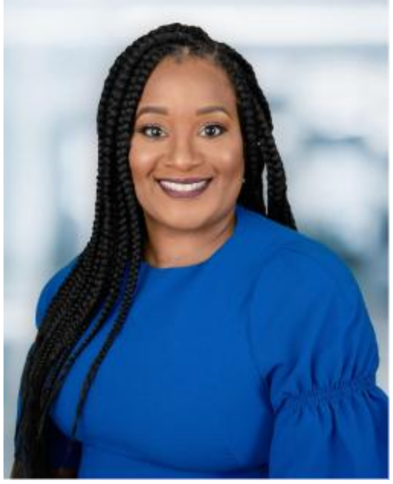
Speaker Biographies

and

Abstracts

Dr. Malika Jeffries-EL



Dr. Jeffries-EL is a Professor in the Department of Chemistry and the Division of Materials Science at Boston University, where she has also served as Associate Dean of the Graduate School of Arts & Sciences since July 2020. She earned bachelor's degrees in Chemistry and Africana Studies from Wellesley College before completing her M.Phil. and Ph.D. in Chemistry at The George Washington University. She conducted postdoctoral research under the guidance of Professor Richard D. McCullough at Carnegie Mellon University. Dr. Jeffries-EL began her academic career in the Department of Chemistry at Iowa State University, where she later earned tenure and was promoted to Associate Professor. She also served as a Martin Luther King Jr. Visiting Professor in the Department of Chemistry at Massachusetts Institute of Technology.

Her research focuses on the design and development of organic semiconductors. Dr. Jeffries-EL has authored more than 50 publications, delivered over 200 invited lectures, and received numerous honors, including the inaugural Robert Holland Award from Research Corporation for Science Advancement. She is a Fellow of both the American Chemical Society and the American Association for the Advancement of Science.

In addition to her research and teaching, Dr. Jeffries-EL serves as an Associate Editor for Chemical Science and has served on the editorial advisory boards of ACS Central Science, Macromolecules, and Chemical & Engineering News. She is also a member of the ACS Board of Directors. She is a strong advocate for diversity, equity, and inclusion and volunteers with the American Chemical Society and Alpha Kappa Alpha Sorority, Incorporated. Originally from Brooklyn, Dr. Jeffries-EL remains committed to mentoring the next generation of scientists and expanding opportunities in STEM.

Design and synthesis of organic electronic materials

Dr. Malika Jeffries-EL

Department of Chemistry and Division of Materials Science, Boston University

The past two decades have seen a dramatic increase in the number of consumer electronics in use. Previously, most households had a landline phone, one or two televisions and the occasional desktop computer. These days most people own numerous electronic devices, resulting in an increased demand for the semiconducting materials that drive this technology, in addition to the energy needed to power them. Accordingly, there has been a large amount of interest in the development of organic semiconductors, as many of the inorganic materials used in these devices are in limited supply. Organic semiconductors are either polymers or small molecules that feature and extended pi-conjugation. These materials possess many exceptional electronic, optical, and thermal properties and thus are well suited for applications, such as transistors, solar cells, and light emitting diodes. Unfortunately, there are several issues that must be addressed before real-life products can be developed. Unfortunately, there are several issues that must be addressed before real-life products can be developed. Our group focuses on the design and synthesis of new organic semiconductors based on low cost and/or easily prepared starting materials. Since the properties of organic semiconductors can be readily modified through chemical synthesis, we have turned our attention towards the design and synthesis of novel aromatic building blocks. Our group developed several new materials based including wide band gap materials for use in organic light-emitting diodes and narrow-band gap materials for use in photovoltaic cells. Our recent work will be presented.

Dr. Stefania Musolino

Dr. Stefania Musolino currently serves as the Director of Technology at XLYNX Materials, a specialty chemical company that has spun out from the University of Victoria. Since the company's inception, she has played a pivotal role in driving its growth and innovation. Over the past years, Dr. Musolino has expertly led the Research and Development team, overseeing numerous projects from concept to commercialization. Her notable contributions include the development of PFAS-free diazirine crosslinkers, which have become essential to the company's product offerings.

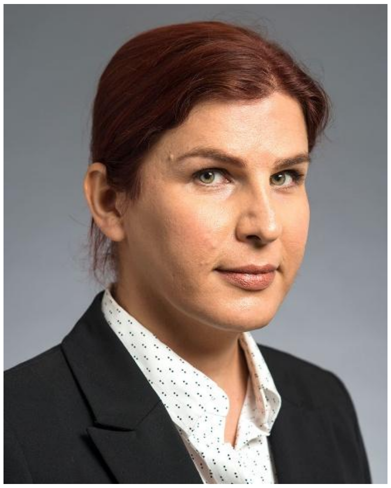
Dr. Musolino earned her Ph.D. in Chemistry from the University of St Andrews, Scotland, in 2019 and holds an MSc in Chemistry and Pharmaceutical Technologies from the University of Pisa, Italy. She has further honed her expertise through a Mitacs Post-Doctoral Fellowship at the University of Victoria in Canada, focusing on innovative crosslinking diazirine materials from 2019 to 2022.

Diazirine-Based Crosslinking: A Non-Destructive Pathway for Advanced Electronics

Dr. Stefania Musolino

As the demand for flexible, hybrid, and multilayer electronics grows, traditional manufacturing methods face critical bottlenecks. Conventional patterning often requires high temperatures, corrosive developers, or harsh plasma treatments that can damage sensitive device architectures and impede the integration of dissimilar materials. At XLYNX Materials, we have developed a new class of photoactivated diazirine-based crosslinkers designed to overcome these challenges. This innovative chemistry facilitates non-destructive, PFAS-free photopatterning on a wide range of polymeric and low-surface-energy substrates. By leveraging low-energy UV exposure to form permanent covalent bonds, this approach enables room-temperature processing and high-resolution pattern definition without compromising the integrity of underlying layers. This presentation will explore the fundamental chemistry of diazirine crosslinking and its role in solving adhesion and reliability issues in advanced packaging and flexible electronics. Through select case studies, we will showcase how this material-preserving pathway enables the next generation of robust, high-performance electronic devices.

Dr. Lilo Pozzo



Prof. Pozzo graduated from CMU’s Chemical Engineering PhD program in 2006 after completing thesis research with Prof. Lynn Walker using neutron scattering and rheology to discover new pathways for controlled assembly of colloids using block-copolymer micelle crystals. Her current research interests are still in the broad area of colloids, polymers and soft-matter systems. The group focuses on controlling and manipulating materials structure over broad length-scales, for applications in health, alternative energy and separations. Her group also continues to develop and use new advanced measurement techniques involving neutron and x-ray scattering. Prof. Pozzo obtained her B.S. from the University of Puerto Rico at Mayagüez. She also worked in the NIST Center for Neutron Research as a post-doctoral fellow and is currently the Boeing-Roundhill Professor of Chemical Engineering at the University of Washington where she has served since 2007. In addition to her research activities, she is dedicated to improving engineering education with course development in areas of entrepreneurship and service-oriented global engagement. You can find out more about her research by exploring the group’s website and her Google Scholar bibliography.

‘Digital Twins’ for Nanoparticle Assembly from High-Throughput Experiments and Simulations

Hanson Chen, Huat Thart-Chiang, Zachary Sherman and Lilo Pozzo

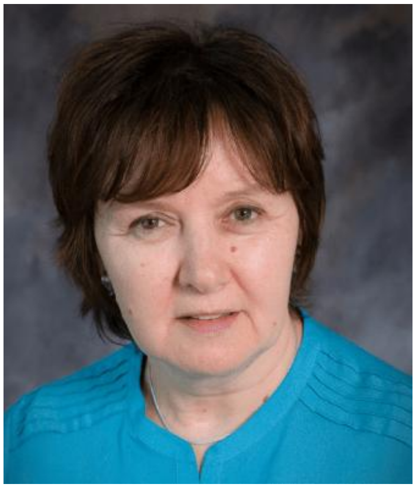
Department of Chemical Engineering, University of Washington, Seattle WA USA

Directing the self-assembly of nanoparticles into ordered structures requires navigating high-dimensional design spaces spanning particle chemistry, ligand architecture, solution conditions, and thermal processing. Further complications arise from the fact that many of these systems are found outside-of-equilibrium or in metastable states with large degeneracy in outcomes. Thus, the exhaustive exploration of parameters and conditions can be very costly and slow, motivating the integration of high-throughput experimentation (HTE) with physics-informed computational models.

We present a combined experimental and simulation framework for optimizing nanoparticle assembly. On the experimental side, HTE workflows coupled with rapid structural characterization, including dynamic light scattering, small-angle X-ray and neutron scattering (SAXS/SANS), and zeta-potential, enable efficient screening of formulation and processing conditions. In parallel, we develop a ‘digital twin’ in which coarse-grained (CG) simulations serve as an adjustable basis for physically interpretable representations of the multiscale assembly process. Mapping functions link experimental variables to CG interaction parameters, and a Bayesian optimizer iteratively refines these mappings by minimizing the distance between simulated and experimental observations (e.g. structure factors). The framework is designed to serve multiple types of assembly processes, accommodating diverse interaction potentials, particle geometries, distance metrics, and experimental observables.

We demonstrate this approach using DNA-lipid mediated nanoparticle assembly, where cholesterol-modified DNA physically tethered to lipid-encapsulated particles enables tunable hybridization-driven assembly across multiple particle types. The use of HTE and simulations to optimize, validate, and exploit ‘digital twins’ provides a generalizable pathway toward integrated and self-consistent physics-guided materials optimization compatible with autonomous experimentation platforms.

Dr. Eugenia Kumacheva



Eugenia Kumacheva is a University Professor and Distinguished Professor of Chemistry in the University of Toronto. In 2003-2020, she was Canada Research Chair (Tier 1) in Advanced Polymer Materials. Her primary research interests are in the materials science of soft matter, including polymers, colloids, and liquid crystals. She uses microfluidics, 3D bioprinting, and artificial intelligence (machine learning) to make new materials with a broad range of applications.

Eugenia has published 2 books, 10 book chapters, and >320 papers, holds 40 patents, and is a founder of two companies. She has given >330 invited, keynote, and plenary lectures, as well as public lectures.

Among her awards are the E. W. R. Steacie Award, ACS Polymer Chemistry Award, Guggenheim Fellowship (USA), De Gennes Prize in Soft Matter and Schlumberger Scholarship (both U.K.), International Chorafas Foundation Award in Physics and Engineering (Switzerland), Humboldt Research Award (Germany), Killam Fellowship, Macromolecular Science and Engineering Award, Clara Benson Award (all Canada), and the 2009 L'Oreal-UNESCO Award “For Women in Science” (given to 5 laureates in the world). She is recipient of the Canada Institute for Chemistry (CIC) medal, the top CIC’s award. She is a Fellow of the Royal Society of Canada, the Royal Society (U.K.) and Academia Europaea. In 2020, Eugenia Kumacheva has been recognized as an Officer of The Order of Canada, one of our country’s highest civilian honors.

Stimulus-Responsive Transport Properties of Polymer Hydrogels

Yuhang Huang, Sofia M. Morozova, Terek Li, Hani E. Naguib, Eugenia Kumacheva

University of Toronto, Toronto, Ontario, M5S2H6, Canada

Applications of polymer hydrogels in separation technologies, water remediation, and drug delivery all require control of hydrogel transport properties that are largely governed by the pore dimensions. Temperature-responsive polymer hydrogels are used to vary pore sizes "on demand", however such changes are generally coupled with drastic changes with hydrogel volume and mechanical properties. Here, we report a hydrogel that exhibits temperature-controlled increase in pore size without the change in hydrogel volume or mechanics. The hydrogel was formed by the covalent cross-linking of aldehyde-modified cellulose nanocrystals and chitosan carrying end-grafted poly(*N*-isopropylacrylamide) (pNIPAm) molecules. Owing to the temperature-mediated coil-to-globule transition of the pNIPAm grafts, they acted as a temperature-responsive "gate" controlling hydrogel transport properties. At elevated temperatures, the size of the pores showed up to a four-fold increase, with no significant changes in hydrogel volume. Temperature-mediated transport properties of the gel were explored by studying diffusion of nanoparticles with different dimensions from the gel, leading to the model-established correlation between the kinetics of nanoparticle release and the ratio of nanoparticle dimensions-to-pore size. The proposed approach to stimulus-responsive control of hydrogel transport properties has many applications, including their use in nanomedicine and tissue engineering.

Dr. Danniebelle Haase

Dr. Danniebelle N. Haase is a Research Scientist in Packaging and Specialty Plastics and Hydrocarbons at Dow, where she leads innovation in wire and cable formulations that power homes and communities. Her work is driven by a deep curiosity, a passion for learning, and a strategic, solutions-oriented mindset that blends scientific rigor with practical impact. Danniebelle has a track record of generating innovative ideas not previously considered and as the team coalesces around a plan, she helps to de-risk the plan by identifying and avoiding pitfalls. Since joining Dow in 2014, she has applied this approach to design, prepare and support the commercialization of emulsion polymers for industrial wood and direct-to-metal (DTM) applications and resins for road markings. Danniebelle has been integral in the commercialization of four products for the direct-to-metal market. She has 2 granted patents, 2 patent applications and has delivered > 12 presentations at conferences.

Before joining Dow in 2014, Dr. Haase served as an Assistant Professor of Chemistry at Lincoln University. She earned her Ph.D. in Chemistry with a minor in Medicinal Chemistry from the University of Florida in 2009, following a M.Phil. in Organic Chemistry from the University of the West Indies, Mona, Jamaica. Her journey began in education, teaching high school chemistry from 2000 to 2002, an experience that shaped her commitment to mentorship and outreach.

Danniebelle is highly engaged in the scientific community. Subsequent to her term as a POLY Programming Chair (2025 Chair, team member from 2021 – 2024), Danniebelle serves as an Alternate Councilor for the Division of Polymer Chemistry and the Program Manager for the Women Chemists Committee. Beyond ACS, she is Chair of the U.S. National Committee for the International Union of Pure and Applied Chemistry (IUPAC) and an active member of IUPAC's Polymer Division and the Chair of IUPAC's Committee on Chemistry and Industry (COCI).

Dr. Haase’s contributions to the field have been recognized with numerous awards, including the Chemical Abstracts Service’s Colors of Chemistry Photo Contest in October 2011, one of her most cherished honors. Her broad experience across academia, industry, and professional societies uniquely positions her as a collaborative, strategic leader who is ready to drive the team’s mission forward. She is known for her ability to foster teamwork, offer keen insights, and champion progress in every organization she serves.

Away from the bench, she enjoys reading, traveling, and exploring new cuisines.

Fast Curing, Silane Crosslinkable Solutions for Power Cables

Danniebelle N. Haase*, Saurav Sengupta, Katherine Ortega, Bharat Chaudhary*

The Dow Chemical Company, 400 Arcola Road, Collegeville, PA 19426, USA.

Fast curing, silane crosslinkable compounds for Medium Voltage Wire and Cable applications enable good physical and mechanical properties, as well as high temperature operations. The insulation and jacketing material, critical components of medium voltage (MV) cable constructions, are typically prepared via extrusion. The polyethylene-based insulating layer contributes to the high electrical breakdown strength of the covering and the jacket, usually prepared from higher density polyethylene with improved abuse resistance, protects the conductor and insulation from mechanical and chemical damage. The conductor shield contributes to the improved reliability and performance of the cable. This talk will provide an overview of the structure/property relationship of the polyethylenes used in MV cable applications and their use in the preparation of high-performance materials.

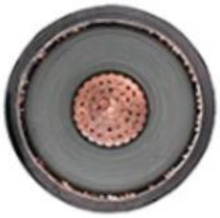


Figure 1: An example of a medium voltage cable construction

Dr. Elizabeth Gillies

Elizabeth Gillies is a Tier 1 Canada Research Chair in Polymeric Biomaterials and a Professor in the Department of Chemistry and Department of Chemical and Biochemical Engineering at the University of Western Ontario. She obtained her B.Sc. degree in Chemistry from Queen's University, Kingston, in 2000. She then moved to the University of California, Berkeley where she completed her Ph.D. degree in 2004 working under the guidance of Jean Fréchet. After postdoctoral work at the University of Bordeaux with Ivan Huc, she joined Western in 2006. Her research interests are in the development of biodegradable polymers, stimuli-responsive polymers, phosphorus-containing polymers, and polymer assemblies. Her team is applying these polymers via multidisciplinary collaborations with industry and academia to a range of applications including coatings, packaging, drug delivery, tissue engineering, and agriculture. Dr. Gillies is currently an Executive Editor at the journal Biomacromolecules. She has received a number of recognitions including an NSERC E. W. R. Steacie Memorial Fellowship, the Macromolecular Science and Engineering Award from the Chemical Institute of Canada, as well as membership in the Royal Society of Canada College of New Scholars, Artists, and Scientists and the Canadian Academy of Engineering.

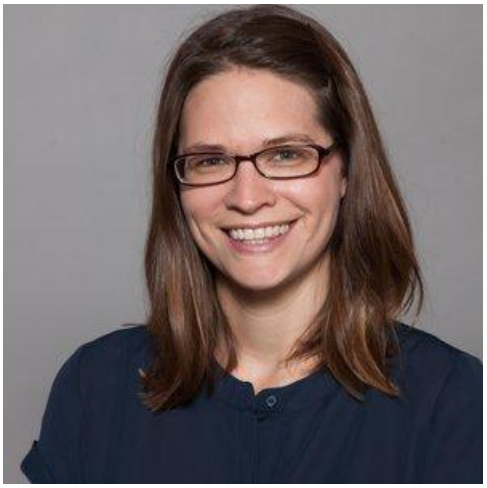
Self-immolative polymers: Designing, synthesizing, and applying polymers that fall apart

Elizabeth R. Gillies

Department of Chemistry; Department of Chemical and Biochemical Engineering, The University of Western Ontario, 1151 Richmond St., London, Ontario, Canada N6A 5B7

Degradable polymers are of growing interest for many areas, including biomedical applications, smart materials and devices, and to address the challenges associated with plastics pollution. Significant progress has been made using backbones such as polysaccharides, polyesters, and a growing number of bio-based polymers. However, in some cases it is desirable to be able to control precisely when and where polymers degrade and to access their degradation under a diverse range of conditions. Self-immolative polymers are a growing class of degradable polymers that undergo controlled end-to-end depolymerization following a stimulus-mediated backbone or end-cap cleavage. This presentation will describe the chemical foundations of self-immolative polymers including elimination-based spacers and low ceiling temperature polymers, followed by the rational design of different backbones and end-caps. Their incorporation into block copolymers and hydrogel networks will also be explored. Finally, the presentation will then cover examples of how these polymers can be applied.

Dr. Christina Cooley



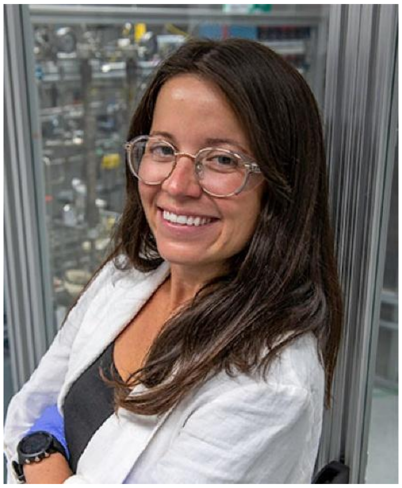
Christina Cooley grew up in Conway, AR, where she studied Chemistry and Music at Hendrix College. She earned a Ph.D. in Organic Chemistry at Stanford University, working in the laboratory of Professor Paul Wender to develop new oligomeric scaffolds for drug delivery applications. She then completed postdoctoral training in Chemical Biology at Scripps Research in San Diego with Professors Jeff Kelly and Luke Wiseman, focusing on therapeutic approaches for protein misfolding diseases. Christina joined the Trinity Chemistry faculty in 2015, where she leads an interdisciplinary undergraduate research program that applies the power of synthetic organic chemistry to impact related fields including polymer and medicinal chemistry. Current major project areas include the development of fluorogenic radical polymerization reactions for chemical and biodetection applications, and prodrug strategies for disease-targeted therapeutic delivery. Beyond research, she is passionate about educating and mentoring the next generation of scientists, as well as serving the Trinity and broader scientific communities.

Real-Time Synthesis and Applications of Fluorescent Polymers by Fluorogenic Radical Polymerization

Christina Cooley

A simple and direct method to observe synthetic polymer formation in real-time could enable applications ranging from sensing and diagnostics to polymer synthesis and characterization. We are developing fluorogenic radical polymerization reaction platforms that utilize fluorogenic monomers that are dark in their monomer form but reveal visible fluorescence as they are incorporated into a growing polymer chain. Fluorescent polymer detection can provide both a qualitative and quantitative readout of polymerization reaction kinetics, polymer length, and initiator concentration. Synthetic approaches toward fluorogenic monomer probes and their radical polymerization to form fluorescent polymers for bioanalyte detection and polymer characterization applications will be described.

Dr. Kat Knauer (NREL)



Dr. Katrina (Kat) Knauer is a polymer scientist who is driven by a steadfast commitment to addressing the pressing issue of plastic waste. She earned her Ph.D. in Polymer Science and Engineering from the University of Southern Mississippi in 2016. Dr. Knauer further honed her expertise through an industrial post-doctoral stint with BASF, specializing in plastics recycling. Building upon this experience, she ventured into entrepreneurship with Novoloop Inc., a chemical recycling startup company. In 2021, Dr. Knauer joined the National Renewable Energy Laboratory (NREL) as a Senior Researcher in Polymer Science and Engineering and the Chief Technology Officer (CTO) of the Bio-Optimized Technologies to keep Thermoplastics out of Landfills and the Environment (BOTTLE) Consortium. Concurrently, she serves as an Assistant Adjoint Professor and RASEI Fellow in Chemical and Biological Engineering at the University of Colorado, Boulder. Dr. Knauer's research endeavors revolve around the development of innovative recycling technologies for existing plastics, as well as the design of intrinsically recyclable-by-design materials for the future.

A random walk career in sustainable plastics

Kat Knauer

National Laboratory of the Rockies

Plastics, and by extension polymer science, have transformed modern life, yet their success has also contributed to a global waste and emissions crisis that disproportionately impacts vulnerable communities and ecosystems. Addressing this challenge requires not only rethinking how we design materials and recycling infrastructure, but also how we engage people, partnerships, and purpose in building a circular economy. This talk highlights recent advances in intrinsically recyclable, bio-based polymers developed at the University of Colorado Boulder and the National Laboratory of the Rockies, where machine learning-guided design enables materials that retain high performance while being chemically deconstructed to their original building blocks. We apply a polyester-centric approach, leveraging shared ester chemistries to enable easier waste sortation and scalable recycling pathways while reducing reliance on fossil carbon. In addition to discussing these scientific advances, I will reflect on my unconventional career path through a major chemical company, a small startup, and ultimately to a national laboratory research program, and how each experience shaped my perspective on innovation, collaboration, and sustainability in polymer science.