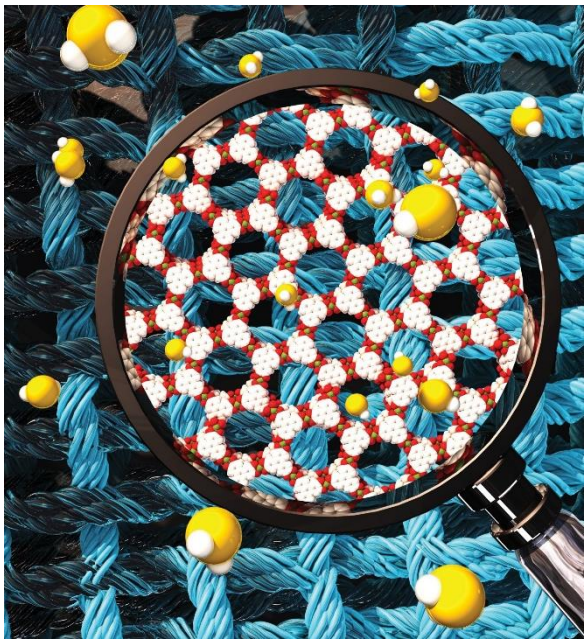
Title: Molecular Engineering of Conductive Framework Materials for Chemical Sensing, Filtration, and Detoxification

Presenter: Katherine A. Mirica, PhD



Abstract: Molecular engineering of new materials holds promise for improving human health, safety, efficiency, and quality of life. This presentation will describe strategies for molecular engineering of conductive stimuli-responsive molecularly precise materials. The presentation will describe several approaches for design, synthesis, and device integration of two-dimensional (2D) conductive metal–organic frameworks (MOFs) and covalent organic frameworks (COFs) to create devices with promising utility in electroanalysis. An emphasis will be placed on the fundamental understanding and molecular design of modular structure–property relationships within this class of 2D materials. The presentation will also highlight how the integration of conductive MOFs on textiles can enable new approaches to simultaneous sensing, filtration, and detoxification. In summary, this presentation will demonstrate how molecular-level features within solid state materials can be used to tune their stimuli-responsive function in multifunctional devices.

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Bio: Katherine was born and raised in Ukraine and emigrated with her family to the United States as she was starting high school. She obtained her B.S. in Chemistry at Boston College, where she developed a passion for Materials Chemistry, working in the laboratory of Lawrence T. Scott. She earned her Ph.D. in Chemistry from Harvard University under the guidance of George M. Whitesides and completed her postdoctoral training with Timothy M. Swager at the Massachusetts Institute of Technology. Katherine began her independent scientific career as an Assistant Professor in the Department of Chemistry at Dartmouth College in July 2015 and was promoted to Associate Professor with tenure in 2021. Her research interests span the topics of self-assembly, design and synthesis of multifunctional framework materials, electroanalysis, energy, catalysis, and adhesion science. She is a recipient of the Army Research Office Young Investigator Award (2017), Sloan Research Fellowship (2018), PMSE Young Investigator Award (2018), 3M Non-Tenured Faculty Award (2018), Cottrell Scholar Award (2019), NSF CAREER Award (2020), Camille Dreyfus Teacher-Scholar Award (2020), and NIH Maximizing Investigators' Research Award (2020). Since 2022, she has been an Associate Editor of ACS Sensors.