THE MATERIALS SCIENCE AND ENGINEERING DEPARTMENT
SPRING 2026 COLLOQUIUM SERIES PRESENTS:

Professor Amanda Morris

Professor of Inorganic and Energy Chemistry and Chair of Chemistry

Virginia Tech

Programmable Metal–Organic Frameworks for Energy, Catalysis, and Materials Innovation

Metal–organic frameworks (MOFs) are a versatile class of porous, crystalline materials that enable precise control over structure and function at the molecular level. In our research group, we harness this tunability to design frameworks that address challenges spanning energy, catalysis, and advanced materials synthesis. Our approach integrates synthetic chemistry, mechanistic insight, and emerging data-driven strategies to establish structure–property relationships that guide the rational design of functional materials. We explore MOFs as platforms for energy transfer, including lightharvesting assemblies and photocatalytic architectures that enable efficient capture and conversion of solar energy. We also develop photo-responsive frameworks that undergo controlled structural transformations, providing new opportunities in catalysis and drug delivery. In parallel, we investigate single-atom modifications within MOFs to access well-defined catalytic sites with enhanced activity and selectivity. Beyond molecular-scale function, we extend MOF design into composite and templating strategies. This includes MOF-reinforced polymer composites with improved mechanical and functional properties, as well as the use of MOFs as high-temperature sacrificial scaffolds to access difficult-to-prepare or uniquely structured materials. A unifying theme of this work is understanding how local chemical environments and framework dynamics give rise to emergent behavior across length scales. Together, these efforts position MOFs as adaptable platforms for advancing chemical reactivity, materials design, and energy-relevant applications.

Dr. Amanda Morris is a Professor of Inorganic and Energy Chemistry and Chair of Chemistry at Virginia Tech. Her research education, conducted at Penn State University (B.S.), Johns Hopkins University (Ph.D.), and Princeton University (Postdoctoral), was focused on addressing critical environmental issues with fundamental science, including water remediation, solar energy harvesting and storage, and carbon dioxide conversion. As her publication record shows, Morris is a classically trained photo-electrochemist with demonstrated success utilizing various techniques (cyclic voltammetry, spectroelectrochemistry, and pulsed-laser spectroscopy) to explore new frontiers in renewable energy. Her research group's current focus is on light-matter interactions and catalysis. She has received numerous awards for her research pursuits, listed below. She serves as the Chair of the Division of Inorganic Chemistry of the American Chemical Society, an Associate Editor of Chemical Physics Reviews, and sits on the Editorial Advisory Boards for the Journal of the American Chemical Society, ChemSocRev, ACS Applied Energy Materials, and EnergyChem.

Tuesday, April 21st • 4 pm CT • Tech L211

In person only; no Zoom

Questions? Contact allison.macknick@northwestern.edu

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