



MATERIALS SCIENCE and ENGINEERING SEMINAR

Co-sponsored by the Center for Hybrid, Active and Responsive Materials (CHARM)



Dr. Benjamin McDonald

Department of Chemistry

Brown University

Molecular Design of Processes and Polymers for Bioinspired Soft Materials

Nature's soft materials such as silk, tendon, barnacle cement, and membraneless organelles span a diverse range of biological roles, but are unified in their formation, stimuli-responsive assembly programmed by the chemical composition and structure of macromolecular building blocks. Inspired by this multiscale intersection of molecular structure, we seek to explore how the hierarchies of polymer structure impact the assembly, structure, and properties of polymeric soft materials. To be discussed are ion specific interactions as a new opportunity to program dynamic and responsive soft matter and ultra-dense bottlebrush polymers as colloidal liquid crystals. Finally, we'll consider how these can cooperatively enable the assembly of polymer networks with structures and properties inspired by biological materials.

BIOGRAPHY

Ben was born in Maine but was raised rural central Ohio in a nature and science-centered household, making him eager to understand the world through the lens of chemistry. He received his undergraduate degree in chemistry from University of North Carolina Asheville in 2012, conducting research with Prof. Herman Holt. He pursued a PhD at Northwestern University as a NIH NRSA predoctoral fellow under the guidance of Prof. Karl Scheidt in 2018, developing new catalytic methods for the construction of small molecules and natural products. Subsequently, he was a Martin Luther King postdoctoral scholar in the lab of Prof. Tim Swager at the Massachusetts Institute of Technology, where he developed a passion for the design of macromolecules and their use as dynamic and reactive materials. Ben began his appointment in the Department of Chemistry at Brown as an assistant professor in 2021, where his training in synthetic and materials chemistry, and fascination with the natural world converged to create *The Laboratory for Bioinspired Macromolecular Materials*. Work in this laboratory blends molecular design and synthesis with soft matter science to explore the translation of biological material assembly and structure for fundamental advances in the materials that support the biomedical and energy sciences.

**MSEG
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11/19/2025

10:30 a.m.

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CENTER FOR HYBRID, ACTIVE,
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