School of Molecular Sciences
Arizona State University

SMS Spring 2024 Seminar Series

Friday February 16 | 3:00 pm | Biodesign Auditorium

Nanocomposite Synthesis via Brush Particles

This seminar will discuss new, scalable nanocomposite synthesis methods, and outline procedures to achieve macroscopic, processible, 3D materials consisting entirely of polymer brush-grafted nanoparticles. Techniques will be presented to synthesize high inorganic content composites (up to ~85 wt%) that are both processable under ambient conditions and mechanically resilient. Additionally, a "self-assembly" approach will be described that permits the first examples of macroscopic materials consisting entirely of ordered nanoparticle superlattices. Technologies enabled by these new classes of composites and their potential for incorporation into optoelectronic devices, structural materials, adhesives, and related applications will be presented.

Robert J. Macfarlane PhD

Professor, Massachusetts Institute of Technology

Prof. Rob Macfarlane has been a faculty member at MIT since 2015, and is currently the Paul M. Cook Associate Professor of Materials Science in the department of materials science. Prior to joining MIT, he obtained his PhD in chemistry in 2013 at Northwestern University, after which he was awarded Kavli Nanoscience Institute post- doctoral fellowship at Caltech. Prof. Macfarlane is the recipient of multiple awards for his research, including a 2016 AFOSR Young Investigator Award, a 2017 NSF CAREER Award, the 2017 ACS Unilever Award, a 2019 3M Non-Tenured faculty Award, and a 2023 ACS PMSE Early Investigator Award. He is an expert in the fields of self-assembly, nanocomposites, materials chemistry, and nanomaterials processing, and his research lab sits at the interface of these fields to establish new materials fabrication techniques. His lab's research focuses on developing systems-level approaches to materials synthesis, where structural features at the molecular, nano, and macroscopic length scales act together as integrated design handles to control a material's hierarchical ordering. These materials range from inorganic nanoparticles to synthetic polymers to biomacromolecules like DNA, and the structures have potential utility in diverse applications ranging from energy storage to protective coatings.

**ZOOM option available: https://asu.zoom.us/j/81517529537*