“Towards Environmentally Benign Synthesis of Functional Nanomaterials”

Wednesday
March 28, 2018
3:00 pm
Wu and Chen Auditorium
Levine Hall

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Abstract
Functional nanomaterials are at the core of many innovations in renewable energy generation and catalysis. However, many of these materials are currently synthesized through high temperature, multi-step processes that utilize organic solvents and expensive precursors. These factors increase the complexity and economic and environmental costs of manufacturing scale-up. In contrast, biomineralization, the process by which biological systems produce structural nanomaterials, occurs under ambient conditions in aqueous media utilizing the available precursors. We have developed routes to adapt these biological processes to the direct and scalable controlled synthesis of a variety of functional nanoparticles; from core-shell metal chalcogenide quantum dots for solar harvesting to mixed metal oxide catalysts. Previous bioinspired synthesis routes typically utilize a biomolecule for templating of a chemical mineralization step, or lack tight control over size or composition of the particles. In contrast, our single enzyme approaches both template growth and catalyze mineralization to form size, composition and structure in controlled particles with function comparable to those synthesized by traditional chemical routes

Bio
Steven McIntosh is the Class of ’61 Associate Professor of Chemical and Biomolecular Engineering at Lehigh University. He received his Bachelor of Engineering from the University of Edinburgh, and his MS and PhD in Chemical Engineering from the University of Pennsylvania. He spent a postdoctoral period in Inorganic Materials Science at the University of Twente. McIntosh’s research focuses on the development of functional materials for energy systems, with topics ranging from Solid Oxide Fuel Cell electrodes to biomineralization of quantum confined nanomaterials. McIntosh is a Fellow of the Royal Society of Chemistry, and recipient of a National Science Foundation CAREER award. He is an associate editor for RSC Advances, and editor for the RSC Specialist Periodical Reports Electrochemistry.

Spring 2018 CBE Seminar Series