University of Wisconsin Dept. of Chemistry

Thursday
1-31-13
12:15 p.m.

Materials Chem Seminar

Prof. Ulrich Wiesner
Cornell University

Materials Science & Engineering

"Functional Hybrid Nanomaterials from Block Copolymers"

Solutions to global problems including energy conversion and storage, clean water and human health require increasingly complex, multicompoment hybrid materials with unprecedented levels of control of composition, structure and order at the nano-scale. One of the characteristics of the associated research is the integration over multiple, often educationally orthogonal fields ranging from inorganic chemistry to polymer science to physics. This talk will give examples for the synthesis and characterization of such hybrid materials based on the assembly of blocked macromolecules with inorganic, solid-state type materials. Examples will include amorphous, polycrystalline as well as single crystal-type materials. The aim of the described work is to understand the underlying fundamental chemical, thermodynamic and kinetic formation principles enabling generalization of results over a wider class of materials systems. Work includes synthesis of all necessary organic/polymer and inorganic components, characterization of assembly structures using various scattering and electron microscopy techniques, as well as the study of specific properties including investigation of optoelectronic devices, fuel cells, meta-materials, and membranes for nano-filtration applications.