Order and Disorder in Multiblock Polymers

Wednesday, March 26, 2014 • Eck Center Auditorium, 1:00 p.m.
Refreshments served at 2:00 p.m. in the Eck Center Lobby

Soft materials constitute a familiar class of condensed matter. Representative examples include all types of polymers, colloidal dispersions, foams, and biological tissue such as collagen and spider silk. Block polymers are a form of macromolecules that provide unparalleled material design opportunities through the coupling of distinct polymer blocks that incorporate different physical properties. Modern synthetic chemical methods afford access to an unlimited number of architectural variations that begin with simple diblocks and progress through a dizzying array of graft and branched geometries. This lecture will focus on relatively simple molecular designs—linear macromolecules that contain two or three different block types strategically sequenced to create useful multiblock molecular architectures. A rich array of nanostructured phases resulting in tailored rheological and mechanical properties have been achieved in these materials.

Block polymers present unique characterization challenges while offering a plethora of intriguing fundamental scientific issues coupled to exciting technical applications. Examples that illustrate the synergistic use of self-consistent field theory along with transmission electron microscopy, small-angle x-ray and neutron scattering, dynamic mechanical spectroscopy and tensile testing will be discussed in the context of research that has led to interdisciplinary discoveries regarding phase behavior in condensed matter while generating commercial products.