Self-Assembly and Directed Assembly of Amphiphilic Block Copolymers for Formulation of Nanostructured Fluids and Synthesis of Nanomaterials

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Abstract
Our research aims to capitalize on self-assembly afforded by amphiphiles and directed assembly imposed by external fields for the (i) fundamental elucidation of interactions and structure in supramolecular assemblies, (ii) formulation of nanostructured polymer-particle dispersions with desired properties, (iii) surface modification and organization of colloidal particles, and (iv) preparation and utilization of ordered templates for nanomaterials synthesis.

This presentation will highlight the interplay between self-assembly properties of amphiphilic block copolymers (ABCs) and (1) liquid or gel formulations with tunable properties based on ABCs, or (2) synthesis and colloidal stabilization of nanoparticles (NPs) in ABC media.


(2) ABCs can initiate NP formation, facilitate NP growth, control NP size and shape, modify NP surfaces for dispersibility in solution or a solid matrix, alter NP optical and electronic properties, and promote long-range NP organization. The relationship between ABC characteristics and NP properties is beneficial for several applications [Langmuir 2004, 20, 550; 2004, 20, 8426].