**Self-Assembly: Fundamentals and Applications in Structured Fluids and Nanomaterials Synthesis**


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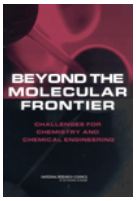
The development of self-assembly as a useful approach to the synthesis And manufacturing of complex systems and materials has been identified as a "grand challenge" in the 2003 U.S. National Academies report "***Beyond the Molecular Frontier***".
http://www.nap.edu/books/0309084776/html




More recently (7/1/05), ***Science*** magazine included "***How far can we push chemical self-assembly***" in the top-25 list of "big questions" facing science.
http://www.sciencemag.org/cgi/content/full/309/5731/95

In our laboratory we utilize the self-assembly afforded by amphiphiles (e.g., surfactants, block copolymers, proteins) and the directed assembly promoted by external fields (e.g., shear, electric) for **(i)** fundamental elucidation of interactions and structure in supramolecular systems, **(ii)** formulation of nanostructured polymer-particle dispersions with desired properties, **(iii)** templating the synthesis of nanomaterials , and **(iv)** surface modification and organization of colloidal particles.

This presentation will address the interplay between the fundamentals of amphiphilic block copolymer (ABC) self-assembly in the presence of selective solvents, and the applications of ABCs in the formulation of complex fluids with tuneable properties, and in the synthesis of nanoparticles in a size- and shape-controlled manner. Ongoing research on shear-induced conformational changes of blood proteins and the dielectrophoretic collection of viral particles will also be highlighted.