



*Network for Computational Nanotechnology
And Materials Science Engineering
Lecture Series*

Exploiting Anisotropy for Nanoscale Building Block Self-Assembly: The Shape(s) of Things to Come

**Friday November 3, 2006
3:30 p.m. Room B12
Materials & Electrical Engineering Bldg.**

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The unique anisotropy of today's new nanoparticle and colloidal building blocks starkly contrasts with the isotropic, spherical colloids that have been the focus of particle assembly for nearly a generation. As the materials community gains further control over the design and fabrication of these new particles, they are poised to become the "atoms" and "molecules" of tomorrow's materials and devices, with applications including sensors, alternative energy, photonics, nanoelectronics and nanocomputing, imaging, drug delivery, and more. In this talk, we present results of computer simulations of anisotropic nanoparticle and colloidal "shape amphiphiles" undergoing self-assembly. We show how various measures of anisotropy, including building block shape, patterning, functionalization and interaction selectivity, can be combined and exploited to achieve complex mesoscale one-, two- and three-dimensional structures such as wires, sheets, shells, and helices through self assembly. We also discuss the formation of diamond arrays from tetrahedrally patched particles, 2-D "S-layer" protein-like sheets from CdTe nanoparticles, and convex structures from conical and spherical particles.

Sharon Glotzer, is professor of Chemical Engineering, Materials Science and Engineering, Physics, macromolecular Science Engineering, and Applied Physics at the University of Michigan in Ann Arbor. Before joining the University of Michigan in 2001, she was a physicist in the Polymers Division of the Materials Science and Engineering Laboratory in the National Institute of Science and Technology. Before joining NIST she was an NRC postdoctoral fellow. She did her Ph.D. in physics at Boston University. Professor Glotzer's research interests are in the assembly of nanoscale systems, supercooled and metastable liquids and complex fluids, colloids, and complex fluids, biomimetic materials design, and computer simulation. She is the recipient of numerous awards – most recently Monroe-Brown Foundation Award for Research Excellence from the College of Engineering at the University of Michigan