Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Small-molecule-directed nanoparticle assembly towards stimuli-responsive nanocomposites KARI THORKELSSON, Department of Materials Science, University of California, Berkeley, YUE ZHAO, ALEXANDER MASTROIANNI, THOMAS SCHILLING, JOSEPH LUTHER, BENJAMIN RANCATORE, KAZUYUKI MATSUNAGA, HIROSHI JINNAI, YUE WU, DANIEL POULSEN, JEAN FRÉCHET, PAUL ALIVISATOS, TING XU — The precise control of spatial organization in nanoparticle assemblies would enable one to take advantage of the various optical, electrical, and magnetic properties found in inorganic nanoparticles, but such control is difficult, and remains an impediment in the "bottom-up" production of functional materials. Most current methods are either highly dependent on the materials used, or not precise enough to use in the fabrication of functional materials. We show how this challenge has been overcome using a diblock copolymer-based supramolecule. 3-pentadecylphenol was hydrogen bonded to the poly(4-vinylpyridine) block of a polystyrene-block-poly(4-vinylpyridine) diblock copolymer. The alkyl moiety of the small molecules interacts favorably with the alkyl ligands used on a number of nanoparticles, and also forces the poly(4-vinylpyridine) block into a comb conformation. This restricts the location of the nanoparticles and forces them into a well-organized array. This strategy has been successful in assembling nanoparticles without special considerations for the actual core material or shape. A variety of small molecules could also be used.

Kari Thorkelsson
Department of Materials Science, University of California, Berkeley

Date submitted: 22 Dec 2009 Electronic form version 1.4