Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Crosslinked nanoparticle assemblies at liquid-liquid interfaces RAVISUBHASH TANGIRALA, HABIB SKAFF[1], YAO LIN[2], THOMAS RUSSELL, TODD EMRICK, University of Massachusetts, Amherst, MA — The assembly of nanoparticles at the interface of immiscible fluids holds promise for the preparation of new materials that benefit from both the physical properties of the nanoparticles and the chemistry associated with the ligands. The weak confinement of nanoparticles to the liquid-liquid interface enables the formation of particle-based assemblies that possess unique features relative to assemblies of micron-scale particles. Crosslinking of nanoparticles at a liquid-liquid interface lends greater stability to the interfacial assembly, leading to ultrathin nanoparticle-based capsules which possess mechanical integrity even after removal of the interface. Norbornene-functionalized CdSe/ZnS core/shell quantum dots are used in this study to afford facile capsule visualization by fluorescence confocal microscopy, as well as ease of crosslinking in mild conditions by means of ring-opening metathesis polymerization (ROMP) using a unique amphiphilic ruthenium benzylidene metathesis catalyst. The crosslinked capsules display a size-selective encapsulation capability, dictated by the interstitial spaces between the nanoparticles. The porosity of the capsules can be further tuned by the addition of small amounts of uncrosslinkable nanoparticles prior to crosslinking.

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Date submitted: 28 Nov 2005 Electronic form version 1.4