Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Directing self-assembly of gold nanoparticles in diblock copolymer scaffold QIFANG LI, JINBO HE, ELIZABETH GLOGOWSKI, TODD EMRICK, THOMAS RUSSELL, Department of Polymer Science & Engineering, University of Massachusetts, Amherst, MA 01003, USA, THOMAS P. RUSSELL TEAM, TODD EMRICK COLLABORATION — A versatile hierarchical approach for directing self -assembly of gold nanostructures with size 2-3nm in diblock copolymer scaffolds is found. Diblock copolymer polystyrene-b-poly(2-vinylpyridine) (PS-b-P2VP) is used to form a regular scaffold of highly anisotropic, stripe-like domains, and controlled differential wetting by dichloromethane and thermal annealing guides gold nanoparticles with half hydrophilic ligand to aggregate selectively along the scaffold, producing highly organized metal nanostructures. In as-cast block-copolymer and gold nanoparticles thin films, micelle structure and gold nanoparticles random distribution on scaffold are typically observed. However, samples annealed in dichloromethane exhibit well-defined short-range ordered nanostructure with gold nanoparticles located at the interface of PS and P2VP nanoscale domain. After annealing at 170 $^{\circ}$C, the gold nanoparticles at interface migrated into the middle of P2VP phase and exhibited long-range ordered hierarchical structures. Synergistic interactions between the gold nanoparticles and the PS-b-P2VP caused an orientation of the microdomains normal to the film surface.

Jinbo He
Department of Polymer Science & Engineering
University of Massachusetts, Amherst, MA 01003, USA

Date submitted: 25 Nov 2006 Electronic form version 1.4