Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Role of defects on self-assembly of nanoparticles in block copolymer thin film JENNY KIM, Universiy of Michigan, PETER GREEN, University of Michigan — The structure of A-b-B block copolymer (BCP) thin films is often exploited as scaffolds for directing nanoparticles into various, long-range ordered geometries. Depending on the affinity between nanoparticles and block chains, nanoparticles preferentially segregate to either A or B domains. We show that dislocations may play a dominant role in the assembly of large nanoparticles in BCP thin film that order at suboptimal thicknesses. Edge dislocations are ubiquitous in lamellar BCP thin films forming a partial surface layer, i.e. holes or island structures. When the ratio of the nanoparticle diameter, d, to the domain dimension, L, d/L < 0.15, the nanoparticles were distributed uniformly throughout the film. However for larger values of d/L, the nanoparticles reside primarily at the dislocation cores. In the case of films of initial film thicknesses between $L < h < 3L$ the nanoparticles self-assemble into 2-dimensional planar shapes at the boundaries of holes or islands where edge dislocations are located.

Jenny Kim
Universiy of Michigan

Date submitted: 30 Dec 2010 Electronic form version 1.4