Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Self-assembled nanostructures in cross-linkable block copolymer/homopolymer blends CHUNLIN HE, IAN CAMPBELL, MARK STOYKOVICH, CU-Boulder — The self-assembly of block copolymers in films that are 50∼100 nm thick provides an attractive approach to patterning nanoscale features. Thermal, chemical, and mechanical stability of the nanoscale morphology in thin films is critical for the generation of robust templates for subsequent fabrication processes, and can be improved by cross-linking the copolymer domains. We have used atom transfer radical polymerization to synthesize PS-b-PMMA diblock copolymers with cross-linkable units capable of reacting through a thermally-activated mechanism or by photoinitiation in response to UV exposure. The self-assembly behavior of lamellar-forming block copolymers with or without cross-linkable units will be compared in thin films. We have developed approaches, including solvent-annealing, for processing the cross-linkable materials in thin films that enable the self-assembly behavior to be decoupled from the cross-linking behavior. The cross-linked nanostructures exhibited enhanced solvent and thermal stability, and have been demonstrated for the fabrication of three-dimensional block copolymer nanostructures in thick films using a layer-by-layer approach.

Chunlin He
CU-Boulder

Date submitted: 28 Nov 2012 Electronic form version 1.4