Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Continuity and connectivity of lamellar-forming block copolymers in thin films IAN CAMPBELL, MARK STOYKOVICH, University of Colorado, Boulder — Thin films of block copolymers are emerging as a low-cost lithographic material. In order to effectively utilize this class of materials, the structure of the self-assembled morphologies in thin films must be well understood. In this work, the network structure formed by a lamellar diblock copolymer of polystyrene (PS) and poly(methyl methacrylate) (PMMA) was explored as the compositional symmetry was varied through homopolymer addition. The volume fraction of PMMA was varied from 0.45 to 0.55. The long-range connectivity of the PS and PMMA domains, as well as the branch and endpoint density, was characterized. Increasing the compositional asymmetry of the copolymer system leads to interconnected networks that span arbitrarily large areas, increased branch density, and decreased endpoint density. The network structure for each copolymer system also depends on annealing time, annealing temperature, and surface chemistry of the substrate. Improved understanding of the variability in lamellar morphologies will enable the selection of copolymers, annealing conditions, and surface chemistries to fabricate lithographic masks by self-assembly.

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Date submitted: 11 Nov 2011 Electronic form version 1.4