Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Annealing Techniques for Obtaining Ordered Morphologies in Poly(methacrylic acid)-Poly(methyl methacrylate) Diblock Copolymer Thin Films YAN SUN, KEVIN HENDERSON, Northwestern University, ZHANG JIANG, JOSEPH STRZALKA, JIN WANG, Argonne National Laboratory, KENNETH SHULL, Northwestern University — The microphase separation of block copolymers in thin films continues to be of great value for the fabrication of nanostructured materials. While highly ordered arrays of microdomains can be easily achieved in some block copolymers, proper processing of others are more challenging. Obtaining ordered morphologies in poly(methacrylic acid)-poly(methyl methacrylate) (PMAA-PMMA), a diblock possessing polyelectrolyte functionality, offers unique associative properties and aqueous reaction chemistries otherwise inaccessible by most other block copolymer films. Due to the limited choices of suitable solvents with sufficiently high vapor pressure and the thermal degradation temperature of PMAA being lower than its glass transition temperature, direct solvent and thermal annealing of PMAA-PMMA are not ideal for generating ordered nanostructures. Here, we begin by solvent annealing poly(tert-butyl methacrylate)-poly(methyl methacrylate) (PtBMA-PMMA) films at room temperature. We then thermally anneal the films to convert the PtBMA block to PMAA. We present results from atomic force microscopy (AFM) and grazing-incidence small-angle x-ray scattering (GISAXS) studies.

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Date submitted: 17 Nov 2010 Electronic form version 1.4