Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

**Morphology Development in Block Copolymer Thin Films via Direct Immersion Annealing** ARVIND MODI, SARANG BHAWAY, BRYAN VOGT, The University of Akron, ASHUTOSH SHARMA, IIT Kanpur, ALAMGIR KARIM, The University of Akron — Conventional methods of annealing thin block copolymer (BCP) films include Thermal Annealing and Solvent Vapor Annealing (SVA) processes. Both of the processes have demonstrated excellent control over morphologies and nanostructures. However, both have constraints including long annealing time duration and/or complicated setup requirement. We introduce Direct Immersion Annealing (DIA) of thin block copolymer (BCP) films involving immersion of polymer films directly into the solvent mixture composed of selective non-solvent and solvent for blocks. Non-solvent prevents the dissolution of films while the good solvent permeates the film and plasticizes the blocks. A fine control of swelling ratio can be achieved through an easy and robust control of solvent volume fractions. We studied cylindrical Poly(styrene-block-methyl methacrylate) system in detail and quantified the growth of correlation length ($\xi$) with time(t) [$\xi = At^n$]. We observe a reduction in growth exponent (n) with several fold increase in pre-exponential factor (A) compared to isotropic thermal annealing. We further demonstrate the extension of this strategy to systems with diverse range of $\chi$-parameter, molecular weight and other morphologies.

Arvind Modi
The University of Akron

Date submitted: 14 Nov 2014 Electronic form version 1.4