Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Tracking Solvent Uptake in Block Polymer Thin Films during Solvent Vapor Annealing CAMERON SHELTON, University of Delaware, RONALD JONES, JOSEPH DURA, National Institute of Standards and Technology, THOMAS EPPS, University of Delaware — A key goal in the block polymer (BP) thin films community is the design of a template-free, universal annealing method to control nanoscale self-assembly over large length scales. Solvent vapor annealing (SVA) offers a unique solution to this challenge with its ability to tune substrate surface, free surface, and polymer-polymer interactions by exposing films to appropriate solvents. However, there is little understanding of how the solvent behaves during the SVA process. In this work, we utilized the combination of deuterated solvents with small-angle neutron scattering (SANS) and neutron reflectometry to track solvent uptake in poly(styrene-b-isoprene-b-styrene) thin films. Two solvents were chosen for this analysis: d-hexane (isoprene selective) and d-benzene (styrene selective). Our work has shown that solvent choice and partial pressure have a significant impact on how solvent segregates within individual polymer domains and the film as a whole, directly impacting the restructuring of polymer domains. This work provides further understanding of the mechanism behind SVA, thereby making it easier to select appropriate conditions for desired self-assembly control.

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Date submitted: 13 Nov 2014 Electronic form version 1.4