Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

New approaches to directing self-assembly and alignment of block copolymer HANQIONG HU, PAWEL MAJEWSKI, CHINEDUM OSUJI, Yale University, OSUJI LAB TEAM — Directed self-assembly of block copolymers (BCPs) has been explored extensively using a variety of methods to simultaneously develop long-range order and exert orientational control over microphase separated structures. Here we propose two new routes for directing self-assembly in BCPs. First we discuss solvent vapor permeation which is based on pressure driven transport of a solvent vapor through a free-standing film. We demonstrate that alignment of BCP interfaces parallel to the vapor flux may be achieved rapidly in mm-scale thick films of high molecular weight BCP. Secondly, we present the use of electrospray for controlled deposition of block copolymer thin films. We speculate that morphology can be dictated by thermal equilibration in the presence of a pre-existing pattern or substrate template and that the ultra-slow growth afforded by electrospray permits persistence of this pattern beyond the 1 micron scale where conventional surface directed morphologies degenerate.

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Date submitted: 19 Nov 2010 Electronic form version 1.4