Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Generating surface energy gradients for block copolymer thin film studies JULIE LAWSON, THOMAS EPPS, Department of Chemical Engineering, University of Delaware — The development of block copolymer materials for future nanotechnologies requires an understanding of how surface energetics affect block copolymer thin film phase behavior. Surface energy gradients allow for combinatorial studies of these effects. In this work, surface energy gradients were created by vapor deposition of functionalized chlorosilanes on UVO-cleaned silicon substrates in a chamber under dynamic vacuum. The diffusion profiles of the chlorosilanes were controlled by the placement of the chlorosilane reservoirs in the chamber relative to the vacuum outlet and the substrate, allowing the profile of the surface energy gradient on the substrate to be tuned. X-ray photoelectron spectroscopy (XPS) was used to examine the results of the vapor deposition process. Additionally, thin films of a poly(styrene-b-methyl methacrylate) (PS-b-PMMA) block copolymer with a bulk cylindrical morphology were flow coated onto the gradient substrates, and the resulting phase behavior was characterized with atomic force microscopy (AFM).

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Date submitted: 27 Nov 2007 Electronic form version 1.4