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Effect of Surface Energetics on Block Copolymer Thin Film Phase Behavior[1] JULIE LAWSON, MICHAEL BANEY, THOMAS EPPS, 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. In this work, we use combinatorial methods to study these effects and to identify transitions in thin film phase behavior and microstructure orientation. Surface energy gradients were created using a vapor deposition technique developed by our group in which cross-diffusion of functionalized chlorosilanes under dynamic vacuum results in a linear gradient in surface energy on a silicon substrate. These gradients were characterized using x-ray photoelectron spectroscopy (XPS) and contact angle measurements. We then cast a thin film of block copolymer on the modified substrates using a flow coating technique. Finally, we used thermal and solvent annealing conditions to affect the surface energy at the free surface. The surface morphology of the films was examined with atomic force microscopy (AFM), and morphological changes across the gradient were found.

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