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Effect of Boundary Conditions on the Directed Self-Assembly of Block Copolymer on Chemical Patterned Surfaces GUOLIANG LIU, Chemical and Biological Engineering, University of Wisconsin-Madison, PAUL NEALEY, Department of Chemical and Biological Engineering, University of Wisconsin-Madison — Previously we determined the morphological phase behavior of lamellae-forming poly(styrene-block-methyl methacrylate) (PS-b-PMMA) density multiplication on chemically patterned surfaces in thin films. The stripe density of the chemical pattern was half of the block copolymer domain density. Parallel lamellae, vertical lamellae, mixed lamellae, PS-dots, and PMMA-dots were observed depending on the pattern stripe width and interaction strength between the polymer and the patterned surfaces. The density multiplied vertical lamellae exhibited three dimensional profiles, which was problematic in the subsequent pattern transfer process. Here we found that the block copolymer domain profiles could be improved by revising the boundary conditions. In the meanwhile, better line width and line edge roughness were obtained. The addition of homopolymers into the block copolymer and subsequent molecular transfer printing could offer a chemically patterned surface with improved boundary conditions for block copolymer directed assembly. The printed chemical patterns had a stripe density and a stripe width matching with block copolymer domains. The interfacial energies of the stripes were favorable to the block copolymer domains.

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