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Conditions for the directed assembly of thick block copolymer films on chemically nano-patterned surfaces ADAM M. WELANDER, PAUL F. NEALEY, Department of Chemical and Biological Engineering, University of Wisconsin, Madison, WI 53706 — The extent to which a lamellae forming block copolymer (bulk period, L_0 = 48 nm) can be directed to assemble on chemically nano-patterned striped surfaces (period L_S) with domains registered to and extending vertically away from the underlying pattern with few defects was studied as a function of film thickness, commensurability between L_S and L_0, and temperature. The thickness through which low defect assembly could be achieved increased as L_S and L_0 became more commensurate and as the temperature increased from 190 $^\circ$C to 230 $^\circ$C. Under certain conditions ($L_S \approx L_0$, 230 $^\circ$C), block copolymer films approaching 750 nm (aspect ratio $\approx$ 30) in thickness still exhibited low levels of defectivity. These results were interpreted in terms of a phenomenological model and minimization of free energy including surface and interfacial energies and chain configuration entropy.

Adam M. Welander
Department of Chemical and Biological Engineering,
University of Wisconsin, Madison, WI 53706

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