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Lamellar and Non-bulk like Morphologies in Thin Films of Block Copolymer on Chemical Nanopatterned Surfaces GUOLIANG LIU, FRANCOIS DETCHEVERRY, JUAN J. DE PABLO, PAUL F. NEALEY, Department of Chemical and Biological Engineering,University of Wisconsin-Madison, 1415 Engineering Drive, Madison, WI, 53706 — Thin films of symmetric PS-b-PMMA (bulk lamellae period L_o) were equilibrated on substrates patterned with periodic stripes such that the adjacent stripes are preferentially wet by the two blocks of the copolymer. The morphology of the films was quantified as a function of the following pattern characteristics: the pattern period, L_s, where $L_s = \delta\ L_o$, $1 \leq \delta \leq 3$, the width of the PMMA wetting strips, W, and the interfacial energies between the blocks and the patterned stripes, $\Lambda_{i,j}$. Under different boundary conditions we can 1) direct the assembly of lamellae perpendicular to the substrate and ordered in linear arrays so as to increase the density of features of the chemical pattern, or 2) obtain a number of stable non-bulk like structures including asymmetric lamellae, mixed orientated lamellae, dots, and check-board structures. The experimental results are compared to a phase-diagram predicted from molecular simulations.

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