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Pattern interpolation in thin films of lamellar, symmetric copolymers on nano-patterned substrates FRANCOIS DETCHEVERRY, UMANG NAGPAL, GUOLIANG LIU, PAUL NEALEY, JUAN DE PABLO, University of Wisconsin — A molecular model of block copolymer systems is used to conduct a systematic study of the morphologies that arise when thin films of symmetric, lamellar forming block copolymer materials are deposited on nanopatterned surfaces. Over 500 distinct cases are considered. It is found that, in general, three distinct morphologies can arise depending on the strength of the substrate-polymer interactions, the film thickness, and the period of the substrate pattern. The relative stability of those morphologies is determined by direct calculation of the free energy differences. The dynamic propensity of those morphologies to emerge is examined by careful analysis of simulated trajectories. The results of this systematic study are used to interpret recent experimental data for films of polystyrene-PMMA copolymers on chemically nanopatterned surfaces.

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