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**Shear Alignment and Realignment of Cylinder-Forming Block Copolymer Thin Films** ANDREW MARENCIC, RICHARD REGISTER, Princeton University, PAUL CHAIKIN, New York University — The microdomains in cylinder-forming block copolymer thin films can be oriented by applying a sufficient shear stress to the film; the cylinders lie in-plane and align with the shear direction, as shown by atomic force microscopy (AFM) post-shear. To understand the alignment process, we applied a stress gradient to the film, and focused on the structure in the transition region from unaligned to aligned. To sample a statistically useful number of grains, we used the moiré patterns formed by interference of the AFM scanning grid with the microdomain lattice to determine the cylinder orientation. The results are compared with a simple melting-recrystallization model, in which grains misaligned with the shear direction are eliminated as the shear stress is increased. In addition, we have applied two shear gradients to the sample in different directions, to directly probe how ordered cylinders can be realigned by a subsequent shear. We again find qualitative agreement with the simple model, but the stress required is a factor of 1.7 larger than required for single shear. We also observed grain boundary generation within the area between alignment with the first shear direction and alignment with the second shear direction.

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