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The dynamics of lamellar re-orientation in free-standing diblock copolymer films: flipping the morphology from edge-on to flat-on
ROBERT D. PETERS, KARI DALNOKI-VERESS, Department of Physics & Astronomy and the Brockhouse Institute for Materials Research, McMaster University, Hamilton, ON, Canada, L8S 4M1 — Many exquisite structures formed by diblock copolymers have been studied rigorously over the past two decades. Using a symmetric polystyrene-poly(methyl methacrylate) diblock copolymer, we prepare thin films on a substrate which form lamellae oriented perpendicular to the film interfaces. These “edge-on” samples are subsequently transferred, by floating onto water, to produce free-standing films with a symmetric boundary condition. Upon annealing these free-standing films, the lamellae switch from edge-on, to “flat-on” such that the domains are oriented parallel to the interface. Using atomic force microscopy, we study the dynamics of pattern formation as lamellae flip from the edge-on to flat-on morphology.

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