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Orientation Distribution for Thin Film Block Copolymers

RONALD JONES, XIAOHUA ZHANG, SANGCHEOL KIM, ALAMGIR KARIM, NIST, ROBERT BRIBER, Univ. of Maryland, HO-CHEOL KIM, IBM Almaden Research Center — The directed self-assembly of nanostructured films with vertically oriented morphologies is a potential solution for manufacture of next generation data storage platforms, microelectronic devices, and nanoporous membranes. In many of these applications, the distribution of orientation must be tightly controlled to enable pattern transfer. This parameter is expected to depend on factors such as the Flory-Huggins chi parameter, but little data has been reported to date. We present results from tomographic small angle scattering on a series of block copolymer films whose assembly has been directed through solvent annealing. Films of poly(styrene-b-ethylene oxide) are cast as a function of annealing time and their orientation distribution reported. The results provide significant insight into the fundamental limits of line edge roughness and defect control possible using this fabrication technique.

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