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Shear alignment of spherical microdomain block copolymer thin films via a viscous fluid layer. M.W. WU, Physics Dept., Princeton Univ., D.E. ANGELESCU, Schlumberger-Doll Research, D.H. ADAMSON, PRISM, Princeton University, X. GUO, Chemical Engineering Dept., Princeton Univ., R.K. PRUD'HOMME, Chemical Engineering Dept., Princeton Univ., P.M. CHAIKIN, Physics Dept., Princeton Univ., R.A. REGISTER, Chemical Engineering Dept., Princeton Univ. — Shearing block copolymer thin films has recently been shown to be a simple method to produce macroscopic orientation and order of the microdomain patterns. We study the alignment of thin films (two or three layers) of a sphere-forming polystyrene-*b*-poly(ethylene-*alt*-propylene) polymer under steady shear flows. With the diblock film as the bottom plate of a rotating plate-plate rheometer and PDMS oil to transmit the shear viscously while annealing above the glass transition and below the order-disorder temperatures, we produce long range order without applying a normal force. This geometry also allows the evaluation of the alignment as a function of stress on a single sample. We observe a temperature-dependent threshold stress for alignment, and propose a possible mechanism for alignment of spheres.

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