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Symmetry Breaking In Block Copolymer Thin Films ERIC COCHRAN, Iowa State University, KIRILL KATSOV, GILA STEIN, ED KRAMER, GLENN FREDRICKSON, University of California, Santa Barbara —
Recent experiments by Stein and Kramer show that thin films of poly(styrene-b-vinylpyridine) diblock copolymer undergo a discontinuous transformation from hexagonally-close packed spheres to a Fmmm orthorhombic packing as the thickness of the film is increased; beyond the hcp-Fmmm transition, the unit cell deforms to asymptotically approach bcc symmetry, which is preferred in the bulk system. We use a Landau-type theory to construct various scenarios of symmetry-breaking in this system. High resolution SCFT calculations show the nature of the competition between the preferred packing in the bulk and that at the interface. We conclude that character of the transition from thin-film to bulk behavior may be either continuous or discontinuous, depending on the bulk properties of the block copolymer and the surface energy.

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