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Structural transition with thickness in films of poly-(styrene-b-2vinylpyridine) (PS-b-P2VP) diblock copolymer/homopolymer blends VINDHYA MISHRA, Materials Research Laboratory, University of California, Santa Barbara, EDWARD KRAMER, Department of Materials and Chemical Engineering, University of California Santa Barbara, SU-MI HUR, GLENN FREDRICK-SON, Materials Research Laboratory, University of California, Santa Barbara, MICHAEL SPRUNG, Argonne National Lab, IL — In multilayer thin films of spherical morphology block copolymers, the surface layers prefer hexagonal symmetry while the inner layers prefer BCC. Thin films with spherical morphology of PS-b-P2VP blends with short homopolymer polystyrene (hPS) chains have an HCP structure up to a thickness n^* at which there is a transition to a face centered orthorhombic structure. Using grazing incidence small angle X-ray scattering and transmission electron microscopy we show that that n^* increases from 5 to 9 with increase in hPS from 0 to 12 vol%. For thicknesses just below n* the HCP and FCO structures coexist, but on long annealing HCP prevails. We hypothesize that the PS segregates to the interstices in the HCP structure reducing the stretching of the PS blocks and the free energy penalty of HCP versus BCC inner layers. Self consistent field theoretic simulations are being carried out to see if this idea is correct.

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