

Abstract Submitted
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Symmetry transition in multilayer films of block copolymer/homopolymer blends¹ VINDHYA MISHRA, E.J. KRAMER, UCSB — Multilayer films of spherical domain poly (styrene-b-2vinyl pyridine) (PS-PVP Mn:65000, $f_{pvp} = .12$) blended with 5 volume% low molecular weight PS homopolymer (Mn:13000) is characterized with grazing-incidence small angle x-ray diffraction (GISAXD) to determine the lattice symmetry and stacking of layers. The structure was also imaged by transmission electron microscopy (TEM). In such films competition between packing preferred at the surfaces with that preferred by the internal layers leads to a transition in the packing symmetry as n , the number of sphere layers, is increased. Pure PS-PVP exhibits hexagonal close packed (HCP) symmetry up through $n=4$. At $n=n^*=5$ the in-plane symmetry becomes face centered orthorhombic whose lattice parameters approach those of the BCC (110) plane for $n \gg 10$. GISAXD and TEM data from the blend films one to ten layers thick shows that the addition of 5 vol % PS increases n^* to 7. We think 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. Significant improvement in translational order is also seen in all the films over the copolymer alone.

¹GISAXD experiments conducted at Advanced Photon Source, Argonne National Laboratory

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