

Phase and Crystallization Behaviors of Miscible Block Copolymer Blends

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Phase and crystallization behaviors of block copolymer blends composed of polystyrene-*block*-poly(ethylene oxide) (PS-*b*-PEO)/polystyrene-*block*-poly(methyl methacrylate) (PS-*b*-PMMA) blends and PS-*b*-PEO/PMMA blends were investigated using differential scanning calorimetry and small angle X-ray scattering. In these blends, PEO and PMMA chains were miscible. As a result, PEO and PMMA shared the common microdomains, and they microphase-separated against the other microdomains composed of the PS block chains. The junction points between the PS and PMMA block chains in PS-*b*-PMMA were located at the interface between the PS and PEO block chains in PS-*b*-PEO. By contrast, PMMA homopolymers were located at the PEO microdomains. Because PEO crystallization occurred at temperatures below the glass transition temperature of PMMA, vitrification of PMMA chains resulted in decreases in the crystallization temperature and degree of crystallinity of PEO. Over a part of composition range these blends underwent microphase separation, exhibiting the lamellar morphology. In addition, compared to the blends composed of homopolymers, binary block copolymer blends with confined crystallization exhibited low crystallization temperatures and degree of crystallinities.