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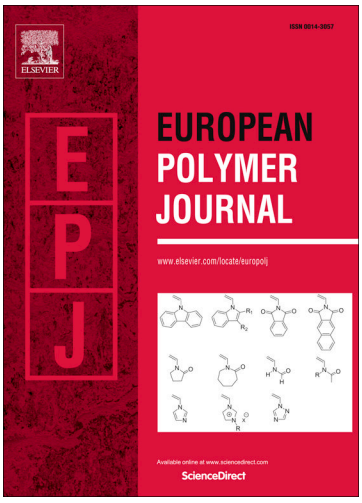

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The Brill Transition in Polyether-*b*-amide Segmented Copolymers and Composition Dependence

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Abstract In present work, the Brill transitions of polyamide component in polyether-*b*-amide (PEBA) segmented copolymers were investigated by a combination of *in situ* wide-angle X-ray diffraction (WAXD), Fourier transform infrared spectroscopy (FTIR) and small-angle X-ray scattering (SAXS). The lab-made, additive-free PEBA copolymers, which consist of crystalline polyamide1012 (PA1012) hard segments (HS) and amorphous poly(tetramethylene oxide) (PTMO) soft segments (SS), provide an opportunity to explore the relationship between the Brill temperature (T_B) and the composition of PEBA, as well as the impact of incorporation of PTMO on the variation of the Brill transition. It was found that the T_B of PA1012 component kept approximately constant during the cooling process and the second heating process for homo PA1012 and HS-dominant PA1012-PTMO copolymers. Manifested itself by the merging of two diffractions of (100) and (110)/(010), the Brill transition for each sample during the second heating occurred with a T_B varying from 115 ^{o}C to 125 ^{o}C. This temperature range can be referred as a T_B zone. The FTIR band at 1188 cm^{-1} disappeared and FTIR bands sensitive to crystalline phase blue shifted from 939 cm^{-1} to 943 cm^{-1}, when the temperature reached the respective T_B for each sample. Based on the calculation of one-dimensional electron density correlation function, lamellae thickness in the initial states of all PA1012 and PA1012-based PEBA samples was found to be independent on the composition, which resulted in the consistent T_B.