Structural Characterization of Poly(Butylene-Adipate-co-Terephthalate) (PBAT) / Thermoplastic Starch Blends

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Abstract. Broad line ^{1}H and ^{13}C CP MAS NMR spectra were used to characterize molecular motion and structure in two sets of poly(butylene-adipate-co-terephthalate) (PBAT) / thermoplastic starch (TPS) blends with weight ratios 70:30, 50:50 and 30:70. One set was prepared using a twin-screw extruder, and the second underwent additional mixing. The measured spectra show that ^{1}H-^{13}C polarization transfer was less efficient in the TPS component in mixed blends, indicating enhanced molecular motion of TPS chains. In contrast, polarization transfer was more efficient in PBAT methylene groups, indicating that motion constraints were present in PBAT due to mixing. Structural information was obtained from the deconvolution of ^{1}H BL NMR spectra and the calculated second moment of their broad components. The results obtained show that blend components affected each other's mobility more distinctly in blends prepared with additional mixing, in which the domain size of the minor blend component is expected to be smaller and the amount of interphase to be larger.