

Influence of Transesterification Occurs During Poly(ethylene terephthalate)/Poly(trimethylene terephthalate) Melt Blending on Fiber Structure Development in High-speed Melt Spinning Process

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In this study, the melt blending of Poly(ethylene terephthalate)(PET)/Poly(trimethylene terephthalate)(PTT)=95/5, 85/15 and 50/50 was performed employing a twin-screw extruder. By controlling the blending temperature and the mass flow rate, a series of PET/PTT blends were prepared. The transesterification occurred during the melt blending was confirmed by the results of the nuclear magnetic resonance (NMR) analysis. The PET/PTT blends were subjected to the high-speed melt spinning process at the take-up velocity ranging from 1 to 8 km/min. On-line measurement of the filament diameter along the spinning line was also carried out. The molecular mass of PET, PTT, and all the blends and fibers was measured by the gel permeation chromatograph (GPC). The thermal analyses of the blends were performed using a differential scanning calorimeter (DSC). By means of the measurement of birefringence and density, DSC and Wide-angle X-ray diffraction (WAXD) analyses, the molecular orientation and the crystalline structure of the as-spun fibers were investigated. The mechanical properties of the as-spun fibers were also investigated by the tensile testing.