폴리에틸렌과 나일론6의 비상용 블렌드의 유변학적 · 형태학적 특성에 관한 연구

최 수 명 · 홍 성 일*

동양나이론 중앙연구소, *서울대학교 공과대학 섬유공학과

Blends of low density polyethylene and nylon6 were prepared in a screw extruder combined with a static mixer. These immiscible binary blends were investigated considering the rheological properties and phase morphology. A criterion for the breakup of the dispersed phase has been evaluated in terms of the critical Weber number($\eta_c \dot{\gamma} a_n / \sigma$) and the viscosity ratio of the dispersed phase to the continuous phase(η_D / η_c). The effect of hydrodynamic conditions such as shear rate, interfacial tension, viscosity, and dispersed phase concentration on the number average size of the dispersed phase was studied. Blend composition had a marked effect on the dispersed phase size, particularly at intermediate concentrations where the region of dual-phase continuity was observed.

The influence of heating in the rheometer reservoir followed by subsequent extrusion through a capillary on the phase morphology was also investigated. A larger phase size resulting from the

coalescence of dispersed phases in the melt was observed when the minor component concentration was increased.

In order to study morphological changes in the fiber cross-section during the attenuation process of the fiber, an experiment by a lab-scale melt spinning equipment was carried out. Both low density polyethylenes and nylon6 exhibited elongational viscosities that increased with the strain rate(showing tension-thickening). In this case, the dispersed fibrils could be made much thinner by increasing the stretch ratio, irrespective of elongational viscosity ratio of the dispersed to continuous phases.