

The Influence of Blend Ratio on the Morphology, Mechanical, Thermal, and Rheological Properties of PP/LDPE Blends

Tladi Gideon Mofokeng, Vincent Ojijo, Suprakas Sinha Ray*

Abstract

This paper reports on how the blend ratio and morphology influence the mechanical, thermal, thermomechanical, and rheological properties of poly(propylene) (PP)/low density polyethylene (LDPE) blends. The blend morphology is composed of the major matrix phase and the minor phase, with subinclusions of the major matrix existing within the minor phase. Blends containing low amounts (<20 wt%) of either phase exhibit partial miscibility but the phases are immiscible at higher contents. Partial miscibility of the blends is revealed by scanning electron microscopy studies showing fibril-like structures and confirmed by rheology. The tensile modulus of the blends decreases with increasing amounts of LDPE, but low LDPE contents exhibit positive deviation from the mixing rule of mixture due to partial compatibility. The crystallinity of PP is affected less than that of LDPE in the blends. Thermomechanical and rheological properties of neat polymers are significantly influenced by blending. The blend ratio and morphology influence impact strength and elongation at break, and the result demonstrates that the 80/20 PP/LDPE blend offers a balance among the mechanical and material properties that are essential for flexible packaging applications.