Barrier Property and Morphology of Biaxially Oriented PP/EVOH Blend Film

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ABSTRACT: In this study, biaxially oriented film process was used to improve barrier property of polypropylene (PP)/ethylene-vinyl alcohol copolymer (EVOH) blends by inducing a laminar morphology of the dispersed phase in the matrix phase. In order to examine the extent of deformation during melt extrusion process, the rheological properties of the resins were measured and the viscosity ratio of the dispersed phase to the continuous phase was determined. The effects of compatibilizer content, draw ratio, and draw temperature on the oxygen permeability and morphology of biaxially drawn blend films were studied. The laminar morphology of the EVOH phase with a larger area of thinner layer induced by biaxial orientation was found to result in a significant increase in oxygen barrier property of PP/EVOH (85/15) blends by about 10 times relative to the pure PP. When both PP-γ-MAH and ionomer were used as the compatibilizers, there existed an optimum level of compatibilizer content for obtaining improved barrier properties with a well developed laminar structure. In addition, higher draw ratio and draw temperature were found to be more favorable processing conditions in obtaining higher barrier blends.

Keywords: PP/EVOH blends, biaxially oriented film, laminar morphology, oxygen barrier property.