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Blend of polypropylene/poly(lactic acid) for medical packaging application: physicochemical, thermal, mechanical, and barrier properties

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Abstract

The effect of polypropylene/poly(lactic acid) weight ratios on the properties of blend films compatilized with polypropylene-grafted-maleic anhydride were investigated with 100:0, 60:40, 50:50, 40:60, and 0:100 of weight ratio. The blend films were prepared by melt mixing technique and cast film extrusion. The results shown that the FTIR spectrum was confirmed the interaction between compatibilizer and polymers. Morphological investigation was distinctly seen a two phases system between polypropylene and poly(lactic acid). Increasing of PLA content from 40 to 60 wt.% resulting in decreased melting temperature and crystallinity from 158 °C to 154 °C and 38% to 31%, respectively. For tensile properties, modulus and tensile strength increased with increasing the PLA content, while elongation at break was drastically decreased from 500% (polypropylene) to less than 50% (blends). The barrier properties indicated that incorporation of poly(lactic acid) into polypropylene tend to increased water vapor permeability while oxygen permeability was decreased. From the morphology, thermal, mechanical, and barrier results, the polypropylene/poly(lactic acid) blends showed a typical immiscible polymer blend.

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