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In-Situ Compatibilization of Polyblends and Polymer Based Composites Induced by γ-Irradiation

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Interfacial compatibility is an essential factor for polyblends and polymer based composites, which is traditionally improved by addition of copolymers with grafting structure or coupling agents, and reactive blending. The generation and recombination of macromolecular radicals at interface makes gamma-irradiation a potential mean to improve the compatibility of immiscible polymer based multiphase materials. In the present work, polyethylene terephthalate (PET), polylactic acid (PLA), and nylon based polyblends and composites were prepared by melt blending, respectively. Gamma-irradiation in nitrogen atmosphere with various absorbed dose were employed following sample molding. Morphology, chemical structure and mechanical property changes were investigated by SEM, FTIR, gel extraction and mechanical testing. The refinement of the separation particles, the ductile deformation at cross-section and the rough surface of pull-out fibers indicated the obvious improvement of compatibility. Gel extraction results and FTIR of the gel confirmed the generation of grafting polymer containing each component. Mechanical properties were significantly increased as a result of in-situ compatibilization. According to the evidently positive effects on miscibility found in all multiphase materials, gamma-irradiation can be widely-used as an innovative solution to immiscible materials.

Country/Organization invited to participate

China

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