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Miscibility, morphology and mechanical properties of compatibilized polylactic acid/thermoplastic polyurethane blends

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Abstract

Poly(lactic acid) (PLA) is a biodegradable polymer and has an excellent strength, however its inherent brittleness and low impact resistance has limited its application. One of the potential alternatives for enhancing the weakness of PLA is by blending it with thermoplastic polyurethane (TPU) which possesses several attractive properties such as high toughness, durability and flexibility. Nevertheless, few works have been reported on the effect of compatibilizer on physical properties of PLA/TPU blends. In this work, the effect of ethylene-methyl acrylate glycidyl methacrylate (EMA-GMA) compatibilizer addition in various blend compositions on miscibility, morphological development and mechanical properties of PLA/TPU blends was analysed. The blends were prepared through melt blending technique and analysis of miscibility and morphological development were conducted using dynamic mechanical analysis (DMA) and scanning electron microscopy (SEM), while evaluation of mechanical properties were performed through tensile and impact tests. Inclusion of EMA-GMA improved miscibility of PLA/TPU blends by reducing the size of the droplets and uniformly dispersed the droplets throughout the matrix. Addition of EMA-GMA further improved mechanical properties of PLA which is showed by significant increment of elongation at break and impact strength of PLA/TPU blends with some composition exhibited non-break behaviour. © 2019 Elsevier Ltd. All rights reserved.

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Mechanical properties; Miscibility; PLA/TPU blends

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