

Comparative assessment of miscibility and degradability on PET/PLA and PET/chitosan blends (Article)

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Abstract

This work reports the synthesis and miscibility of PET/PLA and PET/chitosan blends as well as their degradation in real soil environment (6 months) and in accelerated weathering (1200 h). For this purpose, commercial polyethylene terephthalate (PET) and recycled PET (R-PET) were used as polymer matrixes and extruded with different amounts of polylactic acid (5, 10 and 15 wt-%) or chitosan (1, 2.5 and 5 wt-%) to form filaments. Different characterization techniques such as X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), differential scanning calorimetry/thermogravimetric analysis (DSC/TGA) and scanning electron microscopy (SEM) were used before and after degradation process. The results indicate weak interactions between blend components suggesting secondary bonds by hydrogen bridges or by electrostatic forces. The miscibility of chitosan in both PET matrixes is lower in comparison with PLA; the saturation of PLA into polymer matrixes was reached up to an amount of 10 wt-% whereas longer amounts of 5 wt-% of chitosan become rigid and brittle. The best performance in the miscibility and degradation process was found for PET/chitosan (95/5) which is comparable with commercial bottles of BioPET under similar experimental conditions. © 2014 Elsevier Ltd. All rights reserved.

Author keywords

Blends; Degradability; Miscibility; PET/PLA PET/chitosan