

Effect of organically modified layered double hydroxides on the properties of poly(lactic acid)/poly[(butylene succinate)-co-adipate] immiscible blends

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Abstract

In this study, poly(lactic acid) (PLA)/poly[(butylene succinate)-co-adipate] (PBSA) blend and its nanocomposites with layered double hydroxides (LDH) containing surface stearic acid functional groups (SaLDH) were prepared using the extrusion method, where the weight ratio of PLA/PBSA was fixed at 80/20, while that of the SaLDH varied from 0.1, 0.5, and 1.0 wt%. The characterization of SaLDH using Fourier transform infrared spectroscopy (FTIR), X-ray diffraction (XRD), and Thermogravimetric analysis (TGA) confirmed the presence of stearic acid moieties on the LDH surface. Comprehensive characterization of nanocomposites showed concurrent improvement of the thermal, mechanical, and oxygen gas barrier properties of nanocomposite containing 0.5 wt% of SaLDH. These properties are shown to result from improved interfacial interaction between the polymer matrices and the homogeneous distribution of nanoclay particles obtained at 0.5 wt% SaLDH concentration. The nanocomposite material thus shows high prospects in the industrial development of environmentally sustainable food and cosmetic packaging applications.