

Degradability studies of PLA nanocomposites under controlled water sorption and soil burial conditions

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ABSTRACT

Polymer blended nanocomposites based on polylactic acid (PLA) were prepared via a simple melting process and investigated for its biodegradation behaviour. The treated CNTs were surface modified by using acid treatment and characterisations of composites were done by using Fourier Transform Infra-Red (FTIR) and UV-Vis. FTIR spectra and UV-Vis peak confirmed the surface modification of CNTs. The water uptake and weight loss behaviour based on CNTs and m-CNTs loading at different temperatures (25° and 45°C) were studied. It was found that the water absorption and weight loss of nanocomposites increased by the incorporation of CNTs and m-CNTs. Moisture induced degradation of composite samples was significant at elevated temperature. The addition of treated CNTs successfully reduced the water uptake and weight loss of nanocomposites due to less hydrolytic effect of water on nanocomposites. In soil burial test, the weight loss increases with addition of nanofiller. The loading of m-CNT reduced the ability of nanocomposites degradation.

KEYWORDS:

Biodegradable polymers; Biodegradation; Fourier transform infrared spectroscopy; Nanocomposites; Surface treatment