

Preparation and characterization of polylactic acid/polycaprolactone clay nanocomposites

ABSTRACT

Biopolymer nanocomposites, which have attracted much attention due to their biodegradability and biocompatibility, have been prepared by melt blending polylactic acid (PLA)/polycaprolactone (PCL) and two types of organoclay (OMMT) include octadecylamine-montmorillonite (ODA-MMT) and fatty hydroxamic acid- montmorillonite (FHA-MMT). Materials were characterized using X-ray Diffraction (XRD), Fourier transform infrared (FTIR) spectroscopy, thermogravimetric analysis (TGA), elemental analysis and scanning electron microscopy (SEM). Mechanical properties were also investigated for these nanocomposites. The nanocomposites showed increasing mechanical properties and thermal stability. XRD results indicated that the materials formed intercalated nanocomposites. SEM morphology showed that increasing content of OMMT reduces the domain size of phase separated particles. Additionally, a solution casting process has been used to prepare these nanocomposites and characterized to compare these results with above process. These nanocomposites offer potential for diversification and application of biopolymer due to their good properties such as improved thermal and mechanical properties.

Keyword: Polylactic acid; Polycaprolactone; Clay nanocomposites; Montmorillonite; Biopolymer