

Flexibility improvement of poly(lactic acid) by stearate-modified layered double hydroxide.

ABSTRACT

Poly(lactic acid)/layered double hydroxide (PLA/LDH) nanocomposites were prepared from PLA and stearate-Mg₃Al LDH via a solution casting method. The anionic clay Mg₃Al LDH was prepared first by coprecipitation method from nitrate salts solution at pH 9 and then modified by stearate anions through an ion exchange reaction. This modification increased the basal spacing of the synthetic clay from 8.72 to 31.68 Å. The presence of stearate ions in the synthesized Mg₃Al LDH was shown by the stearate-Mg₃Al LDH infrared spectrum. When the stearate-Mg₃Al LDH at the low concentration was dispersed in the PLA matrix, its layers were largely delaminated. The presence of 1.0 wt % of the stearate-Mg₃Al LDH in the PLA improved drastically (of around 650%) of its elongation at break but retained its tensile strength and modulus as compared to those of the pure PLA.

Keyword: Poly(lactic acid); Nanocomposites; Anionic clay; TEM; Flexibility improvement.