

Enhancement of mechanical and thermal properties of Polycaprolacton/Chiton blend by calcium carbonate nanoparticle.

ABSTRACT

This study investigates the effects of calcium carbonate (CaCO_3) nanoparticles on the mechanical and thermal properties and surface morphology of polycaprolactone (PCL)/chitosan nanocomposites. The nanocomposites of PCL/chitosan/ CaCO_3 were prepared using a melt blending technique. Transmission electron microscopy (TEM) results indicate the average size of nanoparticles to be approximately 62 nm. Tensile measurement results show an increase in the tensile modulus with CaCO_3 nanoparticle loading. Tensile strength and elongation at break show gradual improvement with the addition of up to 1 wt% of nano-sized CaCO_3 . Decreasing performance of these properties is observed for loading of more than 1 wt% of nano-sized CaCO_3 . The thermal stability was best enhanced at 1 wt% of CaCO_3 nanoparticle loading. The fractured surface morphology of the PCL/chitosan blend becomes more stretched and homogeneous in PCL/chitosan/ CaCO_3 nanocomposite. TEM micrograph displays good dispersion of CaCO_3 at lower nanoparticle loading within the matrix.

Keyword: Nanocomposites; Calcium carbonate nanoparticle; Polycaprolactone; Chitosan; Mechanical properties; Thermal properties.