Synthesis and characterization of silver/polylactide nanocomposites

Silver/polylactide nanocomposites (Ag/PLA-NCs) were synthesized via chemical reduction method in diphase solvent. Silver nitrate and sodium borohydride were used as a silver precursor and reducing agent in the polylactide (PLA). The properties of Ag/PLA-NCs were studied as a function of the weight percentages of silver nanoparticles (8, 16 and 32 wt% of Ag-NPs) relative to the weight of PLA. The Ag/PLA-NCs were characterized by X-ray diffraction (XRD), transmission electron microscopy (TEM), electro-optical microscopy (EOM), UV-visible spectroscopy (UV-vis) and Fourier transform infrared spectroscopy (FT-IR). XRD patterns confirmed that Ag-NPs crystallographic planes were face centered cubic (fcc) type. TEM images showed that mean diameters of Ag-NPs were 3.30, 3.80 and 4.80 nm. Electro-optical microscopy revealed excellent dispersion and interaction between Ag-NPs and PLA films. The generation of silver nanoparticles was confirmed from the UV-visible spectra. FT-IR spectra showed that there were no significant differences between PLA and Ag/PLA-NCs films. The synthesized Ag/PLA-NCs were stable in organic solution over a long period of time without sign of precipitation.

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