

Preparation, characterization and antibacterial properties of polycaprolactone/ZnO microcomposites

ABSTRACT

The micro scale zinc oxides in polycaprolactone microcomposites (PCL/ZnO-MCs) have prepared via solution casting method. The properties of the PCL/ZnO-MCs characterized by the Fourier transform infrared spectroscopy (FT-IR), X-ray diffraction (XRD), transmission electron microscope (TEM), thermogravimetric analysis (TGA), scanning electron microscope (SEM). According to the XRD patterns, the crystallinity of PCL was more pronounced after addition of ZnO microparticles (MPs), whereas the intensity of the bands was reduced by addition of ZnO-MPs. The FT-IR characteristic bands of PCL were found to shift to higher or lower wave number in PCL/ZnO-MCs due to formation of covalent bonding. TGA results exhibited that the thermal stability of the PCL/ZnO-MCs is improved with regard to that of pure PCL. The SEM images indicated that the interface adhesion between the ZnO-MPs and the PCL matrix can be enhanced by the surface modifications of ZnO-MPs by octadecylamine. TEM showed that the synthesis of PCL/ZnO-MCs was increased in interfacial interaction between ZnO and PCL matrix, which was obtained by modifying the surface of ZnO-MPs. The antibacterial activities of the PCL/ZnO-MCs films were examined against *Salmonella choleraesuis* as gram-negative bacterium and *Bacillus Subtilis* as a gram-positive bacterium by agar disc diffusion method. The antibacterial effects of the PCL/ZnO-MCs revealed that the antibacterial activity was enhanced with the enhancing of ZnO content.

Keyword: Polycaprolactone; Octadecylamine; Zinc oxide microparticles; Microcomposites; Antibacterial activity