Silver/poly (lactic acid) nanocomposites: Preparation, characterization, and antibacterial activity

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In this study, antibacterial characteristic of silver/poly (lactic acid) nanocomposite (Ag/PLA-NC) films was investigated, while silver nanoparticles (Ag-NPs) were synthesized into biodegradable PLA via chemical reduction method in diphase solvent. Silver nitrate and sodium borohydride were respectively used as a silver precursor and reducing agent in the PLA, which acted as a polymeric matrix and stabilizer. Meanwhile, the properties of Ag/PLA-NCs were studied as a function of the Ag-NP weight percentages (8, 16, and 32 wt% respectively), in relation to the use of PLA. The morphology of the Ag/PLA-NC films and the distribution of the Ag-NPs were also characterized. The silver ions released from the Ag/PLA-NC films and their antibacterial activities were scrutinized. The antibacterial activities of the Ag/PLA-NC films were examined against Gram-negative bacteria (Escherichia coli and Vibrio parahaemolyticus) and Gram-positive bacteria (Staphylococcus aureus) by diffusion method using Muller-Hinton agar. The results indicated that Ag/PLA-NC films possessed a strong antibacterial activity with the increase in the percentage of Ag-NPs in the PLA. Thus, Ag/PLA-NC films can be used as an antibacterial scaffold for tissue engineering and medical application.

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