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Silver-loaded Antibacterial Alginate Nanofibres: Preparation and Characterization

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Abstract

Sodium alginate is a very popular thickening agent used in food, pharmaceutical and textile industry. It is also used in different biomedical applications and wound dressings due to its biocompatible properties. In this study, however, this biopolymer was electro spun from aqueous solution by combining a small portion of polyethylene oxide (PEO) as carrying polymer. In the spinning solution, 70:30 Na-alginate/PEO of total 4.0 wt. % was used to obtain bead-free nanofibres from electrospinning. To provide insolubility and antibacterial properties, these fibres were then chemically modified by treating with CaCl_2 and AgNO_3 in ethanol absolute solution. During chemical treatment process, 1.0 and 5.0 wt. % of CaCl_2 , and 0.5 and 1.0 wt. % of AgNO_3 were used. The nanofibres structure and morphology were investigated by Field Gun Emission Scanning Electron Microscope (SEM), Energy Dispersion X-ray (EDX), and Fourier Transform Infrared Spectroscopy (FTIR). The results prove that silver-loaded antibacterial alginate nanofibres have been successfully produced.

Keywords: Anti-bacterial; Electrospinning; Nanofibres; Poly (ethylene oxide); Sodium alginate