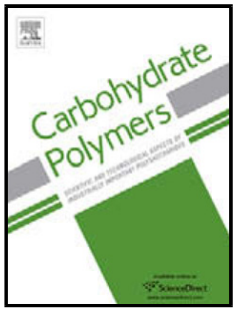

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Electrospun alginate nanofibres impregnated with silver nanoparticles: Preparation, morphology and antibacterial properties

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Abstract

Silver nanoparticles are amongst the most valuable nanoparticles with interesting properties, such as a non-toxic nature and high antibacterial efficiency, making them applicable for tissue scaffold, protective clothing and wound dressing. In this study, silver nanoparticles (AgNPs) have been synthesized using chitosan as reducing and stabilizing agent. The formation of silver nanoparticles was confirmed by UV-vis, and the TEM showed that different shapes were obtained depending on the heating duration. The chitosan/AgNPs was coated onto an electrospun alginate membrane to produce stable polyelectrolyte complex (PEC) nanofibre composites with high antibacterial efficiency. These composites were characterized by scanning electron microscopy (SEM), Fourier transform infrared spectroscopy (FTIR) and X-ray diffraction (XRD). AgNPs were successfully impregnated into the PEC nanofibre composite, while there was complexation between the electrospun alginate and the chitosan/AgNPs composite. PEC demonstrated a good antibacterial activity against both gram negative and gram positive bacteria with acceptable water vapour transmission within the range required for the treatment of injuries or wounds.

Keywords: Chitosan; Silver nanoparticles; Electrospun alginate; Polyelectrolyte complex; Antibacterial activity

Chemical compounds studied in this article: Calcium chloride (PubChem CID: 5284359); Acetic acid (PubChem CID:176); Dimethylsulfoxide (PubChem CID: 24893881); Triton™-X100 (PubChem CID: 24889888); Poly(ethylene oxide) (PubChem CID: 24863166)

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