

## Accepted Manuscript

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

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PII: S0144-8617(17)30198-4

DOI: <http://dx.doi.org/doi:10.1016/j.carbpol.2017.02.068>

Reference: CARP 12047

To appear in:

Received date: 11-11-2016

Revised date: 1-2-2017

Accepted date: 17-2-2017

Please cite this article as: <doi><http://dx.doi.org/10.1016/j.carbpol.2017.02.068></doi>

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

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11  
12 **Abstract**

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

27  
28 **Keywords:** Chitosan; Silver nanoparticles; Electrospun alginate; Polyelectrolyte complex;  
29 Antibacterial activity

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31 **Chemical compounds studied in this article:** Calcium chloride (PubChem CID: 5284359);  
32 Acetic acid (PubChem CID:176); Dimethylsulfoxide (PubChem CID: 24893881); Triton<sup>TM</sup>-  
33 X100 (PubChem CID: 24889888); Poly(ethylene oxide) (PubChem CID: 24863166)

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