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Carbohydrate Polymers

journal homepage: www.elsevier.com/locate/carbpol



Electrospinning of chitosan nanofibers: Processing optimization

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ARTICLE INFO

Article history:

Received 26 November 2007

Received in revised form 3 December 2008

Accepted 17 February 2009

Available online 21 February 2009

Keywords:

Electrospinning

Chitosan

Nanofibers

Hydrolysis

ABSTRACT

In this study, the electrospinning of chitosan has been investigated. The problem of chitosan high viscosity, which limits its spinability, is resolved through the application of an alkali treatment which hydrolyzes chitosan chains and so decreases its their molecular weight. Solutions of the treated chitosan in aqueous 70–90% acetic acid produce nanofibers with appropriate quality and processing stability. Decreasing the acetic acid concentration in the solvent increases the mean diameter of the nanofibers. Optimum nanofibers are achieved with chitosan which is hydrolyzed for 48 h. Such nanofibers result in a moisture regain which is 74% greater than that of treated and untreated chitosan powder. The diameter of this nanofiber, 140 nm, is strongly affected by the electrospinning conditions as well as by the concentration of the solvent. FTIR investigations prove that neither the alkali treatment nor the electrospinning process change the chemical nature of the polymer.