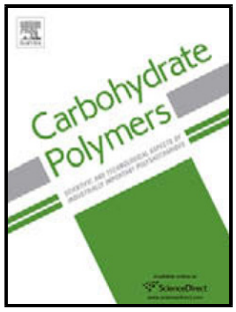

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Incorporation of nanofibrillated chitosan into electrospun PCL nanofibers makes scaffolds with enhanced mechanical and biological properties

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Highlights

- Nanofibrillated chitosan was incorporated into PCL nanofibrous scaffolds
- Tensile strength of PCL scaffolds was enhanced by adding nano chitosan
- The bionanocomposites showed improved wettability and cell compatibility

Abstract

Fabricating polycaprolactone (PCL) composite can be a facile approach to improve wettability, mechanical properties and cellular compatibility of PCL-based scaffolds. In this study, nanofibrillated chitosan (NC) were utilized as dispersing phase in PCL matrix to acquire electrospun nanocomposite fibrous scaffolds. Various amounts of NC were added to PCL solutions and the solutions were electrospun under constant electrospinning parameters. Adding NC to PCL solutions was accompanied with notable changes in the solutions viscosity, conductivity and electrospinnability. Whiles the pure PCL solutions with concentration of 8 and 10 wt. % were not electrospinnable, adding 5-10 % NC made them electrospinnable. The mechanical properties, wettability and cellular compatibility of electrospun PCL/NC composites were improved as well. PCL/NC scaffolds showed remarkable enhancement in both tensile strength and modulus compared to neat PCL scaffold. Contact angle measurements revealed improvement in wettability of scaffolds after adding NC. In addition, proliferation and adhesion of cells was enhanced when NC was incorporated to nanofibers. The results suggest PCL/NC as a proper scaffold for tissue engineering applications.

Keywords: polycaprolactone; nanofibrillated chitosan; scaffold; nanofiber