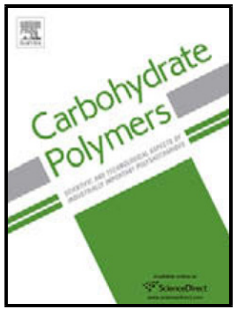


Title: Multi-hierarchical tissue-engineering ECM-like scaffolds based on cellulose acetate with collagen and chitosan fillers

Authors: Ksenia I. Lukanina, Timofei E. Grigoriev, Sergey V. Krasheninnikov, Vissarion G. Mamagulashvilli, Roman A. Kamyshinsky, Sergey N. Chvalun

PII: S0144-8617(18)30219-4
DOI: https://doi.org/10.1016/j.carbpol.2018.02.061
Reference: CARP 13323

To appear in:

Received date: 21-9-2017
Revised date: 5-12-2017
Accepted date: 20-2-2018

Please cite this article as: Lukanina, Ksenia I., Grigoriev, Timofei E., Krasheninnikov, Sergey V., Mamagulashvilli, Vissarion G., Kamyshinsky, Roman A., & Chvalun, Sergey N., Multi-hierarchical tissue-engineering ECM-like scaffolds based on cellulose acetate with collagen and chitosan fillers.*Carbohydrate Polymers* https://doi.org/10.1016/j.carbpol.2018.02.061

Multi-hierarchical tissue-engineering ECM-like scaffolds based on cellulose acetate with collagen and chitosan fillers

Ksenia I. Lukanina, Timofei E. Grigoriev, Sergey V. Krasheninnikov, Vissarion G. Mamagulashvilli, Roman A. Kamyshinsky, Sergey N. Chvalun

National Research Center «Kurchatov Institute», Akademika Kurchatova pl.,1, Moscow, 123182, Russia

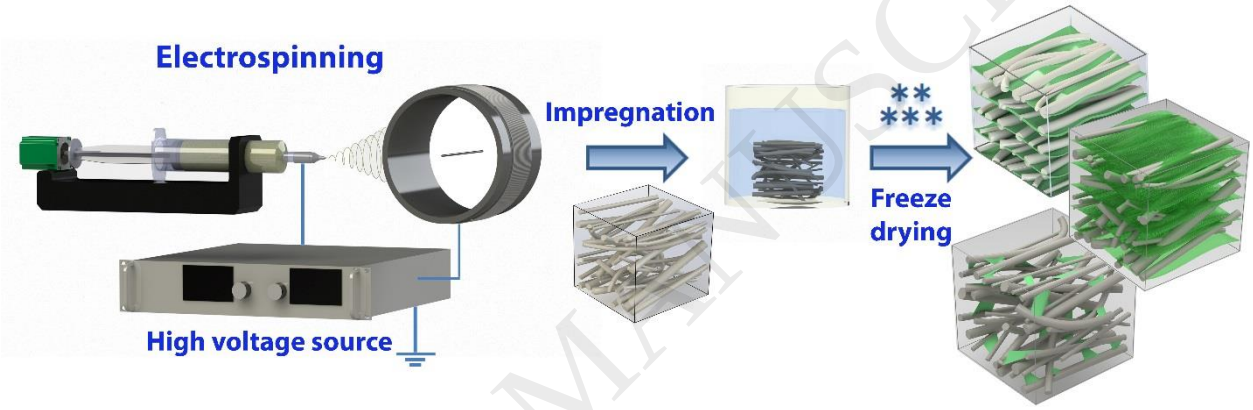
Corresponding author at: National Research Center «Kurchatov Institute» Complex of NBICS Technologies, Akademika Kurchatova pl.1, Moscow, 123182, Russia

Tel.: +7 (499) 196-95-39

Fax: +7 (499) 196-17-04

E-mail address: timgrigo@gmail.com (Timofei E. Grigoriev)

Graphical abstract



Highlights

- **C**omposite biomimetic scaffold based on fiber-sponge architecture was fabricated
- The possibility of forming a different morphology of the developed material was shown
- Developed two-component material has significantly improved mechanical properties

Abstract

A novel high-tech composite biomimetic matrixes for a wide range of medical purposes were prepared. The structure of scaffolds was inspired by the architecture of native decellularized tissue: material consists of a sponge and fibrous components of different spatial geometry based on cellulose acetate with collagen or chitosan filler. The fibrous component was prepared by electrospinning, the sponge – freeze-drying technique. The influence of main technological parameters, such as freeze mode, polymer type and concentration, etc. on the fiber-sponge architecture and properties was examined. It was shown that scaffolds with different types of microstructure can be obtained employing this technique. The impregnation of chitosan or collagen filler in fiber matrix also significantly improves mechanical properties up to 40 MPa for strength and 600 MPa for Young's modulus.

Keywords: cellulose acetate, collagen, chitosan, fiber-sponge scaffold, spatial architecture, mechanical properties