BIOACTIVE COATING EFFECT ON DEGRADATION KINETICS OF SILICA NANOFIBRES

RYSOVÁ Miroslava, POLÁKOVÁ Dagmar, MARTINOVÁ Lenka

Technical University of Liberec, Liberec, Czech Republic, EU

Abstract

Over the last decade, electrospun nanofibres were approved to be an interesting material for many applications thanks to a number of unique properties including enormous specific surface area, high porosity and small pore size. Demands on individual properties and their range vary according to the application field. Materials applied in regenerative medicine, drug and cell delivery are supposed to meet a number of specific requirements. Besides the very basic demands on biocompatibility and non-toxicity, more specific requirements depend on certain application, action period and site. For many applications, degradation period and kinetics play a crucial role. The systems for confluent cell layer delivery may require a bioactive nanostructured surface enabling improved cell adhesion and proliferation combined to optimal degradation kinetics. Silica nanofibres prepared by sol-gel method were confirmed to be biocompatible, non-toxic and biodegradable easily. Their applicability in cell delivery and bioactive coatings effects were confirmed. This study claims to reveal effect of the bioactive coating effect on degradation kinetics and mechanism of silica nanofibres degradation in vitro. The degradation characteristics of uncoated and coated silica nanofibres were tested under certain conditions (37°C, 5% CO2). Progress of degradation over time was investigated using electron microscopy (SEM), mass spectrometry and particle size analysis.

Keywords: Nanofibres, silica, degradation, coating, regenerative medicine

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