POLYCAPROLACTONE MICRO-NANOFIBROUS SCAFFOLDS LOADED WITH AMIDE-AMINE FUNCTIONALISED CARBON PARTICLES AND THEIR EFFECT ON 3T3 MOUSE FIBROBLASTS

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Abstract

In this work, activated carbon particles (CPs) were functionalized with amide-amine groups varying in alkyl chain lengths and the number of amine groups. Four types of composite scaffolds were prepared via sputtering CPs into electrospun polycaprolactone (PCL) micro-nanofibres: three of them with three types of functionalized CPs and one with plain activated CPs. Plain PCL nanofibres and the composite micro-nanofibrous scaffold with plain activated CPs were used as comparative samples. The structure of the materials was studied using scanning electron microscopy. The specific surface area of the particles and scaffolds was measured via nitrogen and krypton adsorption and calculated from Brunauer-Emmet-Teller equation. Cytocompatibility of the materials was tested using 3T3 mouse fibroblasts. Cell viability and proliferation was measured by MTT assay on days 1, 3, 8 and 14 after cell seeding. The samples were then stained using fluorescent dyes and examined via fluorescence microscopy (FM). During the FM analyses, all scaffolds containing CPs underwent degradation when irradiated with either green or blue light, which could be used for selective degradation. However, the mechanism of the degradation has not been fully explained yet. The scaffolds with functionalised CPs showed better cytocompatibility than the scaffold with plain CPs.

Keywords: Nanofibers, carbon nanoparticles, functionalization, cytocompatibility, 3T3, PCL

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