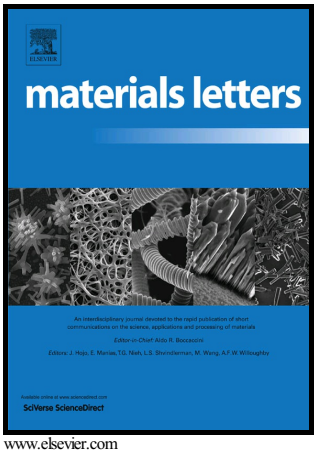

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Surface modification of poly-ε-caprolactone electrospun fibrous scaffolds using plasma discharge with sputter deposition of a titanium target

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Abstract

Poly-ε-caprolactone (PCL) biodegradable fibrous scaffolds were modified by plasma of magnetron discharge with titanium target sputtering. The influence of the plasma treatment time on the structure and properties of the electrospun scaffolds was investigated. It was shown that increasing the plasma treatment time increases hydrophilicity of scaffolds by increasing the content of titanium and oxygen, as well as increasing the size and number of pores on the fibers surface without changing the mean diameter and volume fraction of the scaffolds. In vitro studies demonstrated that the plasma treatment within the chosen time intervals increases the adhesion of cells to the scaffolds, but at the same time it causes the decline in cell viability when increased to 9 minutes.

Keywords: biomaterials, poly-ε-caprolactone, fibrous scaffold, magnetron discharge, plasma treatment.

1. Introduction.

Poly-ε-caprolactone (PCL), a crystalline aliphatic polyester with a melting point (T_m) of 60 ^oC, is a promising material for a large range of the biomedical applications due to its rheological and viscoelastic properties [1].

Electrospinning is one of the most promising methods for the fabrication of scaffolds for the tissue and organ regeneration. Due to the high surface-to-volume ratio, highly interconnected porous structure and a great adjustability of electrospinning parameters such scaffolds are able to mimic the topology of the extracellular matrix (ECM) of a native human tissue [2].