Electrospun nanofibers of PLGA/functionalized SWCNTs nanocomposite for biomedical applications

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The electrospun nanofibers of nanocomposite of poly(D,L-lactic-co-glycolic acid) (PLGA) and functionalized single-walled carbon nanotubes (f-SWCNTs) was prepared for enhanced cell adhesion on the surface of the electrodes for cell-based biosensors or scaffolds. The mechanical properties of electrospun nanofibers of PLGA/f-SWCNTs nanocomposite were improved by using surface f-SWCNTs. In this work, the f-SWCNTs with carboxyl acid groups (c-SWCNTs) and amine groups (a-SWCNTs) were used and a-SWCNTs were obtained by N2/H2 plasma treatment of commercially available c-SWCNTs. The results showed that characteristic of plasma-treated a-SWCNTs were well dispersed in the nanocomposite membranes, improved adhesion of SWCNTs to the surrounding polymer matrix and as a result enhanced mechanical strength of electrospun nanocomposite membranes due to decrease diameters. The tensile modulus of PLGA/c-SWCNTs and PLGA/a-SWCNTs nanocomposite membranes were increased by 127 and 226 %, respectively, compared to that of the electrospun PLGA membranes.