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Hatice Kaya, Osman Bulut, Ali Reza Kamali, Duygu Ege

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L-Arginine Modified Multi-walled Carbon Nanotube/ Sulfonated Poly(ether ether ketone) Nanocomposite Films for Biomedical Applications

Hatice Kaya^a, Osman Bulut^b, Ali Reza Kamali^c, Duygu Ege^{a*}

a: *Institute of Biomedical Engineering, Boğaziçi University, Rasathane St., Kandilli, 34684, Istanbul, Turkey*

b: *Civil Engineering Faculty, Istanbul Technical University, Maslak, 34469, Istanbul, Turkey*

c: *School of Metallurgy, Northeastern University, Shenyang, China*

*** Corresponding Author:** Assistant Prof. Duygu Ege, *E-mail: duygu.ege@boun.edu.tr*

Favorable implant-tissue interactions are crucial to achieve successful osseointegration of the implants. Poly(ether ether ketone) (PEEK) is an interesting alternative to titanium in orthopedics because of its low cost, high biocompatibility and comparable mechanical properties with cancellous bone. Despite these advantages; however, the untreated surface of PEEK fails to osseointegrate due to its bioinert and hydrophobic behaviour. This paper deals with the surface modification of PEEK with a novel method. For this, PEEK was first treated with concentrated sulfuric acid to prepare sulfonated PEEK (SPEEK) films using a solvent casting method. Then, 1 and 2 wt% multi-walled carbon nanotube was incorporated into SPEEK to form nanocomposite films. The samples were characterized with Fourier Transform Infrared Spectroscopy (FTIR) and Scanning Electron Microscopy. After successful preparation of the nanocomposite films, L-arginine was covalently conjugated on the nanocomposite films to further improve their surface properties. Subsequently, the samples were characterized using X-ray Photoemission Spectroscopy (XPS), water contact angle measurements and Atomic Force Microscopy (AFM) and Dynamic Mechanical Thermal Analysis (DMTA). Finally, cell culture studies were carried out by using Alamar

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