OR2301

investigation of biological properties of fluorinated diamon-like carbon films deposited on polycarbonate

Seyed Iman Hosseini[1], Seyed Iman Hosseini[1], zahra Javaherian[2], Dariush Minai-Tehrani[3], Zahra Ghaempanah[4], Marzieh Abbasi Firouzjah[5], Babak Shokri[6]

[1]Shahrood university of technology, Shahrood, Iran [2]Group Physics, Department of Sciences, Ahvaz Branch, Islamic Azad University, Ahvaz, Iran [3]BioResearch Lab, Faculty of Biological Sciences, Shahid Beheshti University, Tehran, Iran [4] Reproductive biotechnology research center Avicenna research institute, ACECR, Tehran, Iran [5]Laser and Plasma Research Institute, Shahid Beheshti University, Tehran, Iran [6]Department of Physics, Shahid Beheshti University, G.C.,, Tehran, Iran

imanhosseini@shahroodut.ac.ir

In this study the antibacterial activity and cell viability of fluorinated diamond-like carbon (F-DLC) films as bio coating on medical implants were investigated. The F-DLC films were deposited on polycarbonate (PC) substrates by the radiofrequency (RF) plasma (direct mode) and microwave (MW) afterglow plasma (remote mode). Acetylene (C2H2) and carbon tetra fluoride (CF4) were used as process gases for deposition of F-DLC films at room temperature. The influences of RF power in the direct mode and MW power in the remote mode on the fibroblast cell proliferation and antibacterial activity against E.coli were studied. Additionally the relevance of F atoms concentration, surface roughness and surface energy with the antibacterial activity was investigated. The fibroblast cell cultivation and proliferation in 3 and 6 days tests revealed that the F-DLC coated PC which were deposited by the both modes has no toxicity for cells. Increasing the RF power to 200 w increased the F concentration and surface roughness, lowered the surface energy which made the films hydrophobic, and eradicated 70% of E.coli bacteria. A drop in this growing trend happened in the mode. As the MW power increased to 450 w, the F content and surface roughness decreased, and surface energy increased which gave a hydrophilic character to the film, and only thirty percent of bacteria was killed. This unexpected result in the remote mode may be due to the high electro negativity and reactivity of F atoms.

Keywords
F-DLC
PECVD
Biology