DOI 10.26201/ISSP.2022/FPPK.145

OPTIMAL SURFACE ROUGHNESS OF Ti6Al4V ALLOY FOR THE ADHESION OF HEK293 HUMAN CELLS

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The wetting behavior of surfaces strongly depends on their roughness. In this work we investigated the effect of surface roughness of Ti – 6 wt.%Al – 4 wt.% V alloy on the adhesion of HEK293 human cells. The array of linear scratches has been produced on the surface of cold-wrought Ti – 6 wt.%Al – 4 wt.% V alloy discs with the aid of various abrasive SiC papers with grit sizes of 220, 400, 600, 800, 1000, 1200, 2000 and 4000 (number of grains per cm^2) and different diamond pastes with grain sizes 6, 3 and 1 μm. These SiC papers grades correspond to the SiC grain size of 68-7 μm. The resulted surface topography of the samples was examined by the conventional and confocal light microscopy and high-resolution scanning electron microscopy. Afterwards, the adhesion of the HEK293 human cells to the samples of different roughness has been measured by fluorescence miscroscopy. The size and morphology of adhered cells were measured by the light miscroscopy. The fraction of adhered cells behaves non-monotonously with grain size. It is about 0.35 for grain size of 1 μm, it increases with increasing grain size up to 0.95 for grain size of 7 μm and then slowly decreases down to 0.55 at abrasive grain size of 68 μm. The position of maximum is comparable with the dimension of HEK293 cells (~14 μm). Thus, the variation of surface roughness opens the way to control and tailor the fraction of adhered cells, depending on demand of medical techniques.

This work was partially carried out within the framework of the state assignment of the Institute of Solid State Physics and the Chernogolovka Scientific Center of the Russian Academy of Sciences, as well as with the financial assistance of the Russian Foundation for Basic Research (grant 19-58-06002) and Israel Ministry of Science and Technology (grant 3-16534).