Short Communication

Corrosion and Electrochemical Impedance Properties of Ti6Al4V Alloy and Ti-3Zr-2Sn-3Mo-25Nb Alloy Treated by Micro-arc Oxidation Process

Mei Yang^{1,*}, Wenhao Zhang¹, Jin Chen², Yang Li², Tingyu Huang¹, Ning Tang¹, Pengcheng Li¹

¹ Materials Science and Engineering, Southwest Petroleum University, Cheng'du 610500, China

² Sichuan petroleum Engineering Construction Co.,Ltd, Cheng'du 610000, China

*E-mail: 380056676@qq.com

doi: 10.20964/2019.09.09

Received: 19 April 2019 / Accepted: 18 June 2019 / Published: 31 July 2019

To analyse the effects of micro-arc oxidation (MAO) on the different substrates, TLM (Ti-3Zr-2Sn-3Mo-25Nb) and TC4 (Ti-6Al-4V) were oxidized in an aqueous electrolyte including KH_2PO_4 , $\text{Ca}(\text{CH}_3\text{COO})_2$ and EDTA-2Na. The bore diameters of the two kinds of material were both between 0.5 and 2 μm in ceramic film surfaces. The MAO coatings consisted of two layers: a dense inner layer and a porous outer layer. The TLM-MAO coating included anatase, rutile, CaP and Nb_2O_5 , whereas the TC4-MAO coating included anatase, rutile, CaP and brookite. The Ca and P contents of the TLM-MAO coating were higher than those of TC4, which had better biocompatibility. Furthermore, the corrosion resistance of the two kinds of coatings was estimated by potentiodynamic polarization curves and the electrochemical impedance spectrum in SBF(simulated body fluid). By analysing the self-corrosion current density, impedance and equivalent circuit model, it was found that the corrosion resistance of the TC4 micro-arc oxidation coating, which mainly depends on the dense layer, is better than that of the TLM-MAO sample.

Keywords: Micro arc oxidation; Corrosion resistance; Coating

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