ABSTRACT

Titanium and its alloy are tremendously used as implants materials due to their excellent biocompatibility, relatively low modulus, corrosion resistance, and also good fatigue strength. Their biocompatibility comes from the formation of natural TiO_2 layer. However, these natural oxide layers are not good enough to meet all of the clinical requirements. Hence, surface modification by TiO_2 layer growth is often implemented to enhance the biological, chemical, and mechanical properties. This study is aimed to fabricate TiO_2 nanostructures are by electrochemical anodization of Ti-6Al-4V under self-organization condition. The effect of different applied potential, anodizing duration and addition of thiourea in H_3PO_4 + NH_4F electrolyte composition were evaluated. Scanning Electron Microscope (SEM) was used to evaluate the morphology of passive layer as well as its thickness whereas linear polarization (LP) and electrochemical impedance spectroscopy (EIS) were used to evaluate the obtained oxide films in corrosion resistance. The results revealed that the E_{CORR} value of anodized Ti-6Al-4V alloy increased as the applied potential increased. Sample anodized at 12 V for 2 hours in electrolyte contained H_3PO_4 + NH_4F without thiourea has the thickest oxide layer and the lowest corrosion rate.

Keyword: Anodization Technique, Corrosion, Surface Modification, Thiourea, TiO_2 Films, Ti-6Al-4V