ABSTRACT

Owing to the materials properties such as high strength, corrosion resistance, and biocompatibility, titanium has been widely used for prosthetic dentistry and implant applications in recent years. Since titanium is easily oxidized at high temperature and an excessive thick layer of titanium oxide could quickly form on the surface, there are still a lot of problems with firing porcelain on titanium. Ti-40Zr out a series of Ti-Zr alloys in previous study was investigated. Pre-heat treatment on the surface of Ti-40Zr alloy at various temperatures yielded an oxide film contained zirconia which played the interfacial bonding layer between HA and metal substrate for enhancing the adherence of HA coating. HA coating was electrochemically produced in a solution of Ca(NO₃)₂‧4H₂O and (NH₄)₃PO₄‧3H₂O. Characteristic analysis of the coating including morphologies, components, phases, corrosion resistance, bond strength and biocompatibility was carried out. The result showed that hydroxyapatite coating was uniformly formed on the substrate with fixed potential and duration to pre-heated Ti-40Zr specimens. An analysis of XRD exhibited that pre-heat treatment at 600℃ was able to increase the crystallinity of hydroxyapatite and had the highest bond strength according to a tensile test, moreover, a corrosion test indicated that preoxidation at 600℃ had the best corrosion resistance. Hydroxyapatite is helpful to promote cellular attachment and protein linkage, therefore, surface oxide layer is useful to improve the corrosion resistance, reduce the ion release in human body, and extend the life of Ti-40Zr implant.

Keywords: hydroxyapatite, ZrO₂, titanium, electrochemical method
參考文獻


[8] 陳威凱,牙科用鈦-鋯合金之微結構及性質研究,私立大葉大學機械工程學系碩士論文, 2007。


[21] 黃瓊嬅,骨內錨定,科學發展, 2005;394。

[22] 楊哲青,生醫用鈦合金之滑動磨潤性質研究,國立成功大學材料科學與工程學系碩士論文, 2003。


[26] 詹青豪,利用電漿處理對鈦植體二氧化鈦層之顯微結構與特性研究,私立龍華科技大學工程技術研究所碩士論文, 2006。


[29] 王盈錦、林峰輝、胡孝光,生物醫學材料, 2002:255-269。

