Morphology of RF-sputtered Mn-Coatings for Ti-29Nb-xHf Alloys after Micro-Pore Form by PEO

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초 록 : Commercially pure titanium (CP Ti) and Ti-6Al-4V alloys have been widely used for biomedical applications. However, the use of the Ti-6Al-4V alloy in biomaterial is then a subject of controversy because aluminum ions and vanadium oxide have potential detrimental influence on the human body due to vanadium and aluminum. Hence, recent works showed that the synthesis of new Ti-based alloys for implant application involves more biocompatible metallic alloying element, such as, Nb, Hf, Zr and Mo. In particular, Nb and Hf are one of the most effective Ti β-stabilizer and reducing the elastic modulus. Plasma electrolyte oxidation (PEO) is known as excellent method in the biocompatibility of biomaterial due to quickly coating time and controlled coating condition. The anodized oxide layer and diameter modulation of Ti alloys can be obtained function of improvement of cell adhesion. Manganese(Mn) plays very important roles in essential for normal growth and metabolism of skeletal tissue in vertebrates and can be detected as minor constituents in teeth and bone. Radio frequency(RF) magnetron sputtering in the various PVD methods has high deposition rates, high-purity films, extremely high adhesion of films, and excellent uniform layers for depositing a wide range of materials, including metals, alloys and ceramics like a hydroxyapatite. The aim of this study is to research the Mn coatings on the micro-pore formed Ti-29Nb-xHf alloys by RF-magnetron sputtering for dental applications. Ti-29Nb-xHf (x= 0, 3, 7 and 15wt%, mass fraction) alloys were prepared Ti-29Nb-xHf alloys of containing Hf up from 0 wt% to 15 wt% were melted by using a vacuum furnace. Ti-29Nb-xHf alloys were homogenized for 2 hr at 1050℃. Each alloy was anodized in solution containing typically 0.15 M calcium acetate monohydrate + 0.02 M calcium glycerophosphate at room temperature. A direct current power source was used for the process of anodization. Anodized alloys was prepared using 270V~300V anodization voltage at room. Mn coatings was produced by RF-magnetron sputtering system. RF power of 100W was applied to the target for 1h at room temperature. The microstructure, phase and composition of Mn coated oxide surface of Ti-29Nb-xHf alloys were examined by FE-SEM, EDS, and XRD. (This work was supported by NRF: 2015H1C1A1035241 & NRF:No.2008-0062283, hcchoe@chosun.ac.kr).