

Ion Release of Zn, Si, Mn-doped Hydroxyapatite Films Formed on the Ti-6Al-4V Alloy by Plasma Electrolytic Oxidation

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Titanium and its alloys have been used in the fields of orthopedics and dentistry due to their abilities to exhibit high specific strength, high corrosion resistance, and chemical inertness particularly in biological circumstances. Despite these attractive properties, their passive films were somewhat bioinert in nature so that sufficient adhesion of bone cells to implant surface was delayed after surgical treatment. Recently, the Plasma electrolyte oxidation (PEO) of titanium metal has attracted a great deal of attention.

Silicon (Si) in particular has been found to be essential for normal bone and cartilage growth and development. Zinc (Zn) plays very important roles in bone formation and immune system regulation, and is also the most abundant trace element in bone. Manganese(Mn) is important in terms of protein synthesis, the manganese is insufficient, the generation of cartilage synthesis of the organic matrix is low is delayed, thickness and length decreased abnormal bone generation is performed. Si, Zn, and Mn has a beneficial effect on bone.

The objective of this work was research on ion release of Zn, Si, Mn-doped hydroxyapatite films formed on the Ti-6Al-4V alloy by plasma electrolytic oxidation. Anodized alloys was prepared at 270V~300V voltage in the solution containig Zn, Si, and Mn ions. Ion release test was carried out using potentidynamic and AC impedance method in 0.9% NaCl solution. The surface characteristics of PEO treated Ti-6Al-4V alloy were investigated using XRD, FE-SEM, AFM and EDS(Supported by NRF: 2015H1C1A1035241 & NRF: No.2008-0062283 ; hcchoe@chosun.ac.kr).

[1] In-Seop Byeon, In-Jo Hwang, Han-Cheol Choe, William A Brantley, Electrochemically-coated hydroxyapatite films on nanotubular Ti-Nb alloys prepared in solutions containing Ca, P, and Zn ions, (2016), <http://dx.doi.org/10.1016/j.tsf.2016.07.089>.