

Electrochemical characteristics of Ca, P, Sr, and Si Ions from PEO-treated Ti-6Al-4V Alloy Surface

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초 록: Ti-6Al-4V alloys are widely used as metallic biomaterials in dentistry and orthopedics due to its excellent biocompatibility and mechanical properties. However, because of low biological activity, it is difficult to form bone growth directly on the surface of titanium implants. For this reason, surface treatment of plasma electrolytic oxidation(PEO) was used for dental implants. To enhance bioactivity on the surface, strontium(Sr) and silicon(Si) ions can be added to PEO treated surface in the electrolyte containing these ions. The presence of Sr in the coating enhances osteoblast activity and differentiation, whereas it inhibits osteoclast production and proliferation. And Si has been found to be essential for normal bone, cartilage growth, and development.

In this study, electrochemical characteristics of Ca, P, Sr, and Si ions from PEO-treated Ti-6Al-4V alloy surface was re-searched using various experimental instruments. DC power is used and Ti-6Al-4V alloy was subjected to a voltage of 280 V for 3 minutes in the electrolyte containing 5, 10, 20M% Sr ion and 5M% Si ion. The morphologies of PEO-treated Ti-6Al-4V alloy by electrochemical anodization were examined by field-emission scanning electron microscopes (FE-SEM), energy dispersive x-ray spectroscopy (EDS), x-ray diffraction (XRD) and corrosion analysis using AC impedance and potentiodynamic polarization test in 0.9% NaCl solution at similar body temperature using a potentiostat with a scan rate of 1.67mV/s and potential range from -1500mV to + 2000mV (Supported by NRF: 2015H1C1A1035241 & NRF: No.2008-0062283 ; *hcchoe@chosun.ac.kr).