Ti-6Al-4V 합금에 2nd ATO 처리 후 플라즈마 전해 산화법에 의한 생체활성표면형성

Formation of Bioactive Surface by PEO-treatment after 2nd ATO Technique of Ti-6Al-4V Alloy

Sang-Gyu Lim*, Han-Cheol Choe+

Department of Dental Materials & Research Center of Nano-Interface Activeation for Biomaterials,

College of Denttistry, Chosun University, South Korea

Corresponding author: +hcchoe@chosun.ac.kr

Abstract : Ti-6Al-4V alloys have been widely used as orthopedic materials because of their excellent corrosion resistance and mechanical properties. However, it does not bind directly to the bone, so it requires a surface modification. This problem can be solved by nanotube and micropore formation. Plasma electrolytic oxidation (PEO) treatment for micropore, which combines high-voltage spark and electrochemical oxidation, is a new way of forming a ceramic coating on light metals such as titanium and its alloys. This method has excellent reproducibility and can easily control the shape and size of the Ti alloy.

In this study, formation of bioactive surface by PEO-treatment after 2nd ATO technique of Ti-6Al-4V alloy was invesgated by various instrument.

Nanotube oxide surface structure was formed on the surface by anodic oxidation treatment in 0.8 wt.% NaF and 1M H_3PO_4 electrolytes. After nanotube formation, nanotube layer was removed by ultrasonic cleaning. PEO-treatment was carried out at 280V for 3 minutes in the electrolytic solution containing the bioactive substance (Mg, Zn, Mn, Sr, and Si). The surface of Ti-6Al-4V alloy was observed by field emission scanning electron microscopy (FE-SEM, S-4800 Hitachi, Japan). An energy dispersive X-ray spectrometer (EDS, Inca program, Oxford, UK) was used to analyze the spectra of physiologically active Si, Mn, Mg, Zn, and Sr ions. The PEO film formed on the Ti-6Al-4V alloy surface was characterized using an X-ray diffractometer (TF-XRD, X'pert Philips, Netherlands).

It is confirmed that bioactive ions play an essential role in the normal bone growth and metabolism of the human skeletal tissues(This research was supported by Supported by Ministry of Science, ICT and Future Planning: 17GJ1006; hcchoe@chosun.ac.kr).