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Effect of electrolyte and anodizing condition on the anodized titanium with nanotubes

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The purpose of this study is to evaluate the surface characteristics of titanium anodized using various electrolytes and different voltages. Three different electrolytes were used for anodizing; all of them contain 80wt. % glycerol. The main variables were the amount of NH_4F and H_2O. The concentration of NH_4F and H2O in these three electrolytes was 0.5 wt.% NH_4F+19.5 wt.% H_2O, 1.0 wt.% NH_4F+19.0 wt.% H_2O and 1.5 wt.% NH_4F+18.5 wt.% H_2O. Anodic oxidation was performed at current density of 30mA/cm^2 up to 20 V, 30 V, and 40 V using a regulated DC power supply. FE-SEM was used to assess the surface morphology of the Ti plates after anodic oxidation. To evaluate the change in surface topography and surface free energy after treatment, surface roughness and contact angle measurements were performed. Biological analysis with MC3T3-E1 cells was carried out to determine the cellular response of TiO_2 nanotubes. The study reveals that a uniform TiO_2 nanotube layer is formed on the surface of Ti plates after anodic oxidation using all three electrolytes. The diameter of the TiO_2 nanotubes is decreased with NH_4F concentration while it is increased with applied voltage. In addition, length of nanotubes and surface roughness are increased with applied voltage. At 40 V, though the diameter of the nanotubes is increased, its growth is restrained. TiO_2 nanotubes formed on Ti plates at 40 V exhibits excellent cell viability after 4-days culture.

Biography

Il Song Park has completed his Ph.D. at the age of 32 years from Chonbuk National University in South Korea and postdoctoral studies from Chonbuk National University and The University of Melbourne. Currently, he is the research Professor at the School of Dentistry, Chonbuk National University. He has published more than 80 papers in reputed journals.

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