

UV Enhanced Hydrophilicity of the Anodized Films Formed at Low Current Density and Low Voltage

Authors : Phanawan Whangdee, Tomoaki Watanabe, Viritpon Srimaneepong, Dujretai Pongkao Kashima

Abstract : The anodized films formed at high current density or high voltage have been widely prepared for dental implant because it can improve the hydrophilicity to the film. Our attempt is exploring whether low current density and low voltage could enhance the good hydrophilicity to the anodized films or not. Furthermore, UV irradiation would be one of the key factor to enhance their hydrophilicity. The anodized films were performed at low current density of 2 mA/cm² in 1M H₃PO₄, 1 mA/cm² in 1M MCPM and low voltage of 6 V in either 1M H₃PO₄ or 1M MCPM. All samples were treated with UV for various times up to 24 h. After UV irradiation, the contact angle decreased, the chemical species changed. The Ti 2p and O 1s peaks increased, while the C 1s peak decreased which might be due to removal of hydrocarbon. The functional groups of the films shown as the change of OH groups appeared at wave number 3700 cm⁻¹ and 2900-3000 cm⁻¹, however, the peak of H₂O at 1630 cm⁻¹ disappeared. It is indicated that UV irradiation might change the stretching modes of OH groups coordinated to surface Ti⁴⁺ cation but UV did not affect to the changes in surface morphologies. The surface energies increased after UV irradiation resulting in improving of the hydrophilicity. The anodized films formed at low current density or low voltage after UV irradiation showed a low contact angle as well as the film formed at high current density or high voltage.

Keywords : hydrophilicity, low current density, low voltage, UV irradiation

Conference Title : ICMBE 2015 : International Conference on Medical and Biomedical Engineering

Conference Location : Toronto, Canada

Conference Dates : June 15-16, 2015