

## Comparison of Structure and Corrosion Properties of Titanium Oxide Films Prepared by Thermal Oxidation, DC Plasma Oxidation, and by the Sol-Gel

**Authors :** O. Çomaklı, M. Yazıcı, T. Yetim, A. F. Yetim, A. Çelik

**Abstract :** In this work, TiO<sub>2</sub> films were deposited on Cp-Ti substrates by thermal oxidation, DC plasma oxidation, and by the sol-gel method. Microstructures of uncoated and TiO<sub>2</sub> film coated samples were examined by X-ray diffraction and SEM. Thin oxide film consisting of anatase (A) and rutile (R) TiO<sub>2</sub> structures was observed on the surface of CP-Ti by under three different treatments. Also, the more intense anatase and rutile peaks appeared at samples plasma oxidized at 700°C. The thicknesses of films were about 1.8 µm at the TiO<sub>2</sub> film coated samples by sol-gel and about 2.7 µm at thermal oxidated samples, while it was measured as 3.9 µm at the plasma oxidated samples. Electrochemical corrosion behaviour of uncoated and coated specimens was mainly carried out by potentiodynamic polarization and electrochemical impedance spectroscopy (EIS) in simulated body fluid (SBF) solution. Results showed that at the plasma oxidated samples exhibited a better resistance property to corrosion than that of other treatments.

**Keywords :** TiO<sub>2</sub>, CP-Ti, corrosion properties, thermal oxidation, plasma oxidation, sol-gel

**Conference Title :** ICMSME 2017 : International Conference on Materials Science and Mechanical Engineering

**Conference Location :** Istanbul, Türkiye

**Conference Dates :** September 28-29, 2017