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Deposition and Evaluation of Duplex Hydroxyapatite and Plasma Electrolytic Oxidation Coatings on Magnesium

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Abstract

Multifunctional hydroxyapatite (HA) - magnesia coatings were formed on Mg by plasma electrolytic oxidation (PEO) followed by cathodic electrodeposition. The coating corrosion performance was evaluated *in-vitro* by potentiondynamic polarisation and electrochemical impedance spectroscopy. Exposure to the physiological environment increased Ca/P ratio of the single PEO coating and decreased it for the duplex HA-PEO coating. Corrosion resistance of Mg was improved by the PEO coating and further enhanced by the HA layer. Corrosion pits were observed after the tests on both coatings. The proposed corrosion mechanism includes electrolyte penetration, coating chemical dissolution and anodic dissolution of Mg.

Key Words: Plasma Electrolytic Oxidation; Cathodic Electrodeposition; Magnesium; Hydroxyapatite; Corrosion Resistance; Electrochemical Impedance Spectroscopy

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