

Corrosion resistance of biodegradable magnesium alloys in the Hank's solution

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Magnesium and its alloys have been in the focus of investigation as a material for biomedical applications. The reason is that magnesium shows biodegradable properties, it could promote bone-healing effect. As it has been reported in recent studies magnesium is non-toxic, and non-allergic those criteria makes magnesium and its alloys (Mg20Zn, Mg19Zn1Ca) very attractive for orthopedic applications. It is known, that magnesium reacts easily with chlorides ions, those are present mainly in body's liquids.

In this study, organic coatings were applied for corrosion protection of magnesium alloys in aggressive conditions. Organic coatings were deposited by spin coater. The chitosan composite coatings were obtained by the addition of silicon glass and hydroxyapatite to 1% chitosan solution in the lactic acid. Electrochemical methods (Linear sweep voltamperometry (LSV), Open circuit potential (OCP) and electrochemical impedance spectroscopy (EIS) were used as well as investigate corrosion behaviour of tested samples. Hydrogen evolution tests has been performed to determine corrosion rate. The chemical composition and structure of corrosion products deposited after corrosion tests were investigated by using Fe-SEM/EDS and X-ray photoelectron spectroscopy (XPS) analysis. The application of organic coatings on the Mg20Zn and Mg19Zn1Ca alloys promote corrosion resistance in solutions with high concentration of Cl⁻.

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