عنوان مقاله:

Nanostructured Hydroxyapatite Coating on Magnesium Based Alloy AZ91: Comparative Study via Sol-Gel and Electrophoretic Deposition Methods

محل انتشار:

اولین همایش بین المللی و ششمین همایش مشترک انجمن مهندسی متالورژی ایران (سال: 1391)

تعداد صفحات اصل مقاله: 10

نویسندگان:

R. Rojaee - *Biomaterials Research Group, Department of Materials Engineering, Isfahan University of Technology*

M.H Fathi

K. Raeissi

خلاصه مقاله:

Great deals of researches are being done on biodegradable biomedical implants for injured tissues of the body to get rid of additional dismissal surgery of the conventional metallic implants. Magnesium is one of the most critical elements in hard tissues regeneration and therefore causes speeding up the restoration ofharmed bones, while high deterioration rate of magnesium in body fluid restricts it to be used as biodegradable implants. Alloying magnesium with some relatively nobler metals such as aluminium, zinc, rare earth elements, magnesium–bioceramics composites, and surface modification techniques are someof the routes to control magnesium corrosion rate. In this study AZ91 magnesium alloy had been coated by nanostructured hydroxyapatite via sol-gel dip coating and electrophoretical methods to survey the final barricade properties of the obtained coatings. In order to perform electrophoretic coating, powders were prepared by sol-gel method, and then the powders deposited on substrates utilizing direct currentelectricity. Zeta potentials of the electrophoresis suspensions were measured to determine a best mode for good quality coatings. Transmission Electron Microscopy (TEM), and Scanning Electron Microscopy (SEM) were used to confirm nanoscale dimension, and the uniformity of the nanostructuredhydroxyapatite coating, respectively. Fourier Transform-Infrared and X-ray diffraction analysis were utilized for functional group and phase structure evaluation of the prepared coatings, correspondingly. Electrochemical corrosion tests were performed in SBF at 37±0.1°C which revealed considerable increasein corrosion protection resistivity and corrosion current density for electrophoretic coated specimens versus sol-gel coated specimens. Results showed that both sol-gel and electrophoretical techniques seemto be suitable to coat magnesium alloys for biomedical applications but electrophoretic coating technique is a better choice due to the more homogeneity and more crystalline structure of the coating.

کلمات کلیدی:

Bioresorbable implants, Magnesium alloys, Sol- Gel, Electrophoretic, Nanostructured Hydroxyapatite