Hydroxy Apatite Composite Coatings on Mg alloy for Medical Applications

M Saremi, D Khazeni, S Nikosefat and **M Ahangaran**
University of Tehran, Iran

Mg and its alloys are important engineering materials with widespread applications especially in aerospace and automobile industries for their light weight and good strength /weight ratio. Moreover, in recent years they have been the focus of research for medical applications due to their biocompatibility, biodegradability and nontoxicity. Mg and Mg alloys are good candidates for use in orthopedic applications as temporary implants because in addition to the above mentioned properties they have also module of elasticity near to the human bone. However such application faces limitations due to high corrosion rate and H2 gas formation. The corrosion of Mg alloy is desirable in temporary implants but it should be controlled to retain its properties during healing process of fractured bone. But H2 formation is a considerable obstacle because it also interferes in healing process. The corrosion of Mg and Mg alloys can be controlled by applying different methods among them surface coating is the most efficient and easy to perform. Hydroxyapatite is the most suitable biocompatible ceramic material with composition near to human bone which is used as coating in medical applications. Application of biocompatible HA coating on Mg alloys can reduce corrosion rate and consequently reduce H2 formation. However, its brittle nature is a major problem for use at load bearing sites of body implants. Moreover the application of HA in orthopedic implants suffers from its low toughness and poor wear resistance. This leads to the focus on developing composite coatings with incorporation of various biopolymers and reinforcing material to improve its mechanical behavior. In our research works we have made different composites of HA with Chitosan as a biopolymer, CNT and Graphene. The composites were prepared and applied on Mg alloy (AZ31) by electrochemical cathodic deposition using CNT or Chitosan as dispersion in the electrolyte solution. In the next attempt graphene and HA particles were dispersed in the electrolyte and the composite of HA-Graphene deposited in an electrophoretic process. he morphological studies showed uniform dispersion of particles in the coating and further electrochemical tests using Tafel polarization and EIS methods confirmed remarkable improvement corrosion resistance of the composite coatings. Nano indentation method was used to check the mechanical behavior of the coating and the results showed considerable improvement in mechanical properties.

Biography

Mohren Saremi is working at University of Tehran , Iran .He belongs to school of metallurgy and materials engineering department

saremi@ut.ac.ir

Notes: