Microstructure and Corrosion Resistance of Electrophoretic Deposited Carbonated Hydroxyapatite-Graphene Oxide Composite Coatings on AZ91 Magnesium Alloy

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Carbonated hydroxyapatite-graphene oxide (GO) composite coatings were obtained on AZ91 magnesium alloy using electrophoretic deposition from isopropanol suspensions. The results showed that ultrasonic treatment exfoliated GO sheets and promoted CO₂ adsorption on the surface of GO sheets. Subsequently, B-type carbonated HA was generated during ultrasonication-assisted EPD. The experimental results manifested that microstructures and porosity, carbonated HA content and the formation of GO-Mg complexes in pores/cracks had a significant synergistic effect on improving corrosion resistance of AZ91 magnesium alloy. HA-GO-0.33 composite coating had shown superior performance of corrosion prevention in the 0.9 wt. % NaCl solution which provided some corrosion theoretical basis for the application of Mg alloy in the direction of human implantation.

Keywords: Magnesium alloy; Graphene oxide; Carbonated hydroxyapatite; Corrosion resistance; Electrophoretic

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