Short Communication

Preparation of Yttrium-based Rare Earth Conversion Coating and Its Effect on Corrosion Resistance of AZ91D Magnesium Alloy

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The yttrium-based rare earth conversion coating on the surface of AZ91D magnesium alloy was prepared and post-treated by simple immersing in solution of yttrium nitrate ($\text{Y}(\text{NO}_3)_3$) and silica sol. The micro-morphology, transverse section and composition of the coatings were investigated by scanning electron microscopy (SEM), energy dispersive spectroscopy (EDS) and X-ray photoelectron spectroscopy (XPS), respectively. The corrosion resistance was assessed by means of potentiodynamic polarization curves, immersion testing and electrochemical impedance spectroscopy (EIS). The results show that the coating is mainly composed of Y_2O_3 , YOx/y , Al_2O_3 and MgO , and the post-treated yttrium-based rare earth conversion coating was homogeneous and uniform in morphology. The corrosion resistance capability of the coated AZ91D magnesium alloy was obviously improved compared with the bare one. The corrosion potential shifted positively about 230 mV, and the corrosion current density decreased about two orders of magnitude.

Keywords: yttrium-based conversion coating; AZ91D magnesium alloy; rare earth; post-treatment; corrosion resistance

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