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Characteristic and Corrosion Studies of Rare Earth (REE) Based Anodizing on AZ91D Magnesium Alloy

Abstract

Oxide coatings on AZ91D magnesium alloy were prepared using anodizing technique with 10mA/cm^2 current density for 5 minutes in electrolyte containing Mg $(NO_3)_2$ with $NaVO_3$ as an additive. The corrosion behaviors of different coatings condition were evaluated by immersion test in 5.0% NaCl electrolyte for 72 hours. The microstructures were analyzed by Optical Microscope (OM) and Scanning Electron Microscope (SEM). It was found that coatings with the addition of $NaVO_3$ produced homogeneous primary α-matrix and bigger β-phase ($Mg_{17}Al_{12}$) compared to untreated AZ91D magnesium alloy. The oxide film formed by anodizing in electrolyte with $NaVO_3$ enhances the corrosion resistance of the AZ91D magnesium alloy significantly.

Keywords; ChrAnodizing, AZ91D Magnesium Alloy, Magnesium Nitrate (Mg $(NO_3)_2$), Sodium Metavanadate (NaVO3)