Short Communication

Effect of Tungsten Carbide Particles on the Characteristics of PEO Coatings Formed on AZ31B Magnesium Alloy in Alkaline Electrolyte

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The oxide coatings were prepared on AZ31B magnesium alloy in the alkaline electrolyte with and without tungsten carbide (WC) particles by plasma electrolytic oxidation. The phase composition and surface morphology of the coatings were studied using X-ray diffraction (XRD) and scanning electron microscopy (SEM), respectively. The anticorrosion performance of coatings was investigated by potentiodynamic polarization tests in 3.5 wt% NaCl solution. It was found that a more uniform and compact oxide coating with less micropores and cracks was formed in the alkaline electrolyte with WC particles. The XRD results showed that the coating formed in the electrolyte with WC particles mainly contains MgO, MgSiO₃, Mg₂SiO₄, and WC. The anticorrosion performance of the magnesium alloy was significantly improved by plasma electrolytic oxidation in the alkaline electrolyte with WC particles, as indicated in the results of potentiodynamic polarization tests.

Keywords: AZ31B magnesium alloy; plasma electrolytic oxidation; tungsten carbide; corrosion resistance

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