Effect of polyaniline and aluminum tri-polyphosphate particles addition on the protective properties of Mg-rich epoxy coating on AZ91D magnesium alloy

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Hydrofluoric acid doped PANI (PANI-HF) and aluminum tri-polyphosphate (SAP) particles were together added into a Mg-rich primer (MRP) on the AZ91D magnesium alloy and improved the protective performance of the MRP greatly. The coating performance was studied with Machu test, OCP and EIS. The surface analysis was conducted on the coating and the AZ91D substrate using SEM and XPS. The results showed that the protective effect of the PANI-HF/SAP/MRP was better than that of the MRP for the substrate underneath the defect coating. On one hand, the corrosion products, consisting of magnesium oxides and phosphates, precipitated on the Mg particles, which healed the micro defects in the coating and improved its barrier effects. On the other hand, a protective film was formed on the AZ91D substrate, which could prevent the permeation of the electrolyte and retard the corrosion of the substrate.

Keywords: Magnesium alloy; Mg-rich epoxy coating; Polyaniline; Aluminum Tri-polyphosphate; EIS

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