

Effect of Pre-immersion Time on Electrophoretic Deposition of Paint on AZ31 Magnesium Alloy

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Abstract: The importance of magnesium alloys has significantly increased due to their low density, high strength/weight ratio, very good electromagnetic shielding features and good recyclability. However, unfortunately, Mg alloys are very susceptible to corrosion due to their high chemical activities ($= -2.356$ V vs. NHE at 25 °C), hence, most commercial Mg alloys require corrosion protective coatings. Organic coating such as painting, powder coating and electrophoretic deposition of paint (E-paint) is typically used in the final stages of the coating process of Mg alloys. In this study, effect of pre-immersion time on the deposition of E-paint on AZ31 Mg alloy was investigated.

It was found that during pre-immersion time, AZ31 Mg alloy rapidly reacts with E-paint solution and paint can be self-deposited on the AZ31 surface without applying of electric current. The pore size on the E-painted AZ31 Mg alloy increased with increasing pre-immersion time from 0 to 5 min. Both adhesion and corrosion resistance of E-painted AZ31 Mg alloy decreased with increasing pre-immersion time. The best E-paint AZ31 Mg alloy, which showed stronger adhesion after water immersion test and good corrosion resistance, was started to deposit after 5 s of pre-immersion time.