

Effect of Additional Ag Layer on Corrosion Protection of Cu-Electrodeposited AZ31 Mg Alloy

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초 록: This study investigated the corrosion protection by electrodeposited copper layer on AZ31 Mg alloy with and without additional silver layer by immersion test, salt spray test, OCP transient and potentiodynamic polarization experiment. The single electrodeposited Cu layer on AZ31 Mg alloy showed a nodular structure with many imperfections of crevices between the nodules, which resulted in the fast initiation of pitting corrosion within first few hours of immersion. Double-layer coating of Cu and outer Ag layer slightly increased the initiation time for pitting corrosion. Triple-layer coatings of Cu/Ag/Cu exhibited the most efficient corrosion protection of AZ31 Mg alloy, compared to the single- and double-layer coatings. Surface morphology of the outer Cu layer in the triple-layer was changed from the nodular structure to fine particle structure with no crevices due to the presence of an additional Ag layer. Thus, the improved corrosion resistance of AZ31 Mg alloy by electrodeposited Cu/Ag or Cu/Ag/Cu layers is readily ascribed to the decreased number of imperfections in the electrodeposited layers due to the additional silver layer. It is concluded that the additional silver layer provides many nucleation sites for the second Cu plating, resulting in the formation of finer and denser structure than the first Cu electrodeposit.

Keywords

Corrosion protection; AZ31 Mg alloy; Ag layer; Electroplating; Copper plating