

Research on Novel Functionalized Hot-dip Galvanizing Processes and the Microstructures of Coating

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Abstract Magnesium alloys, as the lightest metal structural materials, are widely used in automotive, aerospace, electronics, and communications fields, with broad application prospects[1]. However, their poor corrosion resistance severely affects the large-scale application of magnesium alloy[2]. Numerous surface protection technologies can improve the corrosion resistance of magnesium alloys to some extent, but they still face issues such as high costs, high equipment requirements, or thin surface coatings with poor protection[3]. In this research, the excellent resistance Zn alloy coating was fabricated on the surface of magnesium, and the protective properties and mechanisms of the coatings was discussed. The results indicated that the zinc alloy coating consisted of multiple phases, roughly divided into an alloy layer composed of Zn phase, Mg₂Zn₁₁ phase, MgZn₂ phase and a diffusion layer composed of MgZn phase, α-Mg phase. The growth and formation process of the coating mainly involve the interdiffusion of Zn and Mg atoms, the formation of various intermetallic compound layers, and the solidification of the surface alloy layer of the coating. Compared with the bare AZ31 alloy, the corrosion resistance of the samples after dipping is significantly improved, the corrosion rate of 4s coating is 0.30 mm/year, which is only 5.6% of that of AZ31 (5.33 mm/year), the reason was mainly attributed to the continuous and uniform multi-phase layer structure, which effectively hinders the penetration of corrosive media.

Keywords Hot-dip; Functional coating; Hot-dip; Coating; Corrosion

Reference

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