A study on zinc phosphate conversion coatings on Mg alloys

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Abstract

Magnesium alloys exhibit many attractive properties such as low density, high strength/weight ratio, high thermal conductivity, very good electromagnetic features and good recyclability. However, most commercial magnesium alloys require protective coatings because of their poor corrosion resistance. Attempts have been made to improve the corrosion resistance of the Mg alloys by surface treatments, such as chemical conversion coatings, anodizing, plating and metal coatings, are commonly applied to magnesium alloys in order to increase the corrosion resistance. Among them, chemical conversion coatings are regarded as one of the most effective and cheapest ways to prevent corrosion resistance. In this study, zinc phosphate conversion coatings on various Mg alloys have been developed by selecting proper phosphating bath composition and concentration and by optimizing phosphating time, temperature. Morphology, coatings composition, corrosion resistance, adhesion and its formation and growth mechanism of the zinc phosphate conversion coatings were studied. Results have shown some attractive properties such as simplicity in operation, significantly increased corrosion protective property. However, adhesions between coatings and substrate and also between coatings and paint are still not satisfied. Resolving the problems and understanding the mechanism of phosphating process are targets of our study.

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