

Manganate Conversion Coating for Magnesium Alloys

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ABSTRACT

Phosphate-permanganate conversion coating treatment has been made on the AZ31magnesium alloy, with emphasis on the formation mechanism and microstructure of the coating. Furthermore, the growth kinetic of the coating was investigated via the measurement of the weight difference of the specimens before and after conversion coating treatment. The operation parameters studied included the solution temperature and immersion time. Experimental results indicate that as the immersion proceeded, the surface of the AZ31 alloy changed from grey to dark brown. Meanwhile, as the thickness and weight of the coating increased with increasing immersion time, the corrosion resistance of the AZ31 alloy was improved as evident from the polarization curve and the salt spray test. Accompanying with the increase in coating thickness, SEM revealed that numerous microcracks formed with their crack opening increased with the coating thickness. Finally, corss-sectional TEM resolved the coating was porous and consisted of nano-sized crystallinities dispersed within the amorphous matrix. The coating mainly contained phosphorus, oxygen, magnesium, manganese and aluminum.

Keywords : magnesium alloy, phosphate-permanganate conversion coating, polarization curve, salt spray test.

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