The Study of a Phosphate Conversion Coating on Magnesium Alloy AZ91D: III. Nano-particle Modification

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This paper involved a phosphate conversion coating on magnesium alloy AZ91D. In order to strengthen the corrosion resistance of the original phosphate coating, three nano-particles — nano-CeO₂, nano-ZnO and nano-ZrO₂ — were respectively added into the primary treatment bath to obtain the nano-CeO₂ modified coating (Ce coating), the nano-ZnO modified coating (Zn coating) and the nano-ZrO₂ modified coating (Zr coating). For the original coating and the modified coatings, the corrosion resistance was evaluated by immersion test and electrochemical measurement, and the microstructure and composition were characterized by scanning electron microscope (SEM) with energy dispersion X-ray spectroscope (EDS). At the same amount, the addition of nano-CeO₂ and nano-ZrO₂ was available and efficient, whereas the addition of nano-ZnO was useless. The efficiency of the three nano-particles for the corrosion resistance increased in the order: nano-ZnO < nano-ZrO₂ < the nano-CeO₂. At the same time, the modification mechanism of related nano-particles was discussed.

Keywords: magnesium alloy; phosphate coating; nano-particles; corrosion resistance; SEM

FULL TEXT

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