Enhanced Corrosion Resistance and Photocatalytic Properties of Bi₂O₃/Phosphate Composite Film Prepared on AZ91D Magnesium Alloy by Phosphating

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A Bi₂O₃/phosphate composite film was prepared on AZ91D magnesium alloy by phosphate treatment. The surface morphology, chemical composition and corrosion resistance of the composite film were investigated by SEM, EDS, XPS and electrochemical measurements. Meanwhile, the wettability of the composite film was examined by contact angle measurements. The results showed that the composite film was mainly composed of CaHPO₄ and Bi₂O₃, and the thickness of the film was approximately 15 μm. The corrosion current density of the Bi₂O₃/phosphate composite film-coated sample was 100 times lower than that of bare AZ91D. Immersion tests conducted in ASTM D1384-87 solution demonstrated the durability of the composite film-coated AZ91D. Furthermore, the composite film possessed photocatalytic activity, which could protect Mg alloy from corrosion by atmospheric pollutants.

Keywords: AZ91D magnesium alloy; phosphating treatment; Bi₂O₃; corrosion resistance; photocatalytic performance

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