Short Communication

Effects of Cobalt(II)Sulfate Addition on Structure and Corrosion Resistance of Alloy Micro-arc oxidation Coating on the ZL108 Aluminum

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Micro-arc oxidation (MAO) coatings were formed on ZL108 aluminum alloy in silicate electrolyte with CoSO_4 . Scanning electron microscopy (SEM), X-ray diffraction (XRD), X-ray photoelectron spectroscopy (XPS) and electrochemical workstation were used to investigate the effects of CoSO_4 on the microstructure, phase composition, elemental distribution and corrosion resistance of the MAO coatings. The results showed that the addition of CoSO_4 increased the micro arc oxidation voltage, which increased the coating formation rate, resulting in an increase in the thickness of the MAO coatings. After the addition of CoSO_4 , the discharge on the coating surface was more uniform, which made the coating flatter. The phases of the MAO coatings were mainly composed of $\alpha\text{-Al}_2\text{O}_3$, $\gamma\text{-Al}_2\text{O}_3$ and SiO_2 . The XPS test results showed that CoSO_4 was converted to CoO and Co_3O_4 , which made the MAO coatings denser. Electrochemical corrosion tests showed that the corrosion resistance of the coatings with CoSO_4 was improved. Therefore, the addition of CoSO_4 can optimize the structure of the MAO coating and improve its comprehensive properties.

Keywords: ZL 108 aluminum alloy; Micro-arc oxidation; Cobalt(II)Sulfate; Corrosion resistance

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