

研究论文

镁合金微弧氧化--溶胶凝胶复合膜层的耐蚀性

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摘要: 用微弧氧化和溶胶凝胶法在AZ91D镁合金表面制备复合膜层,用扫描电镜(SEM)、能谱分析(EDS)、X射线衍射(XRD)和电化学测试等分析手段表征其成分、相结构和截面形貌,研究了复合膜层的耐蚀性。结果表明,溶胶凝胶膜有效地封闭了镁合金表面微弧氧化膜的微孔,形成结合力好且较为致密的复合膜层。复合膜层的组成主要有MgO、MgAl₂O₄、SiO₂和ZrO₂,其耐蚀性能有显著提高。

关键词: 材料失效与保护 镁合金 微弧氧化 溶胶凝胶 复合膜层 耐蚀性

Micro - arc Oxidation and Sol - Gel Composite Coatings on Magnesium Alloy

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Abstract: Protective composite coatings were obtained on a magnesium alloy by micro - arc oxidation (MAO) and sol - gel technique. The cross - section morphologies and composition of the MAO coating and composite coatings were analyzed by scanning electron microscopy (SEM) and energy dispersive X - rays (EDX). The phase structure of the composite coatings was analyzed by X - ray diffractometer (XRD). The corrosion resistance of MAO coating and composite coatings in a 3.5% (mass fraction) NaCl solution was evaluated by potentiodynamic polarisation measures. The results show that SiO₂ - ZrO₂ sol can effectively seal the micropores in the MAO coating, and the composite coatings are more compact and have good adhesion. The composite coatings are composed of MgO, MgAl₂O₄, SiO₂ and ZrO₂. The corrosion resistance of the sample with composite coatings is enhanced significantly.

Keywords: materials failure and protection magnesium alloy micro - arc oxidation sol - gel composite coatings corrosion resistance

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