

### 论文摘要

中国有色金属学报

ZHONGGUO YOUSEJINSHUXUEBAO XUEBAO

第18卷 第10期 (总第115期) 2008年10月

 [PDF全文下载]

文章编号: 1004-0609(2008)10-1825-06

### 钙对镁合金表面锰系转化膜的影响

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**摘 要:** 将钙离子作为添加剂, 加入到镁合金锰系转化膜成膜溶液中。应用粗糙度仪和电化学方法研究钙离子对膜层粗糙度和膜层耐蚀性的影响规律; 应用SEM和XPS分析钙离子对膜层表面形貌影响、膜层的元素组成和钙离子的存在形式。结果表明:  $\text{Ca}(\text{NO}_3)_2$ 浓度大于2 g/L后, 膜层粗糙度较未添加前有所降低, 膜层表面组织变得平整, 膜层裂纹变得窄小;  $\text{Ca}(\text{NO}_3)_2$ 浓度为5 g/L时, 膜层的耐蚀性最好。XPS结果表明, 膜层主要由Mn、P、O、Mg、Ca和Al元素组成, 钙离子在膜层中以 $\text{CaCO}_3$ 、CaO和一种无定形态磷酸钙盐存在。

**关键字:** 钙离子; 镁合金; 锰系磷酸盐转化膜; 裂纹

### Effect of $\text{Ca}^{2+}$ on phosphate conversion coating on magnesium alloy

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**Abstract:**  $\text{Ca}^{2+}$  was added into the phosphate conversion solution of magnesium alloy as an additive. Roughness tester and electrochemical test were used to analyze the effect of  $\text{Ca}^{2+}$  on the roughness and corrosion resistance of coating; SEM was used to observe effect of  $\text{Ca}^{2+}$  on the morphology of coating. XPS was used to investigate the composition of coating and what kind of Ca salts existing in the coating. The results show that the surface of coating turns to smooth and the crack of the coating becomes narrow when the concentration of  $\text{Ca}(\text{NO}_3)_2$  in conversion solution exceeds 2 g/L. The corrosion resistance of coating is the best at 5 g/L of  $\text{Ca}(\text{NO}_3)_2$ . XPS results show that the coating is composed of Mn, P, O, Mg, Ca and Al, and  $\text{Ca}^{2+}$  exists in the coating in the form of  $\text{CaCO}_3$ , CaO and a kind of amorphous calcium phosphate salt.

**Key words:**  $\text{Ca}^{2+}$ ; magnesium alloy; phosphate conversion solution; crack

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