

### 论文摘要

中国有色金属学报

ZHONGGUO YOUSEJINSHUXUEBAO XUEBAO

第19卷 第10期 (总第127期) 2009年10月

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文章编号: 1004-0609(2009)10-1741-07

## 固溶处理对AZ91D镁合金微弧氧化的影响

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**摘 要:** 研究AZ91D镁合金的固溶处理对其微弧氧化成膜的影响。结果表明: 固溶态基体由于成分分布均匀而能够迅速成膜并长大, 且在相同的微弧化处理时间内其膜层厚度始终大于铸态基体上的膜层厚度, 提高幅度约为40%; 随反应时间的延长, 膜层厚度逐渐增加, 微弧氧化膜表面的喷射空洞和喷射沉积物呈现粗大化趋势, 膜层表面粗糙度也随之增大; 在微弧氧化反应初期, 固溶态基体上膜层粗糙度较小; 反应约100 s后, 固溶态基体膜层的粗糙度逐渐超过铸态基体膜层的粗糙度; 当微弧氧化膜厚度相同时, 固溶态基体上膜层的粗糙度始终小于铸态基体膜层的; 微弧氧化膜上存在微裂纹, 铸态基体膜层上的裂纹深而长, 呈连续分布且随处可见; 固溶态基体膜层上裂纹浅而短, 呈单个分布且数量较少; 固溶处理带来的基体成分的均匀化能降低微弧氧化生成同厚度膜层的能耗。

**关键字:** AZ91D镁合金; 热处理; 微弧氧化膜

## Effect of solution heat treatment on microarc oxidation coatings of AZ91D magnesium alloy

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**Abstract:** The effects of solid solution heat treatment on micro-arc oxidation (MAO) coatings on AZ91D magnesium alloys were investigated. The results show that the homogenous element distribution in AZ91D substrate resulted from the solution heat treatment enhances the growth of MAO coatings, and the coatings on the solution-treated samples are about 40% thicker than that on the as-cast samples. With the oxidation process going and the coatings growing, the discharging hole and the ejecting deposition on the coating surface become bigger and coarser, which in turn results in the increase of surface roughness of coatings. At the beginning of the oxidation process, the roughness of the coatings on the solution-treated samples is lower than that on the as-cast samples, while it goes opposite after about 100 s later. However, the coating

surface on the samples treated by solid solution is always rougher than that on the as-cast samples if based on the same coating thickness. A few cracks featured with shallow and short morphology are observed on the coatings of the solution treated samples, but more cracks with deep and long features occur in the as-cast samples. Also the even element distribution in the substrates due to the solution treatment contributes to the energy saving if producing MAO coatings with the same thickness.

**Key words:** AZ91D magnesium alloy; heat treatment; microarc oxidation; coating

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