

论文摘要

中国有色金属学报

ZHONGGUO YOUSEJINSHUXUEBAO XUEBAO

第17卷 第11期 (总第104期) 2007年11月

 [PDF全文下载]

文章编号: 1004-0609(2007)11-1860-05

电解质对镁合金微弧氧化表面膜组织与腐蚀性能的影响

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摘要:采用SEM、TEM、EDX、XRD、AUTOLAB电化学工作站分析比较两种电解质(硅酸盐体系和有机胺体系)直流微弧氧化处理AZ91D合金表面涂层的成分、组织结构和涂层的动电位极化曲线。虽然两种电解质体系涂层元素成分和组成相相同, 均为金属相、MgO相和Mg₂SiO₄相, 但有机胺电解质体系的涂层中非金属相(MgO、Mg₂SiO₄)相对含量高于硅酸盐处理体系, 有机胺体系获得的涂层表面均匀致密性也优于硅酸盐体系。有机胺体系获得的涂层在3.5% NaCl中性介质中的腐蚀电流密度、腐蚀电压分别为0.29 mA/cm²和522 mV, 与硅酸盐体系处理涂层相比, 前者的抗腐蚀能力有大幅度的提高。

关键字: 镁合金; 微弧氧化; 电解质; 有机胺; 腐蚀

Effect of electrolyte on microstructure and corrosion resistance of micro-arc coatings of AZ91D magnesium alloy

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Abstract: Abstract: By means of SEM, TEM, EDX, XRD and AUTOLAB, the composition, constituent phase, microstructure and corrosion resistance of two micro-arc coatings were investigated, which were treated in two electrolytes: organic amine system and silicate solution. The results show that the constituent phases in coatings from two electrolyte are the same, i.e., α/β -Mg, MgO and Mg₂SiO₄; the relative fraction of ceramic phases in the coating from organic amine is higher, and the coating surface morphology looks finer and denser than those from silicate solution. According to the potential-dynamic polarization curves in 3.5% NaCl solution, the corrosion current density and corrosion voltage from organic amine treated coating are 0.29 mA/cm² and 522 mV respectively. The corrosion resistance of organic amine treated coating is improved significantly.

Key words: magnesium alloy; micro-arc oxidation; electrolyte; organic amine; corrosion

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