



AZ91D镁合金低压交流氧化成膜机制

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Mechanism of anodizing oxidation film of AZ91D magnesium alloy at low AC voltage

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摘要

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摘要 基于一种低的交流电压条件(10 V),在NaOH和Na₂SiO₃的混合溶液体系中,对AZ91D镁合金进行电化学阳极氧化处理.利用扫描电镜(SEM)、X射线能谱仪(EDS)、X射线衍射仪(XRD)、电化学测试技术等手段研究了AZ91D镁合金表面阳极氧化的成膜过程、膜层生长的特点以及氧化工艺参数对膜层性能的影响规律.试验结果表明:在10 V这样低的交流电压下,在镁合金表面获得的氧化膜层表面均匀,为无孔洞的平层状膜层,其生长过程呈叠加式特点;获得的氧化膜层的主要成分为Mg₂SiO₄;在质量分数为3.5%的NaCl溶液中,经过电化学阳极氧化的镁合金的耐腐蚀性优于未经处理的镁合金.

关键词: AZ91D镁合金 交流低压 阳极氧化 成膜过程

Abstract: A new anodizing process at low AC voltage (10 V) was used to prepare an electrochemical anodized film on AZ91D magnesium alloy in the electrolyte containing NaOH and Na₂SiO₃. A scanning electron microscope (SEM) with an energy dispersive X-ray spectroscopy (EDS) system was used to study the characteristics of the film-forming and growth process of the anodizing oxidation film on the AZ91D magnesium alloy. The influence of the parameters of oxidation process on film growth process and the properties of the film were also investigated by using an X-ray diffractometer (XRD) and electrochemical analyzer. It is found that the oxidation film on the AZ91D magnesium is even, non-porous and flat-shape. The growth process of oxidation film show superposition-type and the phase composition of the oxidation film is mainly Mg₂SiO₄. In addition, the corrosion resistance of anodic film on the AZ91D magnesium alloy is superior to the blank sample in 3.5%(mass fraction)NaCl solution.

Keywords: AZ91D magnesium low AC voltage anodizing oxidation growth process

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