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论文

微量锶对镁锰牺牲阳极显微组织和电化学性能的影响

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摘要：

采用OM、SEM、EDS、XRD及电化学测试等手段，研究了微量Sr对镁锰牺牲阳极显微组织和电化学性能的影响.结果表明，微量Sr的加入能够细化晶粒，当Sr含量从0增加到0 30mass%时，合金的晶粒尺寸由900 μm减小到80 μm.随着Sr含量的增加，阳极的电流效率升高，开路电位负移，当Sr加入量为0.10%时，电流效率和开路电位达到最佳，其值分别为54.5%和-1.73VSCE；进一步增加Sr的含量，阳极电流效率下降，开路电位正移.研究认为，Sr含量不超过0.10%时，晶界析出的Mg17Sr2(弱阴极相)和α-Mg基体(阳极相)组成了电偶对，阻碍了晶间腐蚀，减少了晶粒大块脱落，电流效率升高，同时晶粒细化，晶界面积变大，杂质相(阴极相)分布更均匀，开路电位负移；Sr含量大于0.10%时，过量的Mg17Sr2相作为阴极相加大了镁阳极的腐蚀，电流效率下降，开路电位正移.

关键词： 锶镁锰牺牲阳极 显微组织 电化学性能

EFFECT OF SMALL ADDITION OF STRONTIUM ON MICROSTRUCTURE AND ELECTROCHEMICAL PERFORMANCE OF Mg-Mn SACRIFICIAL ANODE

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Abstract:

The effect of small addition of strontium on the microstructures and electrochemical performances was investigated by optical microscope (OM),X-ray diffractometer(XRD),scanning electron microscope (SEM),energy dispersive spectrometer (EDS)and electrochemical methods.The results show that the crystal grains are diminished with the small addition of Sr and the average grain size decreases from 900 μm to 80 μm when the Sr addition varies from 0 to 0.30%.When the addition of Sr is less than 0.1%,the efficiency is improved,and the open potential shifts negatively.The efficiency and the open potential of the anode will meet the peak values simultaneously with 0.1% Sr additio n which are 54.5% and -1.73VSCE .However,when the Sr addition is more than 0.1%,the efficiency is remarkably decreased,and the open potential shifts notably. The reasons that Sr addition affects the efficiency and the potential are mainly attributed to:(1)when the Sr addition is less than 0 1%,the microgalvanic cells which are established by the Mg17Sr2 phase(cathode) and theα-Mg matrix(anode),reduce the intergranular corrosion diminishing the particles falling and the efficiency increases.The refined microstructures by small Sr addition increasing the grain boundary areas induce more uniform distribution of the impurities,and the open potential shifts negatively;(2)when the Sr addition is more than 0.1%,more Mg17Sr2 phase pasticles act as the cathode,which increases the corrosion along the grain boundaries and the efficiency drops and the open potential shifts notably.

Keywords: Sr Mg-Mn sacrificial anode microstructure electrochemi cal performances

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