

研究论文

镁合金微弧电泳复合膜层的微观结构和抗腐蚀性能

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摘要:

采用恒压模式在硅酸盐系电解液中制备镁合金微弧氧化陶瓷层, 对比研究了微弧电泳和直接电泳镁合金的截面形貌、结合力大小以及抗腐蚀性能差异. 结果表明: 在镁合金微弧氧化陶瓷层的表面可制备电泳有机层, 简化了电泳工艺; 在微弧电泳复合膜层间形成机械咬合力和化学键力, 附着力等级可达1级; 经800 h中性盐雾腐蚀试验后, 复合膜层腐蚀增重量和样品表面的形貌均没有明显的变化; 与微弧氧化陶瓷层和直接电泳有机层相比, 微弧电泳复合膜层的电化学稳定性显著增强, 腐蚀电流相分别减少了约5个和2个数量级.

关键词: 金属材料 微弧电泳 复合膜层 微观结构 耐蚀性

Microstructure and corrosion resistance of composite coating on magnesium alloy by microarc oxidation and electrophoresis

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Abstract:

Microarc oxidation (MAO) coatings on magnesium alloy were prepared in silicate electrolyte under constant voltage mode. Cross-section morphologies, binding force and corrosion resistance of the coatings treated by micro arc oxidation and electrophoresis or direct electrophoresis were studied, respectively. The results show that electrophoresis coating can be prepared on the surface of MAO coating, and this technique is simpler than the traditional electrophoresis. The forces of physical binding and chemical bonding of the composite coatings were formed, and the grade of binding force is NO.1. The corrosion weight and surface morphology of the composite coatings are not changed under the neutral salt spray test for 800 h. The electrochemical stability of the microarc oxidation and electrophoresis coating is better, and corrosion current is decreased by 5 or 2 grades compared by the ceramic coating or direct electrophoresis coating.

Keywords: metal materials microarc oxidation and electrophoresis composite coating microstructure corrosion resistance

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参考文献:

- 1 R.F.Zhang, D.Y.Shan, R.S.Chen, E.H.Han, Effects of electric parameters on properties of anodic coatings formed on magnesium alloys, *Materials Chemistry and Physics*, 107, 356(2008)
- 2 LUO Haihe, CAI Qizhou, WEI Bokang, YU Bo, HE Jian, LI Dingjun, Effects of additive concentration on microstructure and corrosion resistance of ceramic coatings formed by micro-arc oxidation on AZ91D Mg alloy, *The Chinese Journal of Nonferrous Metals*, 18(6), 1082(2008)
(骆海贺, 蔡启舟, 魏伯康, 余博, 何剑, 李定骏, 添加剂浓度对微弧氧化陶瓷层结构及耐蚀性的影响, *中国有色金属学报*, 18(6), 1082(2008))
- 3 JIANG Bailing, ZHANG Shufen, WU Guojian, Study of corrosion resistance on micro arc oxidation

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ceramic coatings on magnesium alloy, J Chin. Soc. Corros., 22(5), 301(2002)
 (蒋百灵, 张淑芬, 吴国建, 镁合金微弧氧化陶瓷层耐蚀性的研究, 中国腐蚀与防护学报, 22(5), 301(2002))

4 S.Verdier, M.Boinet, S.Maximovitch, F.Dalard, Formation, structure and composition of anodic films on AM60 magnesium alloy obtained by DC plasma anodizing, Corrosion Science, 47, 1430(2005)

5 S.V.Gnedenkova, O.A.Khrisanfova, A.G.Zavidnaya, S.L.Sinebrukhov, P.S.Gordienko, S.Iwatsubo, A.Matsui, Composition and adhesion of protective coatings on aluminum, Surface and Coatings Technology, 145, 146(2001)

6 LUO Xiaoping, XIA Lanting, ZANG Dongmian, Present state of Chemical Conversion Treatment on Face of Magnesium Alloys, Research studies on foundry equipment, 2, 44(2007)
 (罗小萍, 夏兰廷, 臧东勉, 镁合金表面化学转化处理研究现状, 铸造设备研究, 2, 44(2007))

7 G.P.Writz, S.D.Bown, W.M.Kriven, Ceramic coatings by anodic spark deposition, Materials and Manufacturing Processes, 6(1), 87(1991)

8 XUE Wenbin, SHI Xiuling, HUA Ming, LI Yongliang, Preparation of anti-corrosion films by microarc oxidation on an Al-Si alloy, Appl. Surf. Sci., 253, 6118(2007)

9 C.E.Barchiche, E.Rocca, J.Hazan, Corrosion behaviour of Sn-containing oxide layer on AZ91D alloy formed by plasma electrolytic oxidation, Surf. Coat. Technol., 202, 4145(2008)

10 H.Y.Zheng, Y.K.Wang, B.S.Li, G.R.Han, The effects of Na₂WO₄ concentration on the properties of microarc oxidation coatings on aluminum alloy, Materials Letters, 59, 139(2005)

11 G.Sundararajan, L.Rama Krishna, Mechanisms underlying the formation of thick alumina coatings through the MAO coating technology, Surf. Coat. Technol., 167, 269(2003)

12 XUE Wenbing, DENG Zhiwei, CHEN Ruyi, ZHANG Tonghe, MA Hui, Microstructure and properties of ceramic coatings produced on 2024 aluminum alloy by microarc oxidation, Journal of Materials Science, 36, 2615(2001)

13 LIANG Jun, HU Litian, HAO Jingcheng, Improvement of corrosion properties of microarc oxidation coating on magnesium alloy by optimizing current density parameters, Appl. Surf. Sci., 253, 6939(2007)

本刊中的类似文章

1. 刘汉强, 高汝伟, 韩广兵 .Fe₃B基纳米复合永磁材料的微结构和性能[J]. 材料研究学报, 2003,17(4): 0-400
2. 杨振明, 张劲松, 曹小明, 李峰, 徐志军 .用柠檬酸溶胶-凝胶法制备三效催化剂[J]. 材料研究学报, 2003,17(4): 0-374
3. 李德辉, 李志成, 刘路, 邹壮辉 .时效对Mg-Y-Nd合金的影响[J]. 材料研究学报, 2003,17(5): 0-488
4. 冯+C3419奇, 巴恒静, 刘光明 .二级界面对水泥基材料孔结构和性能的影响[J]. 材料研究学报, 2003,17(5): 0-494
5. 陈岁元, 刘常升, 张雅静, 才庆魁 .激光辐照丙酮溶液中固体靶制备纳米碳粉[J]. 材料研究学报, 2003,17(5): 0-498
6. 张栋杰, 都有为 .Fe₂O₃对锌铁氧体隧道结构和磁性能的影响[J]. 材料研究学报, 2004,18(1): 34-
7. 刘志义, 许晓娟, 邓小铁, 李海 .淬火工艺对含ZrC的20Mn2钢组织及力学性能的影响[J]. 材料研究学报, 2004,18(1): 39-
8. 沙桂英, 韩恩厚, 张修丽, 徐永波, 刘路 .应力波载荷作用下X70管线钢的应力[J]. 材料研究学报, 2004,18(5): 461-465
9. 顾四朋, 侯立松, 赵启涛 .Sn掺杂Ge--Sb--Te相变薄膜的晶化特性[J]. 材料研究学报, 2004,18(2): 181-186
10. 罗守靖, 程远胜, 杜之明 .陶瓷基复合材料伪半固态触变成形[J]. 材料研究学报, 2005,19(1): 107-112

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