中国腐蚀与防护学报 >>2010 >>30 >>(4)

中国腐蚀与防护学报 2010, **30**(4) 329-332 **DOI**: **ISSN**: 1005-4537 **CN**: 31-1421/TG

研究报告

低驱动电位Al-Ga合金牺牲阳极及其活化机制

马力[1,2,3],李威力[4],曾红杰[5],闫永贵[2],侯保荣[1]

1. 中国科学院海洋研究所 青岛 266071
2. 中船重工七二五所 海洋腐蚀与防护国防科技重点实验室 青岛 266071
3. 中国科学院研究生院 北京 100049
4. 南京理工大学材料科学与工程系 南京210094
5. 北京科技大学材料学院 北京 10083

摘要:

采用恒电流试验评价了不同Ga含量的Al-Ga二元合金牺牲阳极的电化学性能，并通过X射线衍射、扫描电镜及能谱分析、回沉积等实验探讨了阳极的活化溶解机制。结果表明，采用高纯铝锭炼制的Al-0.07%Ga 二元合金工作电位在-0.820 V~-0.876 V（*vs*.Ag/AgCl海水）之间，而用工业铝锭Al99.85炼制的Al-0.1%Ga二元合金阳极工作电位在 -0.802 V~-0.818 V之间，基本满足低驱动电位牺牲阳极的要求，但局部腐蚀溶解均较严重，溶解性能有待改善；Al-Ga合金腐蚀产物中的 Ga含量随基体中Ga含量的增加而增加，但远小于基体中的Ga含量；溶解后阳极表面的Ga含量大于基体中Ga含量，原因是溶解在溶液中的 Ga^{3+}回沉积到阳极表面，使得阳极表面Ga含量增加；Al-Ga阳极的活化符合溶解-再沉积机理。

关键词： Al-Ga合金 低驱动电位 牺牲阳极 电化学性能 活化机制

LOW DRIVING VOLTAGE Al-Ga SACRIFICIAL ANODE AND ITS ACTIVATION MECHANISM

MA Li[1,2,3], LI Weili[4], ZENG Hongjie[5], YAN Yonggui[2],HOU Baorong[1]

1. Institute of Oceanology,Chinese Academy of Sciences, Qingdao 266071
2. State Key Laboratory for Marine Corrosion and Protection, Luoyang Ship Material Research Institute, Qingdao 266071
3. Graduate University of Chinese Academy of Sciences, Beijing 100049
4. Department of Materials Science and Engineering, Nanjing University of Science and Technology,Nanjing 210094
5. Materials School, Beijing University of Science and Technology, Beijing 100083

Abstract:

The electrochemical performance of Al-Ga binary alloy with different Ga content were evaluated by constant current test. And the activation mechanism was investigated by X-Ray, SEM+EDS and redeposit experiment. The results showed that Al-0.07%Ga welded by high purity aluminum and Al-0.1%Ga welded by Al99.85 exhibit suitable working potential as low driving voltage sacrificial anode for cathodic protection of high strength steel. Their working potential was varied from -820 mV~-876 mV, -802 mV~-818 mV (*vs*. Ag/AgCl seawater) respectively. However, their performance needs to be improved for its serious local dissolution morphology. The Ga content of corrosion product was increasing with increasing of the Ga content of anode matrix, but the latter is far greater than the former. The content of Ga in anode surface is increasing for Ga^{3+} redeposit to the surface. The activation mechanism of Al-Ga anode obeys dissolution-redeposit mechanism.

Keywords: Al-Ga alloy low driving voltage sacrificial anode electrochemical performance activation mechanism

收稿日期 2009-06-10 **修回日期** 2010-04-01 **网络版发布日期** 2010-08-13

DOI:

基金项目:

总装预研项目(51312040202)资助

通讯作者: 侯保荣

作者简介: 马力，女，1977年生，博士生，研究方向为金属材料腐蚀与防护
通讯作者E-mail: brhou@ms.qdio.ac.cn

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