

前一个

后一个

本期目录 | 下期目录 | 过刊浏览 | 高级检索

[打印本页] [关闭]

研究报告

循环压力对环氧涂层在模拟深海环境中失效行为的影响

唐俊文<sup>1</sup>, 邵亚薇<sup>1</sup>, 张涛<sup>1</sup>, 孟国哲<sup>1</sup>, 王福会<sup>1,2</sup>

1. 哈尔滨工程大学材料科学与化学工程学院腐蚀与防护实验室 哈尔滨 150001
2. 中国科学院金属研究所 金属腐蚀与防护国家重点实验室 沈阳 110016

**摘要:** 在模拟深海环境下, 利用电化学阻抗技术并结合重量法, 研究了循环压力对纯环氧涂层在3.5 mass% NaCl 溶液中失效行为的影响。结果表明, 循环压力条件下, 涂层的阻抗行为呈周期性变化规律: 在高压条件下浸泡时, 有机涂层电容较高、涂层电阻较低; 而常压条件下两者都较高。循环压力增大, 腐蚀介质更容易扩散到涂层内部, 使得涂层吸水量增加, 涂层电阻降低, 涂层防护性能恶化。

**关键词:** 环氧涂层 循环压力 深海腐蚀 电化学阻抗谱

EFFECT OF CYCLIC PRESSURE ON DEGRADATION BEHAVIOR OF EPOXY COATING IN SIMULATED DEEP OCEAN ENVIRONMENT

TANG Junwen<sup>1</sup>, SHAO Yawei<sup>1</sup>, ZHANG Tao<sup>1</sup>, MENG Guozhe<sup>1</sup>, WANG Fuhui<sup>1,2</sup>

1. Corrosion and Protection Laboratory, College of Materials Science and Chemical Engineering, Harbin Engineering University, Harbin 150001
2. State Key Laboratory for Corrosion and Protection, Institute of Metals Research, Chinese Academy of Sciences, Shenyang 110016

**Abstract:** The effect of cyclic pressure on the degradation behavior of the epoxy coating on carbon steel surface in 3.5% NaCl solution in a simulated deep-ocean environment was studied using electrochemical impedance spectroscopy (EIS) and weight method. The results showed that the EIS characteristics displayed a periodic variation under the cyclic pressure condition. The coating capacitance at high pressure was higher and the coating resistance was lower than that at atmospheric pressure during immersion periods, respectively. With increasing the cyclic pressure, the corrosion medium such as water had diffused to the coating/metal interface more easily. As a result, the increase of the water absorption capacity of the epoxy coating and the decrease of coating resistance were observed. The coating protection properties were obviously deteriorated.

**Keywords:** epoxy coating cyclic pressure deep ocean corrosion electrochemical impedance spectroscopy(EIS)

收稿日期 2010-05-24 修回日期 2010-06-17 网络版发布日期 2011-08-11

DOI:

基金项目:

通讯作者: 邵亚薇

作者简介: 唐俊文, 男, 1985年生, 博士生, 研究方向为材料腐蚀与防护

通讯作者E-mail: shaoyawei@hrbeu.edu.cn

扩展功能

本文信息

Supporting info

PDF(1628KB)

[HTML] 下载

参考文献[PDF]

参考文献

服务与反馈

把本文推荐给朋友

加入我的书架

加入引用管理器

引用本文

Email Alert

文章反馈

浏览反馈信息

本文关键词相关文章

环氧涂层

循环压力

深海腐蚀

电化学阻抗谱

本文作者相关文章

唐俊文

邵亚薇

张涛

孟国哲

王福会

PubMed




Article by Tang,J.W

Article by Shao,Y.W

Article by Zhang,s

Article by Meng,G.Z

Article by Yu,F.H

- [1] Schumcher M. Sea Water Corrosion Handbook [M].New Jersey: Noyes Data, 1979: 107-964
- [2] Antoine E, Lemoine L, Peyronnet J, Collection of data on the corrosion of steels and on the marine environment at great depth [R]. Commission of the European Communities, 1982: 105
- [3] Beccaria A M, Poggi G, Gingaud D, et al. Effect of hydrostatic pressure on passivating power of corrosion layers formed on 6061 T6 aluminum alloy in sea water [J]. Br. Corros. J., 1994, 29(1): 65-69
- [4] Beccaria A M, Poggi G. Effect of some surface treatments on kinetics of aluminum corrosion in NaCl solutions at various hydrostatic pressures [J].Br. Corros. J., 1986, 21(1): 19-22
- [5] Cao C N, Zhang J Q. An Introduction to Electrochemical Impedance Spectroscopy [M].Beijing: Science Press, 2002: 154
- [6] Wang C, Wu H, Yang H Y, et al. Electrochemical behavior of organic coatings in simulated deep ocean environment [J]. Corros. Sci. Prot. Technol., 2009, 21(4): 351-353  
王成, 吴航, 杨怀玉等. 有机涂层在模拟深海环境中的电化学行为研究 [J]. 腐蚀科学与防护技术, 2009, 21(4): 351-353 [浏览](#)
- [7] Yan R, Geng Z, Wu H, et al. On failure mechanism of submarine surface coatings [J]. J.Naval Univ. Eng., 2005, 17(5): 38-42  
阎瑞, 耿志, 吴行等. 潜艇表面涂层失效机理的研究 [J]. 海军工程大学学报, 2005, 17(5): 38 
- [8] Gao Y, Zhang H, Zhang L X, et al. The study of test for permeability resistance in chemical medium of the SEBF/SLF anti-corrosion coating [J]. Total Corros. Control., 2002, 16(3): 30-33  
高英, 张红, 张立新等. SEBF/SLF防腐涂层耐介质渗透性试验研究 [J]. 全面腐蚀控制, 2002, 16(3): 30-33
- [9] Zhang J T, Hu J M, Zhang J Q, et al. Studies of impedance models and water transport behaviors of polypropylene coated metals in NaCl solution [J]. Prog. Org. Coat., 2004, 49: 293-301 
- [10] Zhang J T, Hu J M, Zhang J Q, et al. Studies of water transport behavior and impedance models of epoxy coated metals in NaCl solution by EIS [J]. Prog. Org. Coat., 2004, 51: 145-151 
- [11] Shao Y W, Gu S H, Zhang T, et al. Effect of size of mica filler on diffusion of water in epoxy coatings [J]. Paint Coat. Ind., 2007, 37: 11-14

#### 本刊中的类似文章

1. 石树坤, 王均, 李海丰, 王院生, 张雨. 时效处理对2205双相不锈钢在NaCl溶液中电化学腐蚀行为研究[J]. 中国腐蚀与防护学报, 2011,23(6): 463-466
2. 郝永胜, 刘福春, 史洪微, 韩恩厚. 玻璃纤维/环氧复合涂层耐腐蚀性能研究[J]. 中国腐蚀与防护学报, 2011,31(6): 426-430
3. 石秋梅, 邵亚薇, 张涛, 孟国哲, 陈琪昊. 磷酸锌对环氧涂层划痕的保护尺寸研究[J]. 中国腐蚀与防护学报, 2011,31(5): 389-394
4. 王平, 程英亮, 张昭. Ni-SiC纳米复合镀层腐蚀行为的研究[J]. 中国腐蚀与防护学报, 2011,31(5): 371-376
5. 施锦杰, 孙伟. 等效电路拟合钢筋锈蚀行为的电化学阻抗谱研究[J]. 中国腐蚀与防护学报, 2011,23(5): 387-392
6. 倪呈圣, 曾潮流, 牛焱. 多弧离子镀Al涂层对316不锈钢在熔融碳酸盐中的腐蚀的影响[J]. 中国腐蚀与防护学报, 2011,23(5): 417-421
7. 许晨, 李志远, 金伟良. 混凝土中钢筋锈蚀的电化学阻抗谱特征研究[J]. 中国腐蚀与防护学报, 2011,23(5): 393-398
8. 钟彬, 徐小连, 陈义庆, 艾芳芳, 肖宇, 徐承明, 王永明. 09CuPCrNi-A耐大气腐蚀钢电化学阻抗研究[J]. 中国腐蚀与防护学报, 2011,23(5): 437-439
9. 廖强强, 陈亚琼, 闫爱军, 董万田, 葛红花. 氨基磺酸溶液中烷基咪唑啉对碳钢的缓蚀作用[J]. 中国腐蚀与防护学报, 2011,31(5): 356-361
10. 李超, 杜翠薇, 刘智勇, 李晓刚. X100管线钢在水饱和酸性土壤中的电化学阻抗谱特征[J]. 中国腐蚀与防护学报, 2011,31(5): 377-380