

论文

时效处理对FV520B马氏体时效钢的氢脆敏感性影响研究

周倩青^{1、3}, 雍兴平², 翟玉春¹

1 东北大学材料冶金学院, 沈阳 110004; 2 沈阳鼓风机(集团)有限公司, 沈阳 110142
3 中国科学院金属研究所, 沈阳 110016

摘要:

通过系列热处理和热充氢实验, 采用光学显微镜、SEM和拉伸试验等研究了不同温度时效处理对沉淀硬化马氏体不锈钢FV520B的氢脆敏感性的影响. 结果表明: 充氢后, FV520B钢表现出良好的抗氢脆性能; 450℃低温时效后钢的氢脆敏感性较高, 而630℃中温时效后, 钢中由于析出较多的逆变奥氏体, 阻碍氢扩散和裂纹扩展; 充氢后表现出良好的抗氢脆性能. 塑性损减率随钢中逆变奥氏体的增加而降低.

关键词: 马氏体不锈钢 逆变奥氏体 氢脆

EFFECT OF AGING TREATMENT ON HYDROGEN EMBRITTLEMENT OF F520B MARAGING STEEL

ZHOU Qian-qing^{1、3}, YONG Xing-ping², ZHAI Yu-Chun¹

1 School of Materials and Metallurgy, Northeastern University, Shenyang 110004;
2 Shenyang Blower Works Group Co., Ltd, Shenyang 110142; 3 Institute of Metal Research, Chinese Academy of Sciences, Shenyang 110016

Abstract:

The hydrogen embrittlement of a precipitation-hardened martensitic stainless steel, FV520B, after different aging treatments was studied by using optic microscopy, X ray diffraction, SEM and mechanical testing. Hydrogen was introduced into the steel by thermal charging. The results showed that the steel exhibited an obvious hydrogen resistance. The hydrogen induced ductility loss of the steel aged at 630℃ was lower than that at 450℃, which is due to the existence of reverse austenite. The reverse austenite prevents the diffusion and aggregation of hydrogen atoms and restrains the propagation of cracks, therefore, improves the hydrogen resistance of the steel. The hydrogen induced ductility loss decreased with increase of the amount of reverse austenite in the steel.

Keywords: martensitic stainless steel reverse austenite hydrogen embrittlement aging

收稿日期 2008-03-07 修回日期 2007-11-19 网络版发布日期 2009-06-08

DOI:

基金项目:

国家自然科学基金 (No.50871110)

通讯作者: 周倩青 Email: zhai_li4019@sina.com

作者简介: 周倩青 (1965-), 女, 博士研究生, 工程师, 从事冶金物化研究.

参考文献:

- [1] M Abdelshahid, K Mahmodieh, K Mori, et al. On the correlation between fracture toughness and precipitation hardening heat treatments in 15-5PH Stainless Steel [J]. Engineering Failure Analysis, 2007, 14:626.
- [2] A Perujo, E Serra, S Alberici, et al. Hydrogen in the martensitic DIN 1.4914: a review [J]. Journal of Alloys and Compounds, 1997, 253-254:152.
- [3] M Beghini, G Benamati, L Bertini, et al. Effect of hydrogen on the ductility reduction of F82H martensitic steel after different heat treatments [J]. Journal of Nuclear Materials, 2001, 288:1.
- [4] J M Hyzak, R E Stoltz. Hydrogen compatibility of HT 9 martensitic stainless steel [J]. Journal of Nuclear Materials, 1981, 103/104:877.
- [5] 刘中豪, 陈廉. 含氢马氏体时效钢低温力学性能行为与断裂机制 [J]. 金属学报, 1990, 26: 284.
- [6] R B Hutchings, A Turnbull. The effect of prior mechanical deformation on hydrogen transport through 13% Chromium martensitic stainless steel [J]. Corrosion Science, 1992, 33:713.

本刊中的类似文章

1. 杨长江, 梁成浩, 王华. 钛及其合金氢脆研究现状与应用[J]. 腐蚀科学与防护技术, 2006, 18(2): 122-125
2. 徐志刚, 张栋, 傅国如. 飞机机翼与机身连接螺栓裂纹分析[J]. 腐蚀科学与防护技术, 2005, 17(4): 286-287

扩展功能

本文信息

Supporting info

[PDF \(1711KB\)](#)

[\[HTML全文\]](#)

[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

[▶ 马氏体不锈钢](#)

[▶ 逆变奥氏体](#)

[▶ 氢脆](#)

本文作者相关文章

[▶ 周倩](#)

[▶ 雍兴平](#)

[▶ 翟玉春](#)

PubMed

[Article by Zhou, Q.](#)

[Article by Yong, X. B.](#)

[Article by Di, Y. C.](#)

3. 冯耀荣, 李鹤林. 石油钻具的氢致应力腐蚀及预防[J]. 腐蚀科学与防护技术, 2000,12(1): 57-59

4. 周倩青 雍兴平 李秀艳 翟玉春. 沉淀硬化FV520B钢的低温性能研究[J]. 腐蚀科学与防护技术, 2009,21(3): 299-301

文章评论

反馈人	<input type="text"/>	邮箱地址	<input type="text"/>
反馈标题	<input type="text"/>	验证码	<input type="text" value="7521"/>
	<input type="text"/>		