

表面与界面工程

在氢环境中2(1/4)Cr-1Mo钢的断裂特性

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摘要

研究了在模拟加氢反应器工况条件下, 国产加氢反应器壁材料2(1/4)Cr-1Mo钢的断裂特性。应用断裂力学方法, 分别测定了原始状态、原始+电化学渗氢、步冷状态、步冷+热渗氢试样的断裂韧性 K_{IC} ; 计算了埋入裂纹和表面裂纹的裂纹尖端的应力强度因子 K_I 。结果表明: 步冷处理提高了2(1/4)Cr-1Mo钢的断裂韧性, 氢降低了2(1/4)Cr-1Mo钢的断裂韧性; 只要反应器内壁无表面裂纹, 设备运行是安全的。

关键词

[2\(1/4\)Cr-1Mo钢](#) [断裂韧性](#) [应力强度因子](#) [埋入裂纹](#) [表面裂纹](#)

分类号

Fracture properties of 2(1/4)Cr-1Mo steel in hydrogen environment

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Abstract

The fracture properties of 2(1/4)Cr-1Mo steel for hydrogenation reactor wall-material were investigated, in the environment of high temperature and pressurized hydrogen. Fracture toughness values were measured for original steel, electrochemically hydrogen charging, step cooled down and step cooled down plus thermally hydrogen charging. Stress intensity factors of crack tip were calculated for burial crack and surface crack by using fracture mechanics. The results showed that step cooled down increased fracture toughness and the presence of hydrogen reduced fracture toughness of 2(1/4)Cr-1Mo steel. Without surface crack in reactor's inside wall the operation of reactor is safe.

Key words

[2\(1/4\)Cr-1Mo steel](#) [fracture toughness](#) [stress intensity factor](#) [burial crack](#) [surface crack](#)

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