

论文

Fe₃Al氢致开裂和应力腐蚀的TEM原位观察

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摘要: 利用恒位移加载台,在TEM中原位观察了Fe₃Al薄膜试样充氢和应力腐蚀前后裂尖位错组态的变化,以及位错对裂纹形核的影响.结果表明,氢能促进裂尖发射位错,促进位错的增殖和运动,并使无位错区增大.当位错发射、运动发展到临界状态时,就会导致氢致裂纹的形核与扩展.对氢促进位错发射、增殖和运动的原因进行了探讨

关键词: Fe₃Al 氢促进位错发射 氢致开裂

IN SITU TEM OBSERVATION OF HYDROGEN-INDUCED CRACKING AND STRESS CORROSION CRACKING FOR Fe₃Al

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Abstract: The change of dislocation configuration ahead of a loaded crack tip before and after charging with hydrogen, and stress corrosion cracking, and relationship between dislocation and initiation of hydrogen-induced cracking (HIC) for Fe₃Al are investigated in TEM using a special constant deflection loading device. The results show that hydrogen can enhance dislocation emission, multiplication and motion, and increase the size of dislocation free zone (DFZ). A nanocrack of HIC will initiate and propagate in the DFZ when hydrogen enhanced dislocation emission and motion reach a critical condition. The reasons that hydrogen enhanced dislocation emission and motion, and the mechanism of initiation of HIC have been discussed.

Keywords: Fe₃Al hydrogen-enhanced dislocation emission hydrogen-induced crackIng

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