

论文

Ti吸附Hg后位错发射及微裂纹形核的TEM原位研究

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摘要: 用自制的恒位移加载台,在TEM中原位观察了 α -Ti在Hg蒸汽中放置前后加载裂纹前端位错组态的变化以及脆性微裂纹的形核和扩展,并和 α -Ti在TEM中原位拉伸的结果进行了比较.结果表明:加载裂纹吸附Hg原子后能促进位错的发射、增殖和运动;当吸附促进位错发射和运动达到临界状态时,脆性微裂纹就在原裂纹顶端或在无位错区中形核并解理扩展. α -Ti在TEM中原位拉伸时,只有当热激活或外应力促进的位错发射和运动达到临界条件时,微裂纹才形核,并很快钝化成空洞而导致切断.

关键词: α -Ti 透射电镜 位错发射 液体金属脆

IN SITU TEM STUDY OF DISLOCATION EMISSION AND MICROCRACK NUCLEATION FOR α -Ti AFTER ADSORBING Hg

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Abstract: Using a special constant deflection device, the change in dislocation configuration ahead of a loaded crack tip for α -Ti before and after adsorption of Hg atoms, and the initiation of Hg--induced microcrack have been observed in TEM, as well as the in situ extension in TEM without Hg. The results showed that chemisorption of Hg atoms could facilitate dislocation emission and motion. When the dislocation emission and motion developed into a critical situation, a microcrack induced by liquid metal would nucleate from the main crack tip or/and in dislocation free zone (DFZ), and propagate in cleavage mode. During in site extension in TEM without the liquid metal, only when dislocation emission and motion induced by thermal activity and applied stress reached a certain critical condition, microcrack would nucleate but not blunt into a void.

Keywords: α -Ti TEM dislocation emission liquid metal embrittlement

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