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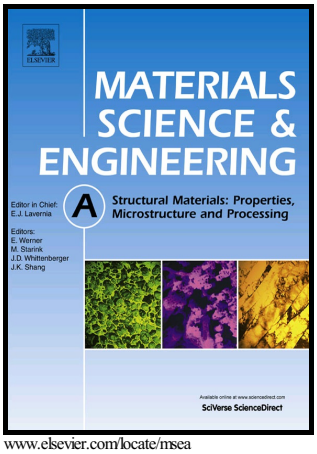

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Hydrogen behavior in high strength steels during various stress applications corresponding to different hydrogen embrittlement testing methods

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Abstract

Atomic scale phenomena during various types of hydrogen embrittlement testing were examined by investigating hydrogen desorption during the tests using tempered martensitic steel and cold-drawn pearlitic steel specimens. Hydrogen desorption increased in the elastic stage of constant stress/strain and cyclic stress testing, implying hydrogen transportation by dislocations. In contrast, hydrogen desorption increased in the elastic stage but turned downward near proof stress and finally deceased to less than that before stress application. This implies that hydrogen-enhanced strain-induced lattice defects such as dislocations and vacancies formed in addition to hydrogen accumulation by mobile dislocations. These results suggest that one of the reasons for the high hydrogen embrittlement

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