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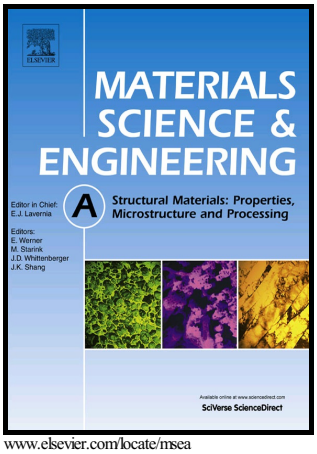

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Chengwei Shao, Weijun Hui*, Yongjian Zhang, Xiaoli Zhao, Yuqing Weng

School of Mechanical, Electronic and Control Engineering, Beijing Jiaotong University, Beijing 100044, PR China

*Corresponding author. Tel.: +86 10 51685461; fax: +86 10 51685461. wjhui@bjtu.edu.cn.

ABSTRACT

The susceptibility to hydrogen embrittlement (HE) of warm-rolled medium Mn steel (0.2C-5Mn-0.6Si-3Al) with different microstructure characteristics obtained by changing intercritical annealing time at 750 °C was investigated by carrying out slow strain rate test and hydrogen thermal analysis on electrochemically hydrogen charged samples. The results show that the increase in intercritical annealing time leads to an increase of the susceptibility to HE regardless of the decrease of both strength and diffusible hydrogen content. Unlike that of typical ductile fracture characteristic of uncharged sample, the hydrogen-charged sample shows a mixed fracture characteristic of ductile intragranular and brittle interface decohesion fracture mode in the crack initiation region. The susceptibility to HE was correlated mainly to the mechanical stability of retained austenite. These results suggest that suitable intercritical annealing treatment should be performed to ensure safety service of components made of this kind steel besides obtaining excellent combination of strength and ductility.

***Keywords*:** Medium Mn steel; Hydrogen embrittlement; Warm rolling; Microstructures; Mechanical property.