MIMS Technical Report No.00027 (201006291)

Hydrogen concentration at interphase boundary caused by strain-induced martensitic transformation in austenitic stainless steel

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Abstract. Redistribution of hydrogen caused by strain-induced α' martensitic transformation in a metastable austenitic stainless steel was calculated. This computation indicates that the martensitic transformation leads to hydrogen concentration at the interphase boundaries inside the austenite. In particular, hydrogen concentrates in a fine austenite region left between two martensite layers. It is hypothesized that the significant concentration of hydrogen in the austenite triggers a fracture related to the interphase boundaries, resulting in severe degradation of the mechanical properties.

Keywords: Hydrogen embrittlement; Strain-induced martensitic transformation; Solubility; Austenitic steel