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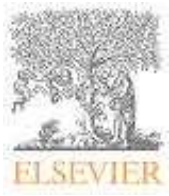

Analysis of hydrogen diffusion and trapping in ultra-high strength steel grades

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Abstract

The transport behavior of hydrogen in ultra-high strength steel grades (UHSS) has been analyzed by several test and evaluation methods. In particular, permeation and desorption measurements have been performed to evaluate material specific parameters such as the effective diffusion coefficient, the reversible trap density and the reversible trap activation energy. Subjects of this study were a dual phase steel grade (DP) with a ferritic-martensitic microstructure and a martensitic steel grade (MS). The results of the permeation measurements indicate that the influence of irreversible traps might be negligible for the investigated UHSS compared to other impact factors. The evaluated reversible trap densities were some orders of magnitude higher than those known for pure iron reflecting the more complex microstructure. The major influence on hydrogen trapping is attributed to reversible traps like grain boundaries and dislocations based on the results of desorption measurements. © 2017 Elsevier Science. All rights reserved© 2017 Elsevier Science. All rights reserved

"Keywords: Hydrogen embrittlement;High strength steel; Permeation measurements; Thermal desorption analysis; Reversible trap density;"

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