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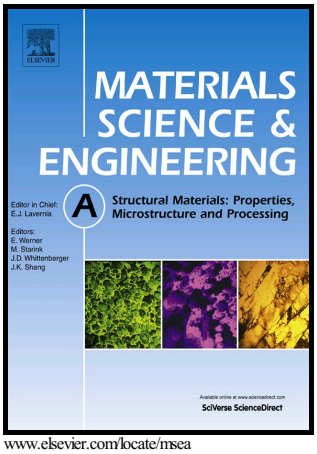

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A systematical analysis with respect to multiple hydrogen traps influencing sulfide stress cracking behavior of API-5CT-C110 casing steel

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Abstract

The irreversible hydrogen traps including Cr-rich M_7C_3, Mo_2C and MC carbides are characterized by scanning transmission electron microscope (STEM) after the quenching-and-tempering process performed on the API-5CT-C110 casing steel. Combined with our previously published work [Mater. Sci. Eng. A 688 (2017) 378-387], a systematic analysis with respect to the hydrogen interactions with reversible traps (grain boundaries and dislocations) and precipitates influencing sulfide stress cracking (SSC) behavior is presented. Grain boundaries provide channels for hydrogen diffusion. Dislocations trap hydrogen and act as hydrogen "transporters" during moving. Precipitates are introducing traps to retain hydrogen and restrict dislocation movement, then improve resistance to SSC. However, the mobile dislocations can transport the trapped hydrogen from precipitates into potential crack sites in the presence of external stress, leading to the initiation of SSC cracks. Therefore, SSC susceptibility significantly depends on the density of dislocations. The

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