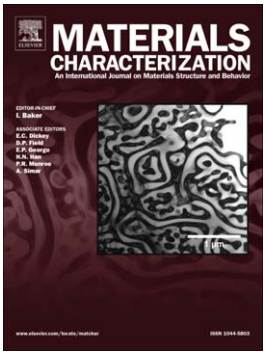

Optimization of chemical compositions in low-carbon Al-killed enamel steel produced by ultra-fast continuous annealing

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Title: Optimization of chemical compositions in low-carbon Al-killed enamel steel produced by ultra-fast continuous annealing

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Abstract:

The influence of Mn, S and B contents on microstructural characteristics, mechanical properties and hydrogen trapping ability of low-carbon Al-killed enamel steel was investigated. The materials were produced and processed in laboratory and the ultra-fast continuous annealing processing was performed using a continuous annealing simulator. It was found that increasing Mn, S contents in steel can improve its hydrogen trapping ability which is attributed by refined ferrite grains, more dispersed cementite and added MnS inclusions. Nevertheless, it deteriorates mechanical properties of steel sheet. Addition of trace boron results in both good mechanical properties and significantly improved hydrogen trapping ability. The boron combined with nitrogen segregating at grain boundaries, cementite and MnS inclusions, provides higher amount of attractive hydrogen trapping sites and raises the activation energy for hydrogen desorption from them.