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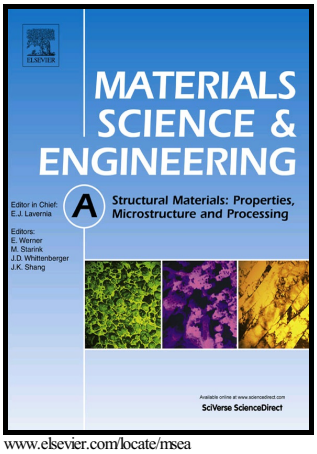

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Microstructural evolution and mechanical properties of a cold rolled ferrite-martensite structure during intercritical annealing

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Abstract

The austenite formation behavior of 80% cold rolled low carbon steel with ferrite-martensite microstructure during intercritical annealing for different times was studied. The annealed microstructures showed that the ferrite recrystallization occurred initially over the whole microstructure. Increasing annealing time led to the formation of austenite at the edge of fine recrystallized ferrite grain boundaries. The values of Avrami exponent for the austenite formation varied from 1.9 to 2 with an activation energy of 58.1 kJ/mol. The variation of hardness, strength and strain-hardening exponent of annealed samples were studied in terms of the microstructural features. The dual phase steel generated by annealing of deformed ferrite-martensite microstructure at 800^0C for 120 s showed a superior strength-elongation balance.

Keywords: Dual phase steel; austenite formation; mechanical characterization; thermo-mechanical processing; grain refinement.

1. Introduction

The research for development of advanced high strength steels (AHSS) has been much in demand by automobile industries in order to decrease the fuel consumption, the CO_2 emission

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