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Strain-induced transformation of supersaturated ferrite into nano-sized austenite in a thermomechanically processed duplex stainless steel

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Abstract

In this research, annealing treatments at 550-950 °C for 4-20 minutes on 70% cold rolled supersaturated ferrite in a duplex stainless steel resulted in the formation of nano-sized austenite at grain boundaries, shear bands and sub-boundaries. The microstructural observations indicated that the recovery in ferrite precedes the austenite transformation at 550 °C. However, at higher annealing temperatures, transformation to austenite restricts the recovery in ferrite and rapidly consumes the deformation energy. It was observed that the nano austenite particles pin the ferrite sub-boundaries and avoid their migration.

Keywords: Phase transformation; Nanoparticles; Rolling; Annealing; Thermomechanical treatment; Nano-austenite.

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