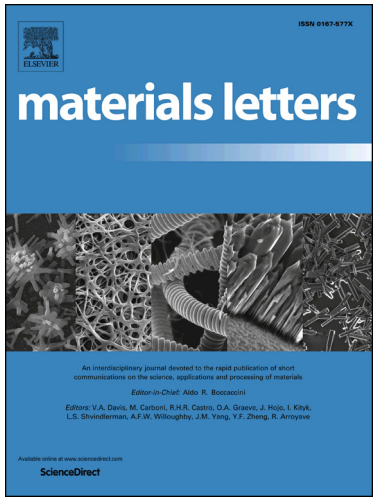
Accepted Manuscript



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

M. Mohammadpour, A. Momeni, H.R. Jafarian, H. Alinejad

PII: S0167-577X(18)30582-2
DOI: https://doi.org/10.1016/j.matlet.2018.03.201
Reference: MLBLUE 24162

To appear in: *Materials Letters*

Received Date: 1 December 2017
Revised Date: 9 March 2018
Accepted Date: 31 March 2018

Please cite this article as: M. Mohammadpour, A. Momeni, H.R. Jafarian, H. Alinejad, Strain-induced transformation of supersaturated ferrite into nano-sized austenite in a thermomechanically processed duplex stainless steel, *Materials Letters* (2018), doi: https://doi.org/10.1016/j.matlet.2018.03.201

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

M. Mohammadpour[1], A. Momeni[1*], H.R. Jafarian[2], H. Alinejad[3]

1- Materials Science and Engineering Department, Hamedan University of Technology, Hamedan, Iran
2- School of Metallurgy and Materials Engineering, Iran University of Science and Technology, 16846-13114, Tehran, Iran.
3- Esfarayen Steel Complex, Esfarayen, Iran.

Abstract

In this research, annealing treatments at 550-950 ºC 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 ºC. 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.

Corresponding Author: Amir Momeni, Email: ammomeni@aut.ac.ir; Tel.: +98-81-38411513