

Effect of carbide precipitation on strain-hardening behavior and deformation mechanism of metastable austenitic stainless steel after repetitive cold rolling and reversion annealing

Y.M. He, Y.H. Wang, K. Guo, T.S. Wang



PII: S0921-5093(17)31272-8
DOI: <http://dx.doi.org/10.1016/j.msea.2017.09.103>
Reference: MSA35570

To appear in: *Materials Science & Engineering A*

Received date: 10 September 2017
Revised date: 21 September 2017
Accepted date: 22 September 2017

Cite this article as: Y.M. He, Y.H. Wang, K. Guo and T.S. Wang, Effect of carbide precipitation on strain-hardening behavior and deformation mechanism of metastable austenitic stainless steel after repetitive cold rolling and reversion annealing, *Materials Science & Engineering A*, <http://dx.doi.org/10.1016/j.msea.2017.09.103>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Effect of carbide precipitation on strain-hardening behavior and deformation mechanism of metastable austenitic stainless steel after repetitive cold rolling and reversion annealing

Y.M. He^a, Y.H. Wang^{a,b}, K. Guo^a, T.S. Wang^{a,b*}

^a*State Key Laboratory of Metastable Materials Science and Technology, Yanshan University, Qinhuangdao 066004, China*

^b*National Engineering Research Center for Equipment and Technology of Cold Strip Rolling, Yanshan University, Qinhuangdao 066004, China*

Abstract

A metastable austenitic stainless steel was repetitively cold rolled and reversely annealed. The strain-hardening behavior and deformation mechanism during tensile testing were comparatively studied for the specimens annealed at 800 °C and 1000 °C. Fine-grained austenite with uniformly distributed carbides was formed in the 800 °C-annealed specimen, whereas coarse-grained austenite without carbides was obtained with annealing at 1000 °C. Continuous strain hardening was achieved in all specimens, which could be attributed to the strain-induced martensite and deformation twinning for the annealed specimens at 800 and 1000 °C, respectively. The carbide precipitation promoted the formation of strain-induced martensite due to the depletion of austenite stabilizers.

Keywords: Austenitic steel; Rolling; Annealing; Carbide precipitation; Strain hardening; Deformation mechanism.

1. Introduction

Grain refinement is a viable approach to improve the strength of engineering metals and alloys [1, 2]. Severe plastic deformation processes, such as equal channel angular pressing [3], high pressure torsion [4], accumulative roll bonding [5], multiple compression [6], and

* Corresponding author. Tel.: +86 335 8074631; fax: +86 335 8074545.
E-mail address: tswang@ysu.edu.cn (T.S. Wang).

Download English Version:

<https://daneshyari.com/en/article/5455119>

Download Persian Version:

<https://daneshyari.com/article/5455119>

[Daneshyari.com](https://daneshyari.com)