

Author's Accepted Manuscript

Stress-Induced Phase Transformation and Room Temperature Aging in Ti-Nb-Fe Alloys

S. Cai, J.E. Schaffer, Y. Ren



PII: S0921-5093(16)31288-6
DOI: <http://dx.doi.org/10.1016/j.msea.2016.10.060>
Reference: MSA34262

To appear in: *Materials Science & Engineering A*

Received date: 27 July 2016
Revised date: 17 October 2016
Accepted date: 18 October 2016

Cite this article as: S. Cai, J.E. Schaffer and Y. Ren, Stress-Induced Phase Transformation and Room Temperature Aging in Ti-Nb-Fe Alloys, *Material Science & Engineering A*, <http://dx.doi.org/10.1016/j.msea.2016.10.060>

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

Stress-Induced Phase Transformation and Room Temperature Aging in Ti-Nb-Fe Alloys

S. Cai¹, J.E. Schaffer¹, Y. Ren²

¹ Fort Wayne Metals Research Products Corp, 9609 Ardmore Ave., Fort Wayne, IN 46809 USA

² Advanced Photon Source, Argonne National Laboratory, 9700 S. Cass Ave., Argonne, IL 60439 USA

Abstract

Room temperature deformation behavior of Ti-17Nb-1Fe and Ti-17Nb-2Fe alloys was studied by synchrotron X-ray diffraction and tensile testing. It is found that, after proper heat treatment, both alloys were able to recover a deformation strain of above 3.5% due to the Stress-induced Martensite (SIM) phase transformation. Higher Fe content increased the beta phase stability and onset stress for SIMT. For the same reason, a strong $\{110\}_\beta$ texture was produced in Ti-17Nb-2Fe compared to the $\{210\}_\beta$ texture that was observed in Ti-17Nb-1Fe. Room temperature aging was observed in both alloys, where the formation of the omega phase increased the yield strength (also SIM onset stress), and decreased the ductility and strain recovery. The phenomenon might be a common feature of most metastable beta Ti alloys and should draw more attention to scientist and engineers in material designs and selections.

Keywords

beta Ti alloy; synchrotron X-ray; stress-induced phase transformation; room temperature aging; super-elasticity; omega phase

1. Introduction

Download English Version:

<https://daneshyari.com/en/article/5456740>

Download Persian Version:

<https://daneshyari.com/article/5456740>

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