

Accepted Manuscript

Depth-sensing cyclic nanoindentation of tantalum

M. Haghshenas, R.J. Klassen, S.F. Liu

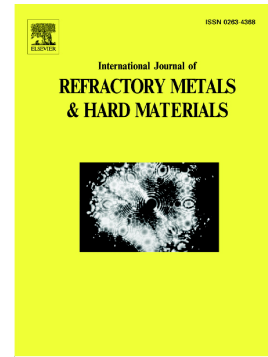
PII: S0263-4368(16)30842-3
DOI: doi: [10.1016/j.ijrmhm.2017.03.015](https://doi.org/10.1016/j.ijrmhm.2017.03.015)
Reference: RMHM 4436

To appear in: *International Journal of Refractory Metals and Hard Materials*

Received date: 21 December 2016
Revised date: 15 March 2017
Accepted date: 21 March 2017

Please cite this article as: M. Haghshenas, R.J. Klassen, S.F. Liu , Depth-sensing cyclic nanoindentation of tantalum. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Rmhm(2017), doi: [10.1016/j.ijrmhm.2017.03.015](https://doi.org/10.1016/j.ijrmhm.2017.03.015)

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 proof before it is published in its final 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.



Depth-sensing cyclic nanoindentation of Tantalum

M. Haghshenas^{1,*}, R.J. Klassen², S.F. Liu³

¹ Department of Mechanical Engineering, University of North Dakota, Grand Forks, USA

² Department of Mechanical and Materials Engineering, Western University, London, Canada

³ College of Materials Science and Engineering, Chongqing University, Chongqing, China

*Corresponding author (Meysam Haghshenas)

Telephone: +1 (701) 7776224;

E-mail: meysam.haghshenas@engr.und.edu

Abstract

In the present paper, depth-sensing multi-cycling instrumented indentation testing of tantalum is studied to assess depth-dependent plastic deformation of the metal at room temperature. Loading/unloading/reloading Ffigscheme in cyclic indentation testing is a reliable indentation-based approach in which data collection is not necessarily adversely affected by lateral inhomogeneities of the sample leading to more accurate measurements. The experimental results show indentation size effect (ISE) and depth-dependent strain rate sensitivity in Ta. To interpret these phenomena, the density of geometrically necessary dislocations (GNDs) and statistically stored dislocations (SSDs) constructed by the Nix-Gao model were used. The observed dependence of hardness and activation volume upon indentation depth indicated that the average flow stress, and hence the average plastic strain, is higher around the small indentations than around the deep indentations.

Keywords: Hardness; tantalum; depth-sensing; cyclic indentation; BCC; strain rate sensitivity.

Download English Version:

<https://daneshyari.com/en/article/5457777>

Download Persian Version:

<https://daneshyari.com/article/5457777>

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