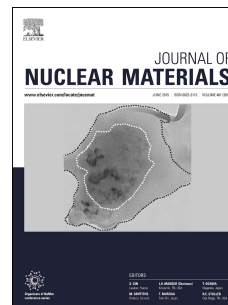


Accepted Manuscript

The influence of external stress/strain on the uranium-hydrogen reaction

O. Appel, L. Rogel, E. Malka, Y.S. Levy, S. Zalkind, R.Z. Shneck, M.H. Mintz



PII: S0022-3115(18)30327-1

DOI: [10.1016/j.jnucmat.2018.07.058](https://doi.org/10.1016/j.jnucmat.2018.07.058)

Reference: NUMA 51118

To appear in: *Journal of Nuclear Materials*

Received Date: 3 March 2018

Revised Date: 28 July 2018

Accepted Date: 28 July 2018

Please cite this article as: O. Appel, L. Rogel, E. Malka, Y.S. Levy, S. Zalkind, R.Z. Shneck, M.H. Mintz, The influence of external stress/strain on the uranium-hydrogen reaction, *Journal of Nuclear Materials* (2018), doi: 10.1016/j.jnucmat.2018.07.058.

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.

The influence of external stress/strain on the uranium-hydrogen reaction

O. Appel^{1,2}, L. Rogel¹, E. Malka¹, Y.S. Levy¹, S. Zalkind^{1*}, R.Z. Shneck², M.H. Mintz³

¹Nuclear Research Center-Negev, POB 9001, Beer-Sheva 84190, Israel

²Dept. of Materials Engineering, Ben-Gurion Univ. of the Negev, POB 653, Beer-Sheva, 84105, Israel

³Dept. of Nuclear Engineering, Ben-Gurion University of the Negev, P.O. Box 653, Beer-Sheva, 84105, Israel

Corresponding author: shimonz@nrcn.gov.il

Abstract

Hydriding experiments performed on bent uranium samples indicated that increasing the applied tensile stress shortens the nucleation and growth periods of the hydrides and facilitates the formation of hydride growth centers (GCs). The results enable the distinction between the influence of the reversible stress-induced elastic component and the irreversible plastic one. It was concluded that the elastic contribution is most significant in the very initial nucleation and (limited) growth of the "small family" hydride spots, that occur beneath the intact oxidation overlayer. On the other hand, the plastic deformation, which induces microstructural changes in the metal, controls the mechanical rupture of that oxide thin layer, thereby facilitating the conversion of the "small family" into GCs. The combined effects of these two contributions control the experimental nucleation and growth periods observed in the overall kinetics of the hydrogen-metal reaction.

Keywords: uranium, hydride, stress, strain, induction period, hydride growth centers

Download English Version:

<https://daneshyari.com/en/article/7962912>

Download Persian Version:

<https://daneshyari.com/article/7962912>

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