

# Accepted Manuscript

Nonstoichiometric molybdenum hydride

M.A. Kuzovnikov, H. Meng, M. Tkacz

PII: S0925-8388(16)33051-1

DOI: [10.1016/j.jallcom.2016.09.288](https://doi.org/10.1016/j.jallcom.2016.09.288)

Reference: JALCOM 39122

To appear in: *Journal of Alloys and Compounds*

Received Date: 15 July 2016

Revised Date: 13 September 2016

Accepted Date: 26 September 2016

Please cite this article as: M.A. Kuzovnikov, H. Meng, M. Tkacz, Nonstoichiometric molybdenum hydride, *Journal of Alloys and Compounds* (2016), doi: 10.1016/j.jallcom.2016.09.288.

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.



## Nonstoichiometric molybdenum hydride

M. A. Kuzovnikov<sup>a,b,\*</sup>, H. Meng<sup>a</sup>, M. Tkacz<sup>a</sup>

<sup>a</sup> *Institute of Physical Chemistry, Polish Academy of Sciences, Warsaw, Poland*

<sup>b</sup> *On leave from Institute of Solid State Physics RAS, Chernogolovka, Moscow District, Russia*

\* Corresponding author. Institute of Physical Chemistry, Polish Academy of Sciences, Kasprzaka 44/52, 01-224 Warsaw, Poland. E-mail: kuz@issp.ac.ru (M.A.Kuzovnikov)

### Abstract

The molybdenum-hydrogen system was studied in a diamond anvil cell at high hydrogen pressure up to 30 GPa at room temperature by X-ray diffraction. At pressure around 4 GPa a phase transformation was observed of a bcc metal to a hydride with a hcp metal lattice and  $H/Mo \approx 1.1$ . Further hydrogen pressure increase resulted in a continuous increase of the hydrogen content of the hydride. At about 15 GPa the hydrogen content reached saturation, and no further hydrogen absorption occurred up to the maximal reached pressure. The saturation composition  $H/Mo = 1.35(10)$  was estimated from volumetric considerations.

### Keywords:

- A. Metal hydrides
- B. Gas-solid reactions
- C. Crystal structure; phase transitions
- D. High-pressure; X-ray diffraction

### 1. Introduction

The most efficient way to produce hydrides is the use of high hydrogen pressure, which increases dramatically the chemical potential of hydrogen in a gas phase. Recent development of the diamond anvil cell (DAC) technique allowed a series of new transition metal hydrides to be synthesized:  $WH_{1.3}$  [1,2],  $ReH_{0.85}$  [3],  $PtH$  [4],  $RhH_2$  [5],  $IrH_3$  [6],  $FeH_3$  [7] and  $RuH$  [8].

At present all transition metals in groups VI-X except osmium were found to form hydrides. Most of them form monohydrides with composition  $H/Me$  close to 1, when hydrogen atoms occupy all available octahedral interstitial positions in a close packed metal

Download English Version:

<https://daneshyari.com/en/article/5460878>

Download Persian Version:

<https://daneshyari.com/article/5460878>

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