

# Accepted Manuscript

Fabrication and mechanical properties of tungsten alloys reinforced with c-ZrO<sub>2</sub> particles

Zhou Li, Liuji Xu, Shizhong Wei, Chong Chen, Fangnao Xiao



PII: S0925-8388(18)32843-3

DOI: [10.1016/j.jallcom.2018.07.342](https://doi.org/10.1016/j.jallcom.2018.07.342)

Reference: JALCOM 47058

To appear in: *Journal of Alloys and Compounds*

Received Date: 27 May 2018

Revised Date: 28 July 2018

Accepted Date: 30 July 2018

Please cite this article as: Z. Li, L. Xu, S. Wei, C. Chen, F. Xiao, Fabrication and mechanical properties of tungsten alloys reinforced with c-ZrO<sub>2</sub> particles, *Journal of Alloys and Compounds* (2018), doi: 10.1016/j.jallcom.2018.07.342.

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.

# Fabrication and mechanical properties of tungsten alloys reinforced with c-ZrO<sub>2</sub> particles

Zhou Li<sup>a</sup>, Liuji Xu<sup>\*a, c</sup>, Shizhong Wei<sup>\*b, c</sup>, Chong Chen<sup>c</sup>, Fangnao Xiao<sup>a</sup>

a. Henan Key Laboratory of High Temperature Structural and Functional Materials, Henan University of Science and Technology, Luoyang 471003, China

b. Henan International Joint Laboratory for High Temperature Refractory Metal Materials, Henan University of Science and Technology, Luoyang 471003, China

c. National Joint Engineering Research Center for abrasion control and molding of metal materials, Henan University of Science and Technology, Luoyang 471003, China

\* Corresponding author

E-mail: wmxlj@126.com (Liuji Xu)

hnwsz@126.com (Shizhong Wei)

**ABSTRACT:** The tungsten alloys reinforced by ZrO<sub>2</sub> were prepared using azeotropic distillation method combined with powder metallurgy method, and then the sintered tungsten alloys were swaged to obtain compact bars. The microstructures of W-xZrO<sub>2</sub> (x = 0, 0.25, 1.0 and 1.5 wt%) alloys were investigated by means of SEM, XRD and TEM. The results show that ZrO<sub>2</sub> exist as a stable cubic phase in tungsten alloys by adding Y<sub>2</sub>O<sub>3</sub>. Fine ZrO<sub>2</sub> particles (500~800 nm) are dispersed in the tungsten matrix, and thus refine the grain size and improve the physical properties and strength of tungsten alloys. With the increase of the ZrO<sub>2</sub> content, the relative density, hardness and compressive strength of tungsten alloys were all increased. The swaged W-1.5 wt%ZrO<sub>2</sub> alloy shows the finest microstructure with an average grain size of 47.18 μm, reducing 34.76% compared with that of pure tungsten. And thus, the swaged W-1.5 wt%ZrO<sub>2</sub> alloy achieves the highest compressive strength (1941.3 MPa) and failure strain (23.1%) at the same time, increasing 23.27% and 22.37%, respectively, compared with that of pure tungsten.

**KEY WORD:** tungsten alloy; ZrO<sub>2</sub>; grain size; hardness; compressive strength; failure strain

## 1. Introduction

Tungsten and its alloys have a wide range of applications in the fields of national defense, medical treatment, aerospace and other high-tech fields. It can be used to make mould, armor,

Download English Version:

<https://daneshyari.com/en/article/7990063>

Download Persian Version:

<https://daneshyari.com/article/7990063>

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