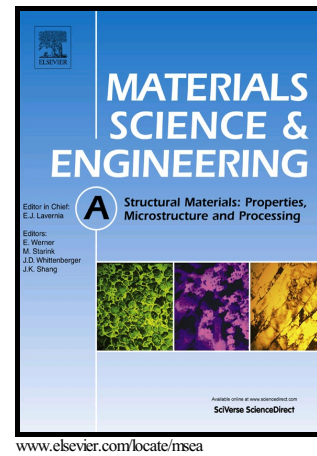


Author's Accepted Manuscript

The introduction of highly dense shear bands and their effect on plastic deformation in Zr and Cu-based bulk metallic glasses

Bo Shi, Fuan Wei, Chao Li, Jiangong Li



PII: S0921-5093(17)30491-4
DOI: <http://dx.doi.org/10.1016/j.msea.2017.04.039>
Reference: MSA34940

To appear in: *Materials Science & Engineering A*

Received date: 26 January 2017
Revised date: 23 March 2017
Accepted date: 10 April 2017

Cite this article as: Bo Shi, Fuan Wei, Chao Li and Jiangong Li, The introduction of highly dense shear bands and their effect on plastic deformation in Zr and Cu based bulk metallic glasses, *Materials Science & Engineering A* <http://dx.doi.org/10.1016/j.msea.2017.04.039>

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.

The introduction of highly dense shear bands and their effect on plastic deformation in Zr and Cu-based bulk metallic glasses

Bo Shi^{a,b,*}, Fuan Wei^b, Chao Li^a, Jiangong Li^{a*}

^a Institute of Materials Science and Engineering, Lanzhou University, Lanzhou 730000, China

^b Qinghai Provincial Key Laboratory of New Light Alloys, School of Mechanical Engineering, Qinghai University, Xining 810016, China

shibo05@126.com (B. S.)

lijg@lzu.edu.cn (J. L.)

*Corresponding authors. Fax: +86-931-8910364.

Abstract

The plastic deformation of the $\text{Zr}_{64.13}\text{Cu}_{15.75}\text{Ni}_{10.12}\text{Al}_{10}$ and $\text{Cu}_{60}\text{Zr}_{30}\text{Ti}_{10}$ bulk metallic glasses (BMGs) with arc-shaped edges were performed by compression. Highly dense shear bands with an average spacing of 520 nm are uniformly distributed in a large area in $\text{Zr}_{64.13}\text{Cu}_{15.75}\text{Ni}_{10.12}\text{Al}_{10}$ BMG, and the shear band spacing can be reduced to a minimum value of about 110 nm. In the region adjacent to the dense shear bands zone in $\text{Zr}_{64.13}\text{Cu}_{15.75}\text{Ni}_{10.12}\text{Al}_{10}$ BMG, the shear band spacing increases linearly. Similarly, highly dense shear bands were also introduced into $\text{Cu}_{60}\text{Zr}_{30}\text{Ti}_{10}$ BMG. When the width of stress concentration zone is of the order of plastic zone size ahead of crack tip, the internal and external stress limitations can lead to the formation of a large number of uniformly-distributed shear bands. In addition, the pre-existing dense shear bands can lead to a non-localized plastic deformation manner for deformed $\text{Zr}_{64.13}\text{Cu}_{15.75}\text{Ni}_{10.12}\text{Al}_{10}$ BMG.

Download English Version:

<https://daneshyari.com/en/article/5455722>

Download Persian Version:

<https://daneshyari.com/article/5455722>

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