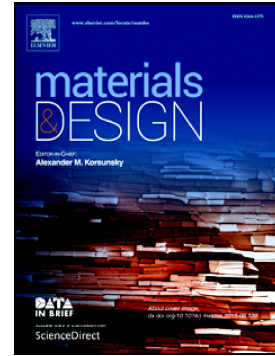


Accepted Manuscript

Improving the strength and retaining the ductility of microstructural graded coarse-grained materials with low stacking fault energy

Ji Gu, Lixin Zhang, Yahui Tang, Min Song, Song Ni, Xianghai An, Yong Du, Zhou Li, Xiaozhou Liao



PII: S0264-1275(18)30675-0
DOI: doi:[10.1016/j.matdes.2018.08.057](https://doi.org/10.1016/j.matdes.2018.08.057)
Reference: JMADE 7355
To appear in: *Materials & Design*
Received date: 10 May 2018
Revised date: 15 July 2018
Accepted date: 28 August 2018

Please cite this article as: Ji Gu, Lixin Zhang, Yahui Tang, Min Song, Song Ni, Xianghai An, Yong Du, Zhou Li, Xiaozhou Liao , Improving the strength and retaining the ductility of microstructural graded coarse-grained materials with low stacking fault energy. *Jmade* (2018), doi:[10.1016/j.matdes.2018.08.057](https://doi.org/10.1016/j.matdes.2018.08.057)

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.

Improving the strength and retaining the ductility of microstructural graded coarse-grained materials with low stacking fault energy

Ji Gu ¹, Lixin Zhang ¹, Yahui Tang ¹, Min Song ^{1,*}, Song Ni ¹, Xianghai An ², Yong Du ¹,

Zhou Li ¹, Xiaozhou Liao ^{2,*}

¹ State Key Laboratory of Powder Metallurgy, Central South University, Changsha 410083, P.R. China

² School of Aerospace, Mechanical and Mechatronic Engineering, The University of Sydney, Sydney, 2006, NSW, Australia

Abstract

Gradient structures were introduced via torsional treatment to Cu and Cu-Al alloys with different starting grain sizes and stacking fault energies (SFEs). Systematic investigations showed that the original grain sizes and SFEs of these materials play vital roles in affecting the formation of gradient structures and their corresponding mechanical properties. Large grain size and relatively low SFE are two critical requirements for the formation of the optimum gradient structure. A superior combination of high strength and good ductility can be achieved by torsional treatment in ultra-coarse-grained materials with low SFEs, which is attributed to the hierarchical structures that led to the simultaneous activations of different deformation mechanisms from full dislocation activities to partial dislocation slip and nano-twinning along the radial direction.

Keywords: Gradient structure; Strength; Ductility; Twinning; Stacking fault energy

*Corresponding authors.

Email addresses: msong@csu.edu.cn (M. Song); xiaozhou.liao@sydney.edu.au (X. Liao)

Download English Version:

<https://daneshyari.com/en/article/8960610>

Download Persian Version:

<https://daneshyari.com/article/8960610>

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