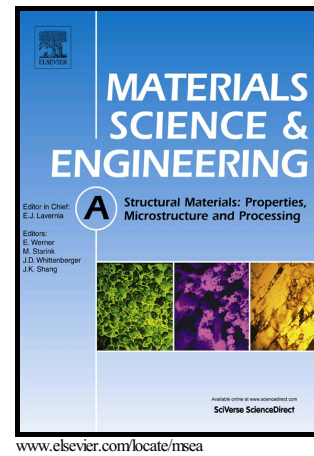


Author's Accepted Manuscript

Selection of grain-boundary segregation elements for achieving stable and strong nanocrystalline Mg

X.C. Cai, B.R. Sun, Y. Liu, N. Zhang, J.H. Zhang, H. Yu, J.Y. Huang, Q.M. Peng, T.D. Shen



PII: S0921-5093(18)30076-5
DOI: <https://doi.org/10.1016/j.msea.2018.01.058>
Reference: MSA36012

To appear in: *Materials Science & Engineering A*

Received date: 26 June 2017
Revised date: 13 January 2018
Accepted date: 15 January 2018

Cite this article as: X.C. Cai, B.R. Sun, Y. Liu, N. Zhang, J.H. Zhang, H. Yu, J.Y. Huang, Q.M. Peng and T.D. Shen, Selection of grain-boundary segregation elements for achieving stable and strong nanocrystalline Mg, *Materials Science & Engineering A*, <https://doi.org/10.1016/j.msea.2018.01.058>

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 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.

Selection of grain-boundary segregation elements for achieving stable and strong nanocrystalline Mg

X. C. Cai ^{a,b}, B. R. Sun ^a, Y. Liu ^b, N. Zhang ^a, J. H. Zhang ^c, H. Yu ^d, J. Y. Huang ^a, Q. M. Peng ^a, and T. D. Shen ^{a,*}

^a *State Key Laboratory of Metastable Materials Science and Technology, Yanshan University, Qinhuangdao 066004, PR China*

^b *School of Science, Yanshan University, Qinhuangdao 066004, PR China*

^c *Key Laboratory of Superlight Materials & Surface Technology, Ministry of Education, Harbin Engineering University, Harbin 150001, PR China*

^d *School of Materials Science and Engineering, Hebei University of Technology, Tianjin 300130, PR China*

ABSTRACT: Nanocrystalline metals, e.g., Mg, are often strong but with a low thermal stability. In this study, six solute elements, Ti, Zr, Ta, Co, Cr, La, which are immiscible in Mg under equilibrium conditions, are mechanically alloyed with Mg to study the extension of solid solubility, the thermal stability and the mechanical properties of nanocrystalline Mg. Extended solid solubility of Ti and Zr solutes in Mg matrix is achieved after mechanical alloying. The nanocrystalline Mg is largely stabilized by Ti, moderately stabilized by Zr, and not stabilized by Ta, Co, Cr and La. The onset temperature for a rapid grain growth increases from 100 °C (0.4 T_m) for nanocrystalline Mg to ~ 350 °C (0.68 T_m) for nanocrystalline Mg_{0.95}Ti_{0.05} (defined as Mg-5Ti). A relatively small grain size of ~ 145 nm is achieved in Mg-5Ti at 350 °C. The enhanced

Download English Version:

<https://daneshyari.com/en/article/7973402>

Download Persian Version:

<https://daneshyari.com/article/7973402>

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