

Philosophical Magazine > Volume 88, 2008 - Issue 7

2,758 179 0

Views CrossRef citations to date Altmetric

**Original Articles** 

# Strain hardening behaviour and the Taylor factor of pure magnesium

C.H. Cáceres \square & P. Lukáč

Pages 977-989 | Received 15 Nov 2007, Accepted 05 Feb 2008, Published online: 17 Aug 2009



Full Article

Figures & data

References

**66** Citations

**Metrics** 

➡ Reprints & Permissions

Read this article

### **Abstract**

Taylor orientation factors for strain hardening in textured and random polycrystals of magnesium were derived from the ratio of the strain hardening rates of polycrystals to that of single crystals deforming by equivalent polyslip. For polycrystals with textures that inhibit basal and prismatic slip while favouring pyramidal polyslip, the Taylor factor is estimated to be between 2.1 and 2.5, increasing to about 4.5 for randomly textured polycrystals. The micromechanics of strain hardening in polycrystals are discussed.

**Q** Keywor

## About Cookies On This Site

We and our partners use cookies to enhance your website experience, learn how our site is used, offer personalised features, measure the effectiveness of our services, and tailor content and ads to your interests while you navigate on the web or interact with us across devices. You can choose to accept all of these cookies or only essential cookies. To learn more or manage your preferences, click "Settings". For further information about the data we collect from you, please see our **Privacy Policy** 

Settings

Accept All

Essential Onliticle

One of t

Czech

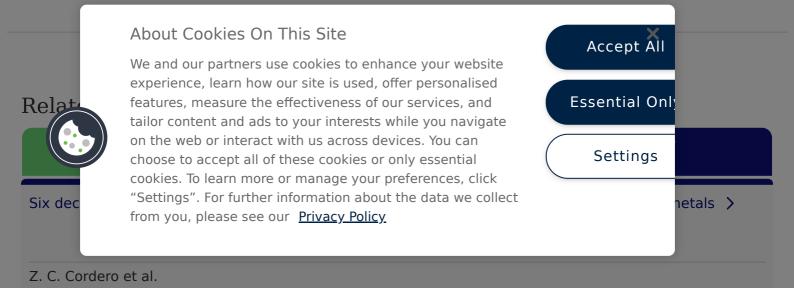
Republic for financial support under the research project MSM 1M2500471001. The

authors are indebted to Sean Agnew from the University of Virginia for encouragement and critical comments on the manuscript. Useful criticism from the journal's reviewers is gratefully acknowledged.

# Notes

#### **Notes**

- 1. Kelley and Hosford <u>13</u> showed that the yield surface of textured polycrystals of pure Mg is highly non-equiaxed due to the stress asymmetry of twinning; however, it takes a nearly equiaxed shape after the first 6-8% strain, once twinning is over.
- 2. Preserving the yield surface's initial shape requires strain hardening proportional to the current flow stress, an assumption which is not easy to justify by dislocation theory <u>3</u>.
- 3. The scales in Figures 1 through 4 are related by the Taylor factors M  $_{\sigma}$  = M  $_{\epsilon}$  = 4.5. A higher or lower M value, respectively, decreases or increases the relative slope of the polycrystal curves.
- 4. It is noted that Graff et al.'s modelling <u>17</u> ignored possible contributions from twinning modes other than . More complex modes of twinning are known to become active at high stresses in Mg, and were indeed observed by Kelley and Hosford in their experiments <u>13</u>, so the picture presented by Figure 5 is likely to be over-simplistic at very large strains.
- 5.  $\langle c + a \rangle$  slip is similar to an octahedral slip system,  $\{111\}\langle 111 \rangle$  in a cubic crystal <u>47</u>, and contains five independent slip systems.



International Materials Reviews Published online: 5 Jul 2016

The deformation of plastically non-homogeneous materials >

M. F. Ashby

The Philosophical Magazine: A Journal of Theoretical Experimental and Applied Physics

Published online: 13 Sep 2006

Back stress strengthening and strain hardening in gradient structure >

Muxin Yang et al.

Materials Research Letters Published online: 2 Mar 2016

View more

#### About Cookies On This Site



We and our partners use cookies to enhance your website experience, learn how our site is used, offer personalised features, measure the effectiveness of our services, and tailor content and ads to your interests while you navigate on the web or interact with us across devices. You can choose to accept all of these cookies or only essential cookies. To learn more or manage your preferences, click "Settings". For further information about the data we collect from you, please see our <a href="Privacy Policy">Privacy Policy</a>

Accept All

Essential Onl

Settings

Information for

**Authors** 

**R&D** professionals

**Editors** 

Librarians

Societies

Opportunities

Reprints and e-prints

Advertising solutions

Accelerated publication

Corporate access solutions

Open access

Overview

Open journals

**Open Select** 

**Dove Medical Press** 

F1000Research

Help and information

Help and contact

Newsroom

All journals

Books

#### Keep up to date

Register to receive personalised research and resources by email



Sign me up











Copyright © 2024 Informa UK Limited Privacy policy Cookies Terms & conditions

Taylor & Francis Group an informa business

Accessibility

Registered in England & Wales No. 3099067 5 Howick Place | London | SW1P 1WG

#### About Cookies On This Site



We and our partners use cookies to enhance your website experience, learn how our site is used, offer personalised features, measure the effectiveness of our services, and tailor content and ads to your interests while you navigate on the web or interact with us across devices. You can choose to accept all of these cookies or only essential cookies. To learn more or manage your preferences, click "Settings". For further information about the data we collect from you, please see our <a href="Privacy Policy">Privacy Policy</a>



Essential Onl

Settings