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Original Articles

Strain hardening behaviour and the Taylor factor of pure magnesium

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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

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Republic for financial support under the research project MSM 1M2560471601. 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



Source: Elsevier BV

Pair interaction of pyramidal dislocations and its contribution to flow stresses in Mg crystals during slip in system {1122}

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Application of texture simulation to understanding mechanical behavior of Mg and solid solution alloys containing Li or Y

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Texture Evolution and Ultrafine Grain Formation in Cross-Cryo-Rolled Zircaloy-2

Source: Springer Science and Business Media LLC

Microscopic observations of glide in non close-packed planes in aluminium, and comparison with magnesium

Source: Elsevier BV

The Influence of Temperature and Strain Rate on the Flow Stress of Magnesium Single

Crystals

Source: CSIRO Publishing

The deformation of magnesium single crystals

Source: Informa UK Limited

Electron-microscopic Investigation of Low Temperature Work Hardening of Mg Single

Crystals

Source: Elsevier

The relation between polycrystal deformation and single-crystal deformation

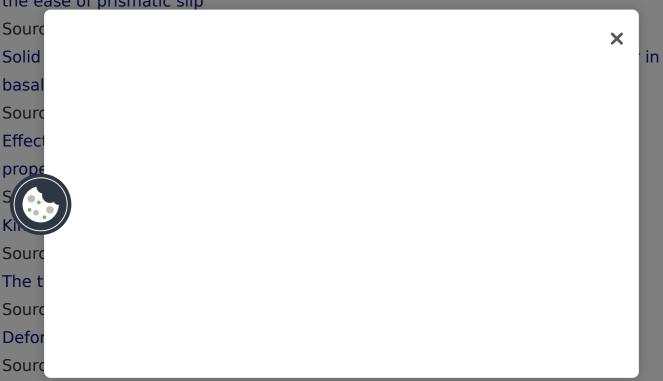
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Polyslip in polycrystals

Source: Elsevier BV

Solid solution strengthening of magnesium single crystals—ii the effect of solute on

the ease of prismatic slip



Microstructure evolution under compressive plastic deformation of magnesium at different temperatures and strain rates

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The plastic deformation of polycrystalline aggregates

Source: Informa UK Limited

Substitutional solution hardening of magnesium single crystals

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Effect of temperature and shear direction on yield stress by {11 \$\$\bar 2\$\$ 2}

\$\$\overline {11} \$\$ 23\| slip in HCP metals 23\| slip in HCP metals

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The crystallography and deformation modes of hexagonal close-packed metals

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The yield surface of h.c.p. crystals

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structure and mechanical properties

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Effects of pressure and aging treatment on microstructures and mechanical properties

of rheo-squeeze casting Mg-3Nd-0.2Zn-0.4Zr alloy

Source: Cambridge University Press (CUP)

Multi-pass submerged friction stir processing of AZ61 magnesium alloy: strengthening

mechanisms and fracture behavior

Source: Springer Science and Business Media LLC

On the strain hardening behaviour of magnesium at room temperature



Self-consistent modelling of the plastic deformation of F.C.C. polycrystals and its implications for diffraction measurements of internal stresses

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Taylor factors in materials with many deformation modes

Source: Elsevier BV

Physics and phenomenology of strain hardening: the FCC case

Source: Elsevier BV

Advancing towards constitutive equations for the metal industry via the LEDS theory

Source: Springer Science and Business Media LLC

Polyslip in single crystals

Source: Elsevier BV

Effect of "Forest" Dislocations in the {1122} []1123[] system on hardening in Mg single

crystals under basal slip

Source: Wiley

{1122} [1123 [] Slip system in magnesium

Source: Elsevier BV

Validating a polycrystal model for the elastoplastic response of magnesium alloy AZ31

using in situ neutron diffraction

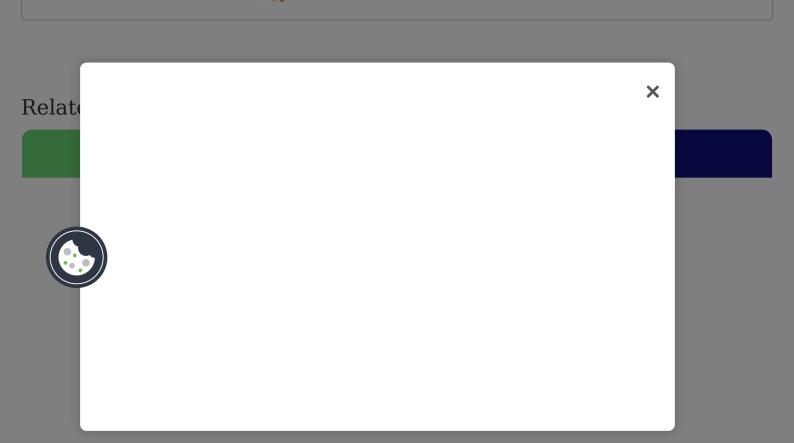
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