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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 that of s h textures that inhi Taylor factor is estima ly textured polycrys cussed.

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Notes

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1. Kelley and Hosford 13 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 3.

3. The scales in Figures 1 through 4 are related by the Taylor factors $M_{\sigma} = M_{\varepsilon} = 4.5$. 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 17 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 13, so the picture presented by Figure 5 is likely to be over-simplistic at very larg

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polycrystalline magnesium

Source: Elsevier BV

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

Source: Elsevier BV

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

Source: Elsevier BV

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

Source: Springer Science and Business Media LLC

Polyslip in polycrystals

Source: Elsevier BV

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

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Microstructure evolution under compressive plastic deformation of magnesium at different temperatures and strain rates
Source: Elsevier BV
The plastic deformation of polycrystalline aggregates
Source: Informa UK Limited
Substitutional solution hardening of magnesium single crystals
Source: Informa UK Limited
Effect of temperature and shear direction on yield stress by {11 $$\bar 2$$ 2} $$\overline {11} $$ 23 slip in HCP metals23 slip in HCP metals
Source: Springer Science and Business Media LLC
The crystallography and deformation modes of hexagonal close-packed metals
Source: Informa UK Limited
Anisotropic Mechanical Behavior of Additive Manufactured AISI 316L Steel
Source: Springer Science and Business Media LLC
The yield surface of h.c.p. crystals
Source: Elsevier BV
Development of gradient concentrated single phase fine Mg-Zn particles and effect on structure and mechanical properties
Source: ASME International
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
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Self-consistent modelling of the plastic deformation of F.C.C. polycrystals and its implications for diffraction measurements of internal stresses
Source: Elsevier BV
Taylor factors in materials with many deformation modes
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Physics and phenomenology of strain hardening: the FCC case
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Advancing towards constitutive equations for the metal industry via the LEDS theory
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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
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Validating a polycrystal model for the elastoplastic response of magnesium alloy AZ31 using in situ neutron diffraction
Source: Elsevier BV
The activity of non-basal slip systems and dynamic recovery at room temperature in fine-grained AZ31B magnesium alloys
Source: Elsevier BV

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