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Strain hardening behaviour and the Taylor factor of pure magnesium

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

 Cite this article  <https://doi.org/10.1080/14786430801968611>

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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... with textures
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Acknowledgements

One of the authors (P. Lukáč) was supported by the Czech 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 [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 $\{10\bar{1}2\}$. 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 large strains.
5. $\langle c + a \rangle$ slip is not active in the polycrystal [47](#), and contributes little to the overall deformation.



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