

Mechanical Properties of Ultrafine-Grained Metals: New Challenges and Perspectives

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Abstract

© 2015 Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim. Investigations of the behavior of ultrafine-grained (UFG) materials manufactured by severe plastic deformation (SPD) have been greatly motivated by the expectations that they may have unique properties as well as by the desire to understand the fundamental mechanisms underlying the specific properties associated with extreme grain refinement. Although the concurrent improvement of both strength and ductility is possible via SPD, the most commonly observed high strength of UFG materials is paired with a very limited uniform elongation. Based on the dislocation kinetics and its relation with the Considère instability, an attempt is made to provide a unified view for the hardening behaviour and early macroscopic strain localization.

<http://dx.doi.org/10.1002/adem.201500177>
