



Structures and Strength of Gradient Nanostructures

Hansen, Niels; Zhang, Xiaodan; Huang, Xiaoxu

Publication date:
2016

Document Version
Peer reviewed version

[Link back to DTU Orbit](#)

Citation (APA):

Hansen, N., Zhang, X., & Huang, X. (2016). *Structures and Strength of Gradient Nanostructures*. Abstract from TMS 2016: 145th Annual Meeting and Exhibition, Nashville, Tennessee, United States.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Structures and Strength of Gradient Nanostructures

Niels Hansen, Xiaodan Zhang, Xiaoxu Huang

A recent study [1] has shown that a microstructure can be refined to a record low of 5 nm and that dislocation glide is still a controlling mechanism at this length scale. The nanostructure was produced in Cu by applying a very high strain in friction. The stress and strain decrease with increasing distance from the surface forming a gradient structure. In this study [2], by shot peening of a low carbon steel a gradient structure has been produced extending to about 1 mm below the surface. A number of strengthening mechanisms have been analyzed as a basis for a calculation of the stress and strain as a function of the distance from the surface. The results are evaluated by a finite element investigation of shot peening.

[1] D. A. Hughes and N. Hansen, Exploring the Limit of Dislocation Based Plasticity in Nanostructured Metals, PRL 112, 135504 (2014).

[2] X. Zhang, N. Hansen, Y. Gao, X. Huang, Hall–Petch and dislocation strengthening in graded nanostructured steel, Acta mater. 60, 5933-43 (2012).