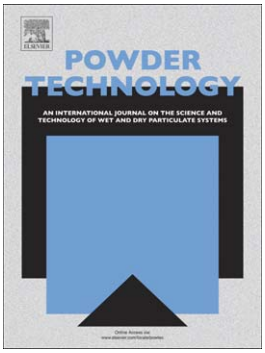

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PII: S0032-5910(17)30939-7
DOI: doi:10.1016/j.powtec.2017.11.059
Reference: PTEC 12978

To appear in: *Powder Technology*

Received date: 2 August 2017
Revised date: 1 October 2017
Accepted date: 26 November 2017

Please cite this article as: Z.M. Wu, Y.X. Liang, E.G. Fu, J.L. Du, P.P. Wang, The process and mechanisms for the transformation of coarse grain to nanoscale grain in tungsten by ball milling, *Powder Technology* (2017), doi:10.1016/j.powtec.2017.11.059

The process and mechanisms for the transformation of coarse grain to nanoscale grain in tungsten by ball milling

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Abstract

Pure tungsten powder with coarse grain was ball milled to obtain nanocrystalline tungsten powder. The morphology and microstructure were characterized by X-ray diffraction (XRD) and transmission electron microscope (TEM) for investigating the process of refinement. Results revealed that the powder grain refinement process in terms of the grain morphology and microstructure includes four stages, and three kinds of grains with different grain size and structure were observed through the deformation of tungsten powder and the interaction and accumulation of dislocations. The minimum grain size of 5 nm of tungsten powder was fabricated. The possible mechanism of nanocrystalline tungsten formation process through ball milling was discussed.

Keywords:

Nanocrystalline tungsten, Ball milling, Refinement, Dislocation, Minimum grain