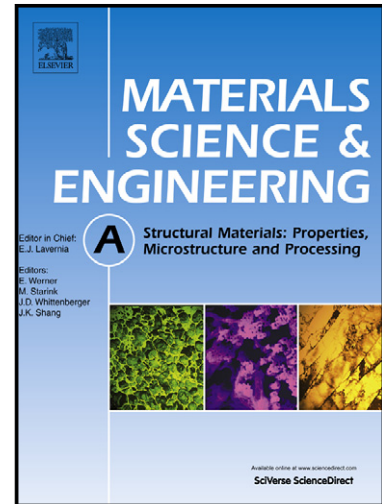


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Microstructure, texture and mechanical properties of cyclic expansion-extrusion deformed pure copper

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Abstract

A recently developed severe plastic deformation technique, cyclic expansion-extrusion (CEE), was applied on a commercial pure copper to investigate the relationship between microstructure, texture and mechanical properties over a wide range of strains. Microstructure and crystallographic texture investigations were performed by optical microscopy, electron back scattering and X-ray diffraction. Significant evolution in grain refinement was achieved down to sub-micron grain size. A considerable texture evolution was also observed within the deformation zone with the extrusion as the decisive step for the final texture. Fiber deformation textures were observed; the <111> component was found to be the main texture component while the <100> component became significant only at very large strains. The evolution in hardness and tensile properties was studied and a clear relationship between texture evolution, microstructural parameters and mechanical properties was found and discussed.

Keywords

Severe plastic deformation; Cyclic expansion-extrusion; Copper; EBSD; Texture; Mechanical properties

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