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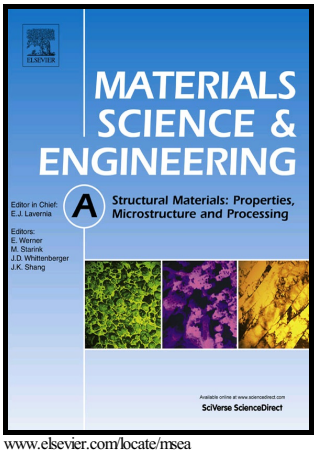

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Microstructural evolution and micro/meso-deformation behavior in pure copper processed by equal-channel angular pressing

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Abstract

Pure copper was processed by equal channel angular pressing (ECAP) using route Bc with a die channel angle of 110^{o}. Electron back scattered diffraction (EBSD) and transmission electron microscopy (TEM) were used to analyze the microstructure and texture during ECAP processing and after combining ECAP with micro-compression. Ultrafine-grained pure copper with an average grain size of ~0.5 μm was achieved after ECAP processing through 12 passes. The anisotropic behavior during micro-compression is caused by the micro-texture of pure copper introduced by ECAP processing. Three kinds of strain softening behaviors are found during micro-compression tests in pure copper processed by ECAP. The strain softening of micro/meso deformation in UFG pure copper is caused by the accelerated dislocations annihilation due to the high dislocation recoveries at HAGBs, which is consistent with the deformation mechanism of grain boundary sliding and grain rotation.

Keywords: microstructure; strain softening; micro/meso-deformation; ultrafine grains; copper

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