

Effect of revolutions number on mechanical properties of HPT processed copper

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Abstract:

This paper studies the effect of high-pressure torsion (HPT) method at ambient temperature on mechanical properties of material. The aim is to compare copper subjected to HPT for 2, 10 and 30-revolutions with coarse grain structured copper in a cold-rolled state. Miniaturized tensile tests were performed to evaluate anisotropy of mechanical properties within a disc product of HPT process. Also the strain rate sensitivity was examined. The results of mechanical tests demonstrate that increasing shear strain leads to ultra-fine grain structure (UFG) which resulted in increasing of material strength. The plasticity of material decreases correspondingly to that. With respect to character of HPT process, discs are known as non-homogenous products, where shear strain effect increases in radial direction from the centre section to the edge. Results show that with different number of HPT revolutions the anisotropy of mechanical behaviour is changing. With increasing number of revolutions the anisotropy within a single disc is increasing.

Key words:

SPD, HPT, Ultrafine-grained Structure, Miniaturized Tensile Test