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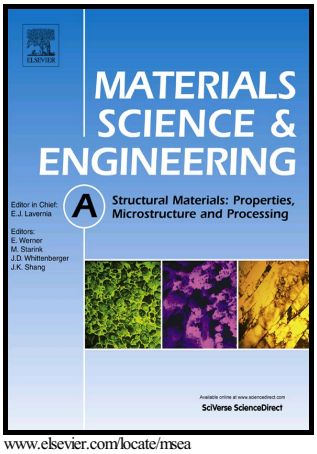

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A new method for severe plastic deformation of the copper sheets

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Abstract

A new severe plastic deformation technique, named "constrained studded pressing" (CSP), was developed for the production of plate-shaped ultrafine grain metals without changing their initial dimensions. In the CSP method, the material is subjected to the repetitive shear deformation by dies with two orthogonal grooves then becomes flat. The repetitive shear deformation and flattening done by constrained-blocks. Calculations showed that the effective strain for the CSP method is more than the CGP (constrained groove pressing) method. The microstructure and the mechanical properties of the CSPed samples investigated by scanning electron microscopy (SEM) and tensile test, respectively. SEM observations showed that the CSP method as the other repetitive corrugation and straightening (RCS) methods is a useful method to refine the grain size. Mechanical properties investigations indicate that the ductility of the samples produced by the CSP method is more than CGPed on, while the ultimate tensile strength of them is approximately the same.

Keywords: Severe plastic deformation; Constrained Studded Pressing; Ductility; Tensile Strength; Toughness; Copper.