

CRYOGENIC SEVERE PLASTIC DEFORMATION ON AA6061 AL ALLOY: MICROSTRUCTURE AND TENSILE PROPERTIES

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Severe Plastic Deformation (SPD) processes combined with cryogenic deformation temperatures can be an efficient way to obtain metals and alloys with very refined microstructure, and thus optimize the strength-ductility pair. However, there is still a lack of studies on cryogenic SPD processes and their effects on microstructure and mechanical properties, especially in aluminum alloys. The aim of this study is to understand the effect of low temperature SPD-processing on microstructure, aging kinetic and tensile properties of Al alloys. Rods of an AA6061 Al alloy in solutionized state were processed by Equal-Channel Angular Pressing (ECAP) at 123 K, for six passes to accumulate true strains up to 4.2. Results indicated that at cryogenic temperature the aging kinetic is accelerated and the microstructure is more refined. In addition, under optimal processing conditions (cryo-ECAP plus T6 treatment), both strength and uniform elongation increases. It was demonstrated the potential of cryo-SPD for microstructure refining and tensile properties improvement of AA6061 alloy.