

## عنوان مقاله:

Investigating the Effects of Expansion Equal Channel Angular Extrusion (Exp-ECAE) on Dynamic Behavior of AA7075 Aluminum Alloy

## محل انتشار:

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## خلاصه مقاله:

Expansion equal channel angular extrusion (Exp-ECAE) is a severe plastic deformation (SPD) operation for processing bulk materials. In the current study, AA7075 Al was SPD-processed by expansion equal channel angular extrusion (Ex-ECAE) at various temperatures and ram velocities. Then, using split Hopkinson pressure bar (SHPB), the severely deformed products were compressed at room temperature and strain rates of  $0.1 \sim 3000 \text{ s}^{-1}$ . Both the strain rate sensitivity (SRS) and the apparent activation volume (AAV) were determined for all deformed samples. The results revealed that the Ex-ECAE operation has noticeably increased the SRS. The tensile strength at a strain rate of  $3000 \text{ s}^{-1}$  was 6 times increased by conducting Ex-ECAE at  $100^\circ \text{C}$  and with a ram velocity of  $7 \text{ mm/min}$ . Ex-ECAE was also capable of considerably decreasing the AAV. The results showed the yield stress of both the Exp-ECAE and the annealed samples increased with increasing the strain rate. Also, the results showed that after the Exp-ECAE process, the AAV reached to  $6.3 \text{ b}^3$  from the initial values of  $118.5 \text{ b}^3$  in the annealed state.

## کلمات کلیدی:

AA7075 Aluminum Alloy, Dynamic Behavior, Expansion Equal Channel Angular Extrusion, Hopkinson Pressure Bar, Severe Plastic Deformation

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