

The Effect of Deformation Activation Volume, Strain Rate Sensitivity and Processing Temperature of Grain Size Variants

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Abstract : The activation volume of 6082T6 aluminum is investigated at different temperatures on grain size variants. The deformation activation volume was computed on the basis of the relationship between the Boltzmann's constant k , the testing temperatures, the material strain rate sensitivity and the material yield stress of grain size variants. The material strain rate sensitivity is computed as a function of yield stress and strain rate of grain size variants. The effect of the material strain rate sensitivity and the deformation activation volume of 6082T6 aluminum at different temperatures of 3-D grain are discussed. It is shown that the strain rate sensitivities and activation volume are negative for the grain size variants during the deformation of nanostructured materials. It is also observed that the activation volume vary in different ways with the equivalent radius, semi minor axis radius, semi major axis radius and major axis radius. From the obtained results it is shown that the variation of activation volume increased and decreased with the testing temperature. It was revealed that, increased in strain rate sensitivity led to decrease in activation volume whereas increased in activation volume led to decrease in strain rate sensitivity.

Keywords : nanostructured materials, grain size variants, temperature, yield stress, strain rate sensitivity, activation volume

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