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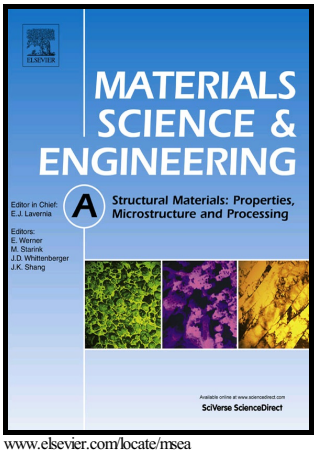

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Abstract

Microstructural evolution to ultrafine grains and consequently, enhancement of mechanical properties has been recently considered for tube formed specimens using various severe plastic deformation methods. In this research, Al-Zn-Mg-Cu tube was processed by the famous equal channel angular extrusion process using a polyurethane mandrel up to two passes at room temperature. Although strength and hardness of the aluminum tube are increased dramatically after the first pass, the aforementioned parameters are enhanced slightly during the second pass of the process. In addition, tube hardness uniformity is decreased remarkably by applying for the first pass and it is improved after the second pass. According to parameters of work-hardening behavior and formability, the flow stress rate of the aluminum tube is reduced by increasing the ECAE pass number. Microstructural analyses showed that low angle and straight grain boundaries of initial sample are transformed into the high angle wavy grain boundaries after introducing the second pass of the process.

Keywords: Equal channel angular extrusion; Al-Zn-Mg-Cu tube; Mechanical properties; Work-hardening capacity; Modified Crussard-Jaoul; Transmission electron microscopy.