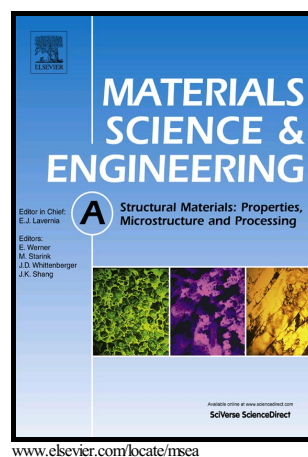


Study on the effect of post-annealing on the microstructural evolutions and mechanical properties of rolled CGPed Aluminium-Manganese-Silicon alloy

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Study on the effect of post-annealing on the microstructural evolutions and mechanical properties of rolled CGPed Aluminium-Manganese-Silicon alloy

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Abstract

Sheet specimens of Al-Mn-Si alloy were severe plastically deformed (SPDed) through constrained groove pressing (CGP). SPDing by the strain of 2.32, samples were ultimately undergone cold rolling and post-annealing, respectively. According to the optical microscopy observations, rolling changed the semi-elongated and wavy morphology achieved by CGP into lamellar structure. This was also promoted the formation of some shear and deformation bands within processed material matrix due to the geometrical effect of applied deformation path. Evolution of intermetallic particles were characterized using field emission scanning electron microscope (FE-SEM) equipped with energy dispersive spectrometer (EDS). Dual-strained sheets were finally annealed at 150, 250 and 350 °C for 1 h. Mechanical examinations including tension and hardness were performed at room temperature. Results alluded to the fact that samples were exhibited thermal stability up to around 250 °C since rolling reduction increment diminished this critical temperature to about 150 °C. Rolling of CGPed sheet by the strain of 1.27 enhanced the ultimate tensile strength and Vickers hardness by 53.62% and 16.53%, respectively, while the elongation to failure decreased by 1.84%. Eventually, the

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