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Analysis of influence of structure on mechanical properties of AlSiMg aluminium alloy processed by ECAP

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Microstructure and texture development of an AlSiMg alloy during equal channel angular pressing (ECAP) was investigated and correlated with the mechanical properties. The micro-structure was effectively refined by ECAP, and the original fibre texture of the extruded aluminium alloy was disintegrated and a new texture was gradually developed by repetitive ECAP pressing. After 6 ECAP passes following the route Bc, the yield stress was lower than that of the as-extruded aluminium alloy, indicating that the texture softening was dominant over the strengthening due to grain refinement. Cross-section of original samples was ϕ 12 mm and their length was 80 mm. Deformation forces were measured during extrusion, resistance to deformation was calculated and deformation speed was determined approximately. Analysis of structure was made with use of light microscopy, TEM and SEM. Mechanical properties of the samples after extrusion were determined by tensile test and by the so called penetration test.

Keywords: micro-structures, properties, aluminium alloy, ECAP

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