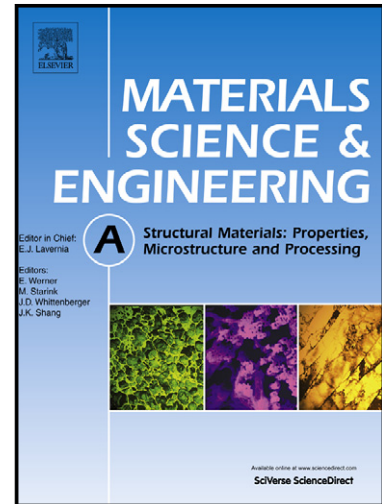


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The influence of heat treatments on the microstructure and the mechanical properties in commercial 7020 alloys

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Abstract

The influence of different heat treatments on the microstructure and hence the macroscopic properties of extruded commercial 7020 alloys is investigated. The development of the microstructure was analysed using a combination of optical microscopy and electron backscatter diffraction for analysing the grain morphology and texture. Furthermore scanning electron microscopy, transmission electron microscopy and three dimensional atom probe were applied to investigate the formation, morphology and chemical composition of the different precipitates. The microstructural conditions are correlated with the results of the compression and tensile test. The analyses by the three dimensional atom probe reveals that the Guinier-Preston zones in the commercial 7020 have the chemical composition Al_6MgZn with additional low Cu contents. The additional elements Fe, Mn and Cr do not have any influence of the chemical composition of the Guinier-Preston zones. Due to the different heat treatments changes in the size and distribution of the precipitates have been determined, which leads to remarkable differences in the mechanical properties. By combining the extrusion process and a dedicated artificial

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