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Plastic anisotropy and deformation behavior of extruded Mg-Y sheets at elevated temperatures

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Abstract:

The plastic anisotropy in terms of tensile mechanical properties and Lankford coefficient (r), and microstructure evolution of as-extruded Mg-1Y (wt. %) and Mg-5Y (wt. %) sheets along the extrusion direction (ED), transverse direction (TD), and diagonal direction (DD) were investigated in detail at temperatures between 25 °C (RT) and 300 °C. The sheets exhibited anisotropic deformation behaviors at lower temperatures, and nearly isotropic for Mg-5Y at 300 °C in these three directions. For both sheets, the ultimate tensile strength anisotropy (UA) and elongation anisotropy (EA) was not sensitive to the temperature, while the yield strength anisotropy (YA) decreased significantly from 49.1% and 40.2% at RT to 7.2% and 2.7% at 300 °C, respectively. The r values of Mg-1Y in all directions first increased from 0.66~1.4 (RT) to 0.81~1.98 (200 °C) then decreased to 0.67~1.56 (300 °C), while those of Mg-5Y decreased from 1.04~2.05 (RT) to 1.18~1.35 (300 °C) with increasing temperature. Few twins were observed in Mg-

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