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Twin-assisted precipitation during hot compression of an Mg-Gd-Zn-Zr magnesium alloy

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ABSTRACT

Dynamic precipitation in an Mg-Gd-Zn-Zr alloy during hot compression at 350°C and 450°C and at strain rates of 0.001-0.1 s⁻¹ is investigated. The deformation conditions were designed such as to promote twinning or slip of dislocations. The results indicated that both twinned and non-twinned grains were present at 350°C, with the extent being a function of the applied strain rate. The formation and propagation of {10 $\bar{1}$ 2}<1011> primary tensile twins within the twinned grains was identified as being at root of the *twin-assisted precipitation* phenomenon. The precipitates had spherical-morphology in the twinned grains whereas parallel arrays of rod-shaped precipitates formed in the non-twinned grains due to dynamic precipitation on the slip bands and the stacking faults. Twin-assisted precipitates were suppressed by increases in the strain rate at 350°C because of the shorter time required for solute element diffusion towards the nucleated precipitates at that temperature. Increasing the deformation temperature to 450°C changed the

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