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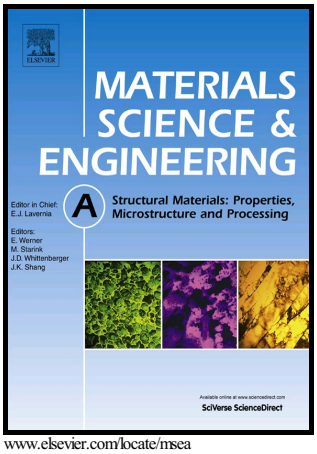

www.elsevier.com/locate/msea

PII: S0921-5093(17)31140-1
DOI: http://dx.doi.org/10.1016/j.msea.2017.08.112
Reference: MSA35460

To appear in: *Materials Science & Engineering A*

Received date: 25 May 2017
Revised date: 29 August 2017
Accepted date: 30 August 2017

Cite this article as: Mohammad Saadati, Rasoul Azari Khosroshahi, Golamreza Ebrahimi and Mohammad Jahazi, Twin-assisted precipitation during hot compression of an Mg-Gd-Zn-Zr magnesium alloy, *Materials Science & Engineering A,* http://dx.doi.org/10.1016/j.msea.2017.08.112

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℃ and 450℃ and at strain rates of 0.001-0.1s^{-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℃, with the extent being a function of the applied strain rate. The formation and propagation of $\{10\bar{1}2\}\langle\bar{1}011\rangle$ 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℃ because of the shorter time required for solute element diffusion towards the nucleated precipitates at that temperature. Increasing the deformation temperature to 450℃ changed the

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