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Plastic Deformation of Mg-Gd Solid Solutions between 4K and 298K

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Abstract : Deformation behavior of Mg-Gd solid solutions have been studied by a combination of measurements of mechanical response, texture and dislocation substructure. Increase in Gd content strongly influences the work-hardening behavior and flow characteristics in tension and compression. Adiabatic instabilities have been observed in all alloys at 4K under both tension and compression. The frequency and the amplitude of adiabatic stress oscillations increase with Gd content. Profuse mechanical twinning has been observed under compression, resulting in a texture dominated by basal component parallel to the compression axis. Under tension, twining is less active and the texture evolution is affected mostly by slip. Increasing Gd concentration leads to the reduction of the tension and compression asymmetry due to weakening of the texture and stabilizing more homogenous twinning and slip, involving basal and non-basal slip systems.

Keywords : Mg-Gd alloys, mechanical properties, work hardening, twinning
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