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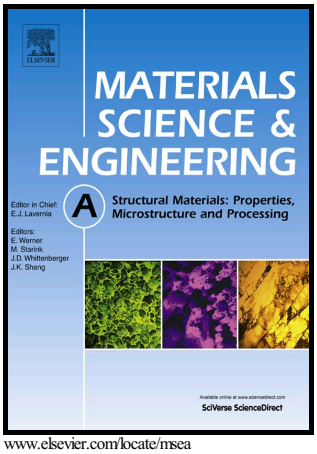


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# Effects of calcium on the activity of slip systems in AZ31 magnesium alloy

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**Abstract**

Magnesium is the lightest structural material, but its applications are very limited due to the intrinsic brittleness, which is attributed to the limited number of independent slip systems available at room-temperature. In the present study, accordingly, we investigated the effect of 0.5 wt.% Ca addition on the activity of slip systems in AZ31 magnesium alloy (AZ31-0.5Ca). For this purpose, polycrystal plasticity simulation based on viscoplastic self-consistent model was used to simulate the texture of AZ31 alloys (with and without Ca) at 10% tensile deformation, and hence, to predict the relative activities of various slip systems in both alloys. The results confirmed that prismatic <a> slip is the dominated deformation system in AZ31-0.5Ca, leading to a higher ductility as compared to the AZ31 alloy. This, in turn, was attributed to the formation of $(Mg,Al)_2Ca$ intermetallic compound due to the Ca addition, as found by microstructural observations using scanning electron microscopy.