Extension twin variant selection during uniaxial compression of a magnesium alloy

Samples of the magnesium alloy AZ31 have been deformed by compression to strains of 5% and 10% and microstructural observations made to investigate the activation of specific \(\{1 0 1\bar{2}\}\) extension twin variants. The twinning has been analyzed on a grain-by-grain basis for more than 260 grains to determine both the number of extension twin variants in each grain, and the volume fraction of each. At 5% strain approx. 30% of the grains contain twins corresponding to variants with the third or lower ranked Schmid factor, with the fraction increasing to 40% after 10% compression. A grain size effect is also observed in that smaller grains are less likely to contain lower ranked twin variants. For both 5% and 10% compression no clear relationship exists between the volume fraction of each twin variant in a given grain population and the Schmid factor for the twin variant. A positive linear relationship can be defined, however, between the maximum twinning fraction that a twin variant can reach and its Schmid factor.

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