

Séminaire LEM3
29 mars 2010
Lundi 10H
Salle FERRARI

Variant Selection during Secondary Twinning in Mg -3% Al

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ABSTRACT

Secondary twin formation during the tensile deformation of Mg-3.4%Al-0.33%Mn was studied by means of the electron backscatter diffraction technique. These were employed to identify the particular variants that formed in each grain. For this purpose, the variants were characterized with respect to the orientation of the parent grain rather than of its host primary twin. This approach led to a regrouping of the 36 possible variants into 4 sets, namely the SA, SB, SC and SD, consisting of variants that are geometrically equivalent. A statistical analysis revealed that the observed secondary twins were almost entirely of the SA and SD types (misorientations of 37.5° and 69.9°, respectively). The former variant is shown to require the least accommodation strain within the parent grain and to have the greatest potential for growth. Formation of the SD variant on the other hand can be attributed to it being favored by the highest resolved shear stresses; i.e. it obeys Schmid's law.