TEM IN-SITU DEFORMATION OF MGNESIUM-YITTRIUM ALLOYS

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Yttrium (Y) addition is known to be effective in enhancing the formability of magnesium (Mg) alloys by reducing the plasticity anisotropy of the hexagonal crystal, viz. improving the ease of <c+a> dislocation slip in relation to the <a> dislocation slip. In this work, in-situ TEM compression test has been carried out to observe the nucleation and movement of <c+a> dislocations in two Mg-Y binary alloys with different Y contents (0.4 wt.%Y versus 4 wt.%Y). The results have shown (Figure 1) that in the Mg-0.4Y alloy, the edge segments of <c+a> dislocations are sessile. The increased Y content in the Mg-4Y alloy has shown (Figure 2) to increase the <c+a> dislocation mobility and the cross-slip propensity. The results will be discussed with computer simulation results published.

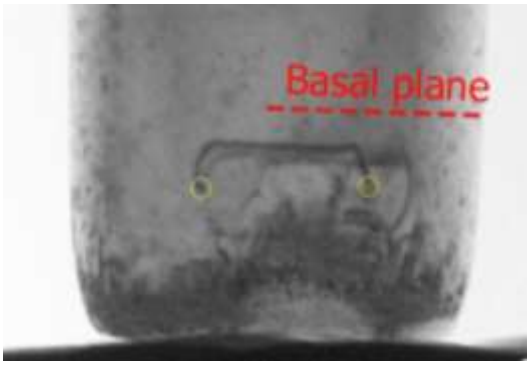

Figure 1 – A snapshot showing <c+a> dislocations in Mg-0.4Y alloy. The long edge segments along the basal plane trace can be observed.

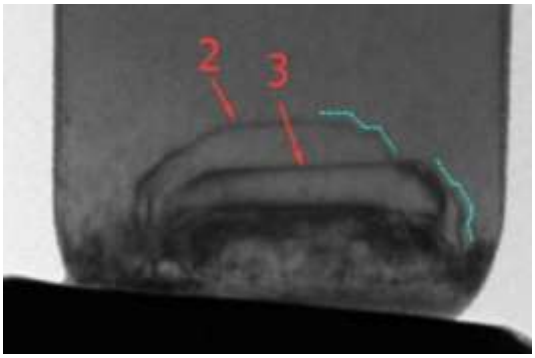

Figure 2 – A snapshot showing <c+a> dislocations in Mg-4Y alloy. The edge segments are less linear decorated with multiple cusps.