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An in situ study of deformation mechanisms in AZ31 and WE43 Mg alloy at elevated temperatures

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The present study examines the deformation mechanisms of AZ31 and WE43 magnesium alloys at elevated temperatures (200 °C for AZ31 and 250 °C for WE43) using *in situ* tensile testing within a scanning electron microscope. The plastic strain field of the alloys has been captured at the sub-grain scale via high resolution digital image correlation (DIC) coupled with electron backscattered diffraction during incremental straining to large strains. For the AZ31, the plastic deformation was largely accommodated by grain boundary (GB) movement and sliding, causing the rotation, formation and break up of grains, whereas dislocation slip was dominant for WE43. A little twinning occurred for the WE43, and curved slip was also observed due to the pinning effect of precipitates. Further according to the slip analysis, <a> type basal slip was observed for the AZ31 while <a> type basal and prismatic, and <c+a> type pyramidal slip were identified for the WE43.

Keywords: Image processing, Plasticity, Slip, Strain, Strengthening.

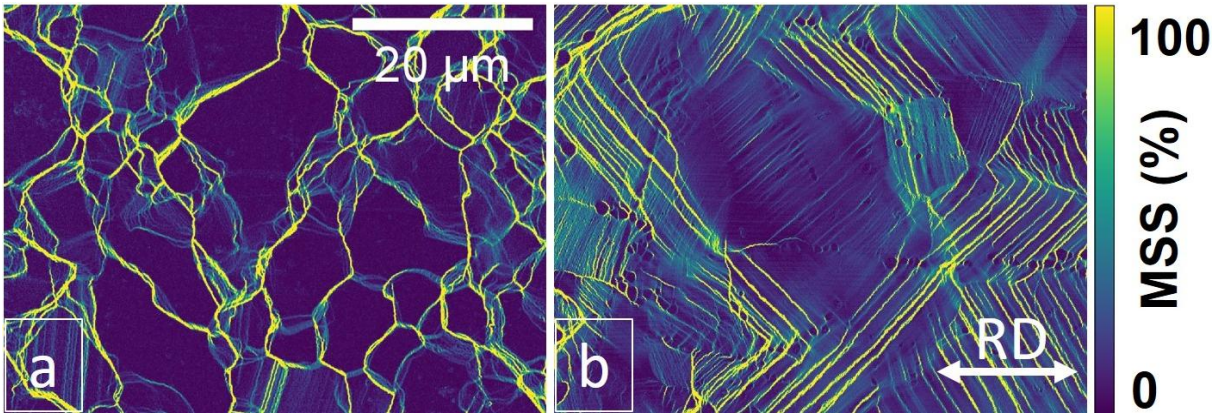

Fig.1 Accumulated maximum shear stress (MSS) maps of (a) AZ31 at 200 °C (50% strain) and (b) WE43 at 250 °C (25% strain). The tensile loading direction is parallel to the rolling direction (RD).