



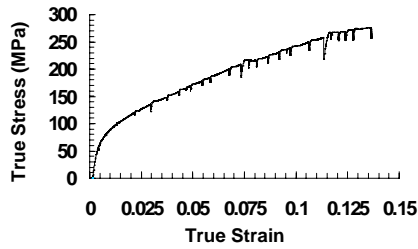
Twinning Sequences in As-cast Mg-3Al-1Zn

Zohreh Keshavarz and Matthew R. Barnett

Centre for Material and Fibre Innovation, Geelong Technology Precinct, Deakin University, Pigdons Rd., Geelong, VIC 3216, Australia

Introduction

Twinning plays a dominant role in deformation behaviour and it can be expected that an increased understanding of twinning will help to improve formability. In present work, the behaviors and sequences of different types of twinning in as-cast Mg-3Al-1Zn alloy were investigated using in-situ tensile testing in scanning electron microscope. The present work reveals that for some orientations the twinning sequences are quite complex. The results also show that compression and double twinning occur prior to failure. These modes may play a role in the ductile limit.

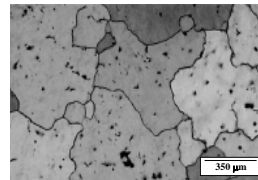
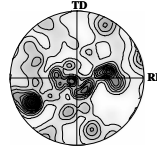


Stress-strain curve of as-cast AZ31 (velocity of 5×10^{-4} mm/s).

Experimental Technique

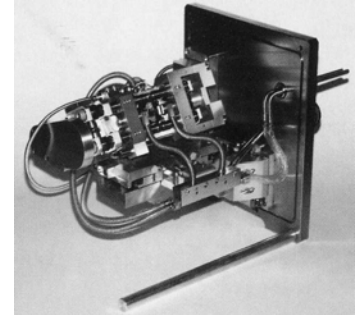
Material

As-cast Mg-3%Al-1%Zn (AZ31)

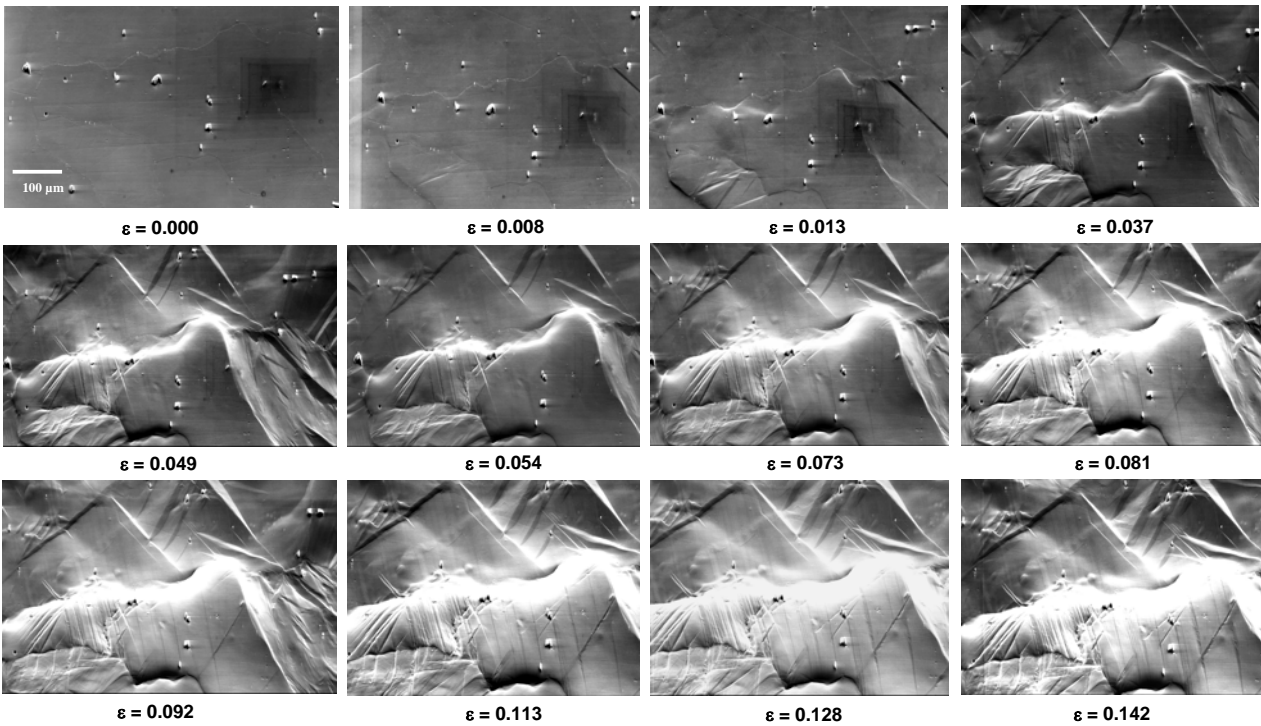


Tensile Test

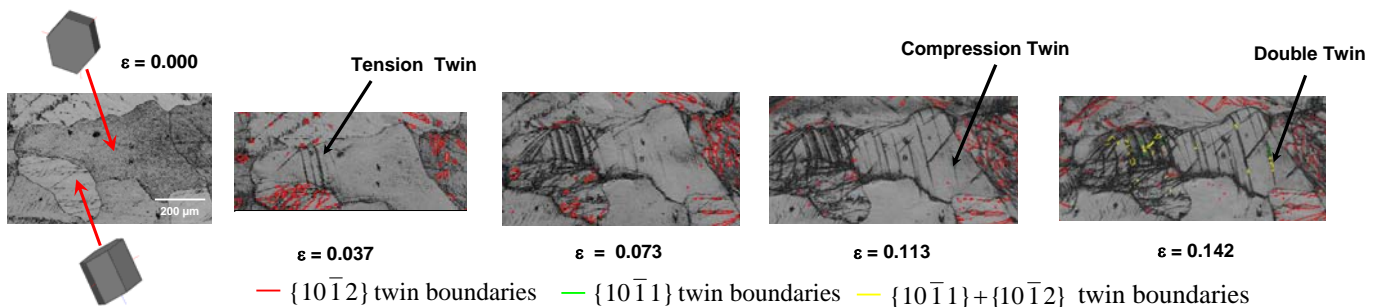
In-situ tension/compression machine in SEM equipped with EBSD camera



SEM Micrographs of Twinning Evolution during Tensile Testing



Band Contrast Images Showing Sequence of Twinning in Double Twinning



Conclusion

The present work reveals that for some orientations the twinning sequences are quite complex. Certain volumes have been observed to turn on tension twin followed by compression twin followed by tension twin interior.

Acknowledgments

This work was supported by the provision of research scholarship by Deakin University and a grant from ARC Discovery Project.