

The Static Recrystallization Behaviour of Magnesium Alloy AZ31



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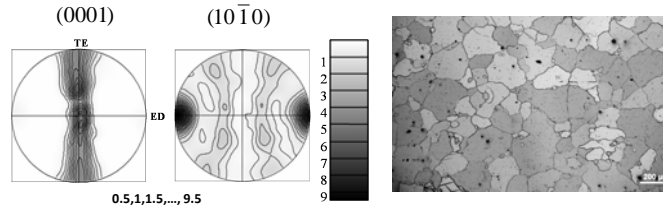
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Introduction

The present work examines the microstructural evolution during the annealing of cold worked magnesium alloy AZ31. The roles of deformation strain, annealing temperature and annealing time are explored. Results show that recrystallization is enhanced with a higher deformation strain and annealing temperature. Hardness testing is used to establish the kinetics of recrystallization, whilst microstructural analysis provides insight into the mechanisms by which this material recrystallizes during annealing after room temperature deformation.

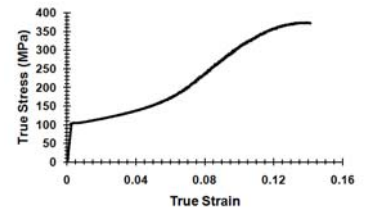
Experimental Technique

Material
Extruded Mg-3%Al-1%Zn (AZ31)



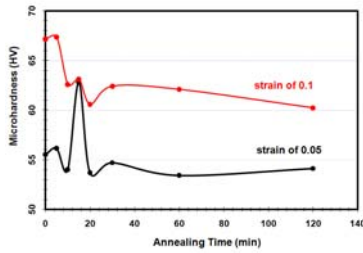
Compression Test and Annealing

Stress-strain curve of extruded AZ31 during room temperature compression along extrusion direction

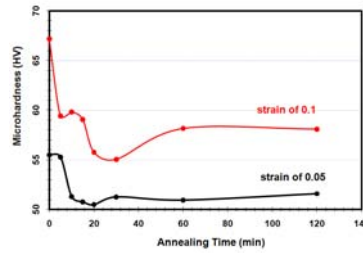


Evolution of Microstructure during Annealing

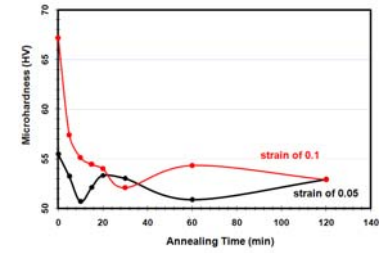
Annealing Temperature of 200°C



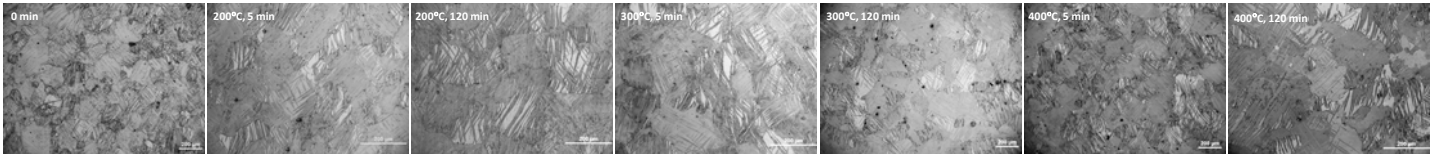
Annealing Temperature of 300°C



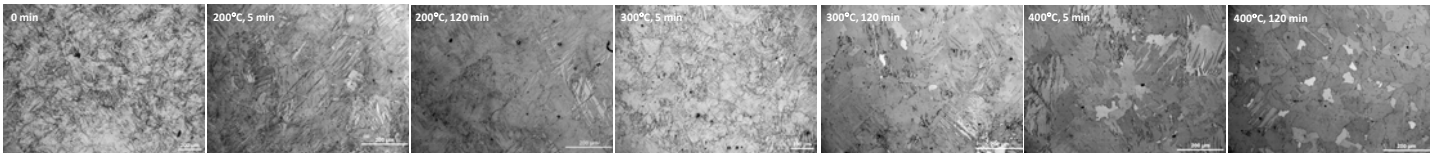
Annealing Temperature of 400°C



Strain of 0.05

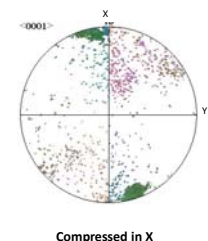
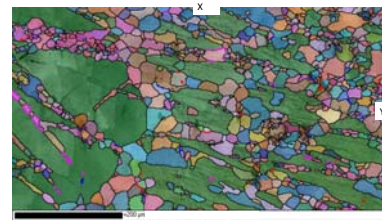
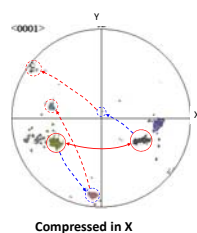
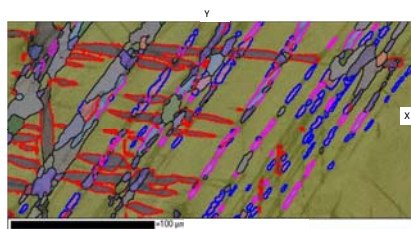


Strain of 0.10



Representative microstructures showing progress of recrystallization for samples

Static Recrystallization of Twins



- {10 $\bar{1}$ 2} twin boundaries
- {10 $\bar{1}$ 1} twin boundaries
- {10 $\bar{1}$ 1} + {10 $\bar{1}$ 2} twin boundaries

Recrystallized grains do not have specific orientation.

Conclusion

The present work provides evidence that SRX grains grow from twins during annealing.

Acknowledgments

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References

- [1] F.J. Humphreys and M. Hatherly, Recrystallization and Related Annealing Phenomena (Pergamon, Oxford, 1995).
- [2] M.P. Anderson, G.S. Grest, D.J. Srolovitz, et al., Acta Mater. 32 783 (1984).
- [3] A. G. Beer, The Evolution of Hot Working Stress and Microstructure in Mg-3Al-1Zn, PhD Thesis, Deakin University, 2004