

Microstructure investigations for developing novel materials

Keywords: Microstructure, transmission electron microscopy, light metals, deformation

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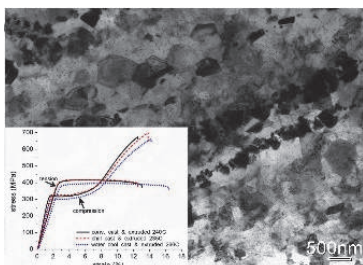
Background

- Transmission electron microscopy to study structure and microstructure of materials
- Study strengthening and deformation behavior of materials
- Produce new materials/composites by various processing methods

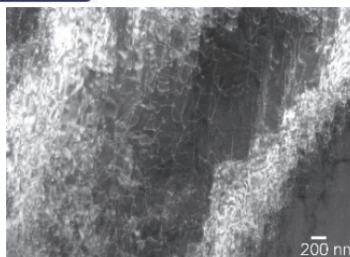
Aim

- Studying the effect of deformation and processing on the microstructure
- Properties of light alloys - magnesium and aluminum alloys, and intermetallics
- Development of new composites for strength and wear resistance

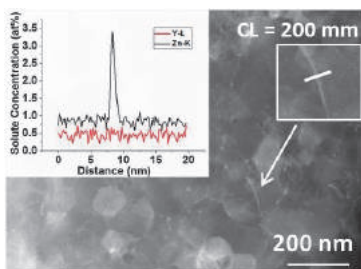
Advanced Research Topics



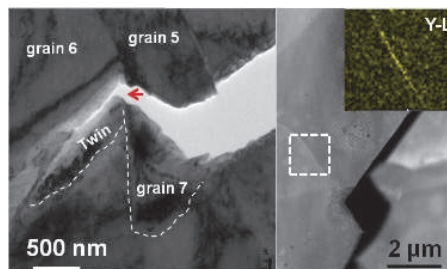
Dispersion of magnesium alloy with quasicrystal produces very high strength



Dislocation structures in a Mg-Y alloy produce isotropic strength



Grain boundary segregation during deformation of a Mg-alloy is studied



Effect of grain boundary segregation on cracking is studied in-situ in TEM

Publications

- Basha et al., Crack propagation along grain boundaries and twins..., Scripta Mater. 142 (2018) 50-54.
- Singh et al., Nucleation of recrystallized magnesium grains..., Scripta Mater. 134 (2017) 80-84.
- Singh, Tailoring microstructure of Mg-Zn-Y alloys..., Science Tech. Adv. Mater. 15 (2014) 044803 1-16.

Summary

- Quasicrystal dispersion strengthened magnesium
- Microstructure evolution by plastic deformation
- Deformation and cracking behavior of alloys

Research outcome

- Very strong magnesium alloys were developed
- Mechanism of solute segregation during deformation was determined
- Effect of solute segregation on deformation behavior was determined