

Precipitation kinetics in Mg-4.5Zn alloys and its effect on mechanical properties



NICOLAS BAUDIN
INTERNSHIPS IN FRANCE INITIATIVE

INSA Lyon

Name of the hosting institution in France	INSA Lyon
Name of the host laboratory / research team	MATEIS
Address	25 Avenue Jean Capelle
Web site	http://mateis.insa-lyon.fr/
Name of the supervisor	FABREGUE Damien
Function	Professor
Email	damien.fabregue@insa-lyon.fr
Phone number	+33472438179

Internship offer

Topic of the internship (title) Precipitation kinetics in Mg-4.5Zn alloys and its effect on mechanical properties

Proposed dates of the internship **Start:** 2019-09-01 **End** 2019-12-01

Scientific and academic objectives of the internship (detailed description of the internship content, work expected from the intern and expected outcomes):

One of the main contributions to strength in Mg alloys comes from the formation of nanometre size precipitates. This increase in strength is related to the interaction between the formed precipitates and twin nucleation and growth. The nature and of the interaction between deformation twins and precipitates is yet to be fully understood. In this project, one extruded Mg-4.5Zn alloy with an average grains size of $\sim 20\mu\text{m}$ was aged at 150°C and 200°C for different times in order to generate different precipitate size and distributions. The samples were then compressed to a plastic strain of 0.012 and the formation of twins under different aging conditions was quantified using EBSD (at Deakin University), the results show that the number of twins increased but the twin growth is inhibited under the aging conditions. The objective of this project (at INSA Lyon) will be to quantify and model the formation kinetics of the rod-like $\beta'1$ precipitates. To achieve this, small angle scattering will be combined with thermoelectric power measurements to indirectly determine the precipitation kinetics in these alloys. If the precipitation model integrating nucleation, growth and coarsening could be successfully gained, a comprehensive theory of precipitation-twinning interaction in Mg could then be developed.

Does the project involve a French industry partner?	No
Name of the Australian partner institution	Deakin University
Name of lab/department/team involved in the collaboration at the Australian partner institution	Institute for Frontier Materials
Main contact in the Australian partner institution	Matthew BARNETT
Function of the main contact in the Australian partner institution	Director
Email address of the main contact in the Australian partner institution	matthew.barnett@deakin.edu.au
Outside of this ongoing collaboration, will applications coming from students of other eligible Australian universities be considered by the hosting institution in France?	No

Expected profile of applicant

Level of study	Master
Discipline	Materials Science, Metallurgy
Required qualities, knowledge and skills	The candidate must be research oriented. Knowledge in phase transformation, mechanical properties of steels are required. The candidate should be able to adapt to different ways of carrying out research.

