

An Indian-Australian research partnership

Project Title:

Project Number

Monash Supervisor(s) *Full names and titles*

Monash Primary Contact: *Email, phone*

IITB Supervisor(s) *Full names and titles*

IITB Primary Contact: *Email, phone*

Research Academy Themes:

Highlight which of the Academy's Theme(s) this project will address?

(Feel free to nominate more than one. For more information, see www.iitbmonash.org)

1. Advanced computational engineering, simulation and manufacture
2. **Infrastructure Engineering**
3. Clean Energy
4. Water
5. **Nanotechnology**
6. Biotechnology and Stem Cell Research

The research problem

Define the problem

Corrosion of light metals, in particular magnesium alloys, is a major technical challenge as we seek to lightweight vehicles for road, rail and air travel. The corrosion of light alloys is driven by chemical and electrochemical heterogeneity of the alloys - which is inherent in the alloy for the development of strength. In recent years, we have developed an understanding of the mechanisms and kinetics of corrosion such processes upon such alloy surfaces, but the work to date is limited to empirical and phenomenological revelations. As such, a mechanistic model for corrosion of such alloys is required to better understand the processes occurring on the microstructural length scale and as a function of time for a range of real and hypothetical microstructures. The feedstock data for such models is the testing of Mg-alloy solid solutions of a variety of compositions that may be produced and tested. This project will be an experimental one, which will be an interesting interdisciplinary project covering corrosion, metallurgy and characterisation of metals.

Project aims

Define the aims of the project

The project aims to produce the electrochemical kinetic data that can be used to predict the corrosion of a range of magnesium. A focus would be given to Mg-based solid solutions, of which the existing information on electrochemistry is very sparse. Such data can be the platform for mechanistic based models that present appropriate fidelity to be used in the damage and life prediction of Mg-alloys.

Expected outcomes

Highlight the expected outcomes of the project

The outcomes will be electrochemical kinetic data that can be used to predict the corrosion of a range of alloys based on empirical feedstock data that would be generated either a priori or in parallel by others at Monash and at IITB.

The final research will contribute towards a model / tool that can be deployed in future projects to guide alloy design.

How will the project address the Goals of the above Themes?

Describe how the project will address the goals of one or more of the 6 Themes listed above.

By providing original experimental data and develop models for application

Capabilities and Degrees Required

List the ideal set of capabilities that a student should have for this project. Feel free to be as specific or as general as you like. These capabilities will be input into the online application form and students who opt for this project will be required to show that they can demonstrate these capabilities.

The candidate will ideally have had some corrosion experience by way of a Masters Degree. It is likely that the ideal candidate will possess strong analytical skills, and may be a graduate of mechanical or chemical engineering, or physics or corrosion science & engineering, metallurgical engineering or materials science.