

An Indian-Australian research partnership

Electrocatalysts for low temperature fuel cells

Project number: IMURA0135

Monash University supervisors: Dr Bradley Ladewig

Monash University contact: Dr Bradley Ladewig, bradley.ladewig@eng.monash.edu.au

IITB supervisors: Professor Manoj Neergat

IITB contact: Professor Manoj Neergat, nmanoj@iitb.ac.in

Research Academy theme/s

1. Clean Energy
2. Nanotechnology

The research problem

The cathode catalysts used in low temperature fuel cells, both polymer electrolyte fuel cells (PEFCs) and direct methanol fuel cells (DMFCs), are based on Pt. These catalysts are too expensive, and have high overpotential for oxygen reduction in PEFCs as well as in DMFCs.

Project aims

This project aims to develop cost-effective electrocatalysts for oxygen reduction with low Pt content or alternatives to Pt without compromising their activity.

Expected outcomes

The project is expected to deliver (a) catalyst with improved activity by limiting the Pt content to catalyst surface, with the interior of the catalysts being a non precious component and (b) methanol tolerant non Pt catalyst with activity comparable to that of Pt. These materials will be tested in fuel cells and their improved performance will be demonstrated.

Which of the above Theme does this project address?

The project addresses the two themes of Clean Energy and Nanotechnology.

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

- (a) by preparing core-shell nanoparticles with Pt shell and transition metal core.
- (b) Fundamental studies on chalcogenides and Pd-X based materials show activity similar to that of Pt. By Proper design and synthesis of these material in bulk, we will convert the insight obtained from fundamental studies to practical catalyst materials.