

An Indian-Australian research partnership

Project Title: **Design, Synthesis and Application of Heterogeneous Catalysts for Continuous Flow Synthesis**

Project Number **IMURA0616** (will be inserted by The Academy)

Monash Main Supervisor
(Name, Email Id, Phone) Prof Neil Cameron
neil.cameron@monash.edu. +61399020774

Monash Co-supervisor(s)
(Name, Email Id, Phone)

Monash Head of Dept/Centre (Name,Email) Prof Nick Birbilis, nick.birbilis@monash.edu

Monash Department: Department of Materials Science & Engineering

Monash ADRT
(Name,Email) Prof Ana Deletic, ana.deletic@monash.edu

IITB Main Supervisor
(Name, Email Id, Phone) Anil Kumar
anilkumar@iitb.ac.in, +91-9819306333

IITB Co-supervisor(s)
(Name, Email Id, Phone)

IITB Head of Dept
(Name, Email, Phone) K. P. Kaliappan, kpk@chem.iitb.ac.in, +91-22-25767177

IITB Department: Chemistry

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
7. Humanities and Social Sciences

The research problem

Define the problem

Chemical synthesis processes are usually conducted under batch conditions, which can be inefficient, hazardous, and prone to problems such as poor selectivity. Continuous flow synthesis provides an attractive, economically viable and greener process for chemical production, leading to faster, efficient and selective reactions with reduced hazards. In this direction, the development of heterogeneous catalysts, i.e. supported on porous continuous media, plays a pivotal

role and hence the genesis of this joint proposal.

Project aims

Define the aims of the project

The aims of the project are

- Design and synthesis of heterogeneous catalysts (chemical and biochemical catalysis)
- Development of porous media for immobilization of catalysts
- Application of these catalysts in continuous flow synthesis

Expected outcomes

Highlight the expected outcomes of the project

The expected outcomes of the project are

- Development of high performance heterogeneous catalysts for a range of (bio)chemical processes
- New porous materials for use in flow chemistry
- New continuous flow processes.

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.

Advanced manufacturing is one of the 6 themes and continuous flow synthesis fits well within this theme as it has been projected as the process for the chemical factories of tomorrow.

The project also addresses the goal 'Biotechnology and stem cell research' since it seeks to create immobilized biocatalysts that can be used for biotech processes such as chemicals manufacture, biofuels production and waste treatment.

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 should have the right bend of mind to work in this interdisciplinary area wherein both synthetic as well as continuous flow process skills are required. An ideal candidate will be one with a strong background in chemistry with some exposure to chemical engineering and/or catalysis.

Potential Collaborators

Please visit the IITB website www.iitb.ac.in OR Monash Website www.monash.edu to highlight some potential collaborators that would be best suited for the area of research you are intending to float.

N/A

Please provide a few key words relating to this project to make it easier for the students to apply.

Continuous Flow Synthesis, Heterogeneous Catalysis, Porous Materials, Biotechnology