

An Indian-Australian research partnership

**Project Title:** **Design, Synthesis and Application of Organocatalysts and Hydrogenation Catalysts for Continuous Flow Processes**

**Project Number** **IMURA0659 (2)**

**Monash Main Supervisor**  
 (Name, Email Id, Phone) Prof Neil Cameron, [neil.cameron@monash.edu](mailto:neil.cameron@monash.edu)

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

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

**Monash Department:** Department of Materials Science & Engineering

**Monash ADRT**  
 (Name,Email) Prof Ana Deletic, [ana.deletic@monash.edu](mailto:ana.deletic@monash.edu)

**IITB Main Supervisor**  
 (Name, Email Id, Phone) Anil Kumar, [anilkumar@iitb.ac.in](mailto:anilkumar@iitb.ac.in)

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

**IITB Head of Dept**  
 (Name, Email, Phone) K. P. Kaliappan, [kpk@chem.iitb.ac.in](mailto:kpk@chem.iitb.ac.in)

**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](http://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*

Hydrogenation and organocatalysis are industrially important processes and have been used as one of the key step for various manufacturing units across the globe. Generally this is carried out 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 greener processes and catalysts is the need of

the hour 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 greener processes for selective hydrogenation via continuous flow process.
- Design and synthesis of new organocatalytic processes via continuous flow process
- 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 greener processes and catalysts for hydrogenation as well as organocatalysts
- 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 'infrastructure engineering' since it seeks to create new miniaturized infrastructure for large scale production in an economically and environmentally friendly route.

## 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](http://www.iitb.ac.in) OR Monash Website [www.monash.edu](http://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, hydrogenation, Organocatalysis, Heterogeneous Catalysis, Porous Materials,