IITB-Monash Research Academy

An Indian-Australian research partnership

Indian Institute of Technology Bombay | MONASH University

Project Title:	**Development of NEW heterogeneous catalyst for SELECTIVE production OF PROPANEDIOL from GLYCEROL**
Project Number	**IMURA0401**

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IITB Department:	Chemical Engineering	*Full name*

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

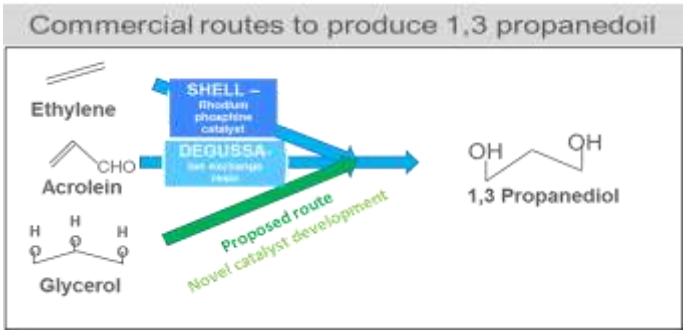
- 1,3 Propanediol has versatile applications - Use as feedstock in synthesizing polytrimethylene terephthalate (PTT), linear aromatic polyester and one of the primary feedstock for carpet fiber.
- Current demand is 45,000 MT/year and the demand is expected to grow steeply. Expected demand in 2020 will be about 230,000 MT.

Production of 1,3 propanediol through ethylene or acrolein route is not very economically attractive, mostly due to high feedstock price.

Technology	Feedstock cost, $/MT (Y)		Production cost $/MT (Y)		Market price, $/MT
Ethylene	382 (1998)	996 (2009)	1372 (1998)	↑ (2013)	1,3 Propanediol
Acrolein	649 (1998)	1700 (2010)	1457 (1998)	↑ (2013)	1760 (2009)
Glucose	804 (1998)	-	1333 (1998)		
Glycerol	1248 (1998)	100-220 (2009)	1891 (1998)	↓ (2013)	

Project aims

To develop novel heterogeneous catalyst for selective production of 1,3 propanediol from glycerol



Expected outcomes

- Develop new SABIC catalyst for emerging route to produce 1,3 propanediol
- SABIC will have exposure on enzyme mimicked catalysis
- SABIC can become a strong IP lead in the emerging research field

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

Understanding active site of enzymes required for selective hydration

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To synthesize analogue of active site

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Immobilize analogue molecule into support to synthesize heterogeneous catalyst

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Evaluate performance of enzyme mimicked catalyst

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Fine tuning of active sites on catalyst(s) for improve performance

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Capabilities and Degrees Required

- Degrees: MSc in chemistry/M.Tech in catalysis or chemical engineering
- Basic understanding of catalysis
- Experience on synthesis of organic/inorganic materials
- Basic knowledge in chromatographic and spectroscopic techniques & data interpretation
- Familiar with literature search tools and prior art

- Report writing and presentation

Additional costs and equipment

Describe below additional costs that would be needed to complete this project.
This would typically include project-related costs (such as consumables).
Computers, desks, conference travel, student travel to Australia, etc should not be included here. They are already provided for.

For Industry Partners::
Potential Collaborators

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

Major Milestones:

Please add major intended milestones for the project

#	Milestone	Deliverable	Timeline	Responsible
A	• Understanding and synthesize active site of enzymes required for selective hydration	• Understanding active site • Synthesis of active site analogue • Immobilize analogue molecule into support to synthesize heterogeneous catalyst		
B	• Performance study of synthesized catalysts	• GC method development • Studies on process parameters (Temp, Space velocity) • Fine tuning of active sites on catalyst(s) for improve performance		
C	•			
D	•			
E	•			
F	•			