

An Indian-Australian research partnership

Project Title:

Project Number

Monash Main Supervisor *Full name, Email*
(Name, Email, Phone)

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

Monash Head of Dept/Centre *Full name, email*
(Name, Email)

Monash Department:

Monash ADGR *Full name, email*
(Name, Email)

IITB Main Supervisor *Full name, Email*
(Name, Email, Phone)

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

IITB Head of Dept *Full name, email*
(Name, Email, Phone)

IITB Department:

Research Clusters:

Research Themes:

Highlight which of the Academy's CLUSTERS this project will address? <i>(Please nominate JUST <u>one</u>. For more information, see www.iitbmonash.org)</i>		Highlight which of the Academy's Theme(s) this project will address? <i>(Feel free to nominate more than one. For more information, see www.iitbmonash.org)</i>	
1	Material Science/Engineering (including Nano, Metallurgy)	1	Advanced computational engineering, simulation and manufacture
2	Energy, Green Chem, Chemistry, Catalysis, Reaction Eng	2	Infrastructure Engineering
3	Math, CFD, Modelling, Manufacturing	3	Clean Energy
4	CSE, IT, Optimisation, Data, Sensors, Systems, Signal Processing, Control	4	Water
5	Earth Sciences and Civil Engineering (Geo, Water, Climate)	5	Nanotechnology
6	Bio, Stem Cells, Bio Chem, Pharma, Food	6	Biotechnology and Stem Cell Research
7	Semi-Conductors, Optics, Photonics, Networks, Telecomm, Power Eng	7	Humanities and social sciences
8	HSS, Design, Management	8	Design

The research problem

Global population is expected to increase by over a third by 2050, requiring an estimated 70% increase in food production. A combination of improved agricultural food production methods and an increase of average per capita income have led to a decrease in global hunger over the last half-century, despite a doubling of the world's population. Projected demand for protein is of interest, with projections that the world demand for animal-derived protein will double by 2050, resulting in concerns for sustainability and food security. In part, this is because it is generally accepted that animal-based foods produce higher levels of greenhouse gases (GHG) than plant-based foods and these are associated with climate change. This is compounded by the fact that increased demand for animal-based protein is expected to intensify pressure on land due to the need to produce more animal feed.

Project aims

The overall aim of the project is to evaluate the potential of underutilized plant based proteins for the development of novel food products such as fibrous meat analogues. This would require processing innovations to be able to transform texture, and functional properties of plant based protein to create range of products that could be used as meat replacers in terms of nutrition and sensory aspects. We will also get insight into the key mechanisms that help us determine the formation of plant-based fibrous meat analogues blends in terms of processing, quality, and nutritional and structural modifications. Green processes such as controlled hydrolysis using enzymes and hybrid processes could improve functional properties of proteins. A successful product development would be followed by techno-economic feasibility analysis.

Expected outcomes

Highlight the expected outcomes of the project including likelihood of patents

1. Development of a novel process to obtain textured veg. protein products which could mimic meat products from underutilized crops
2. Through proper information dissemination, it is expected that the project outputs will increase

interest and investment from potential stake holders (Farmers, consumers, food industries, state and central governments).

3. New commercial opportunities to valorise food by-products
4. Postgraduate training and graduates with experience to work in food valorisation and future Food processing preservation employment opportunities

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.

This project covers Green Chemistry (green processes for protein extraction), Food (for food formulations), and potentially, Biotechnology (enzyme processing may be applied).

Potential RPC members from IITB and Monash

Provide names of the potential research progress committee members (RPC) and describe why they are most suited for the proposed project.

Capabilities and Degrees Required

List the ideal set of capabilities that a student should have for this project. 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.

Applicants should have at least a four-year degree in Chemistry/Food Engineering/Biotechnology/ Chemical Engineering with first class honours or equivalent and a Master' s degree (with thesis). This project requires strong understanding of Protein chemistry and organic transformations, biochemistry and biochemical engineering principles. It is highly desirable for applicants to have a good understanding and experience with analytical techniques and interpretation of the outputs from NMR, HPLC, Gas Chromatography, Mass Spectrometry UV Spectroscopy and FTIR.

Necessary Courses

Biochemistry lab course, Biochemical Engineering, and a course which covers Protein Chemistry.

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.

Select up to **(4)** keywords from the Academy's approved keyword list (**available at <http://www.iitbmonash.org/becoming-a-research-supervisor/>**) relating to this project to make it easier for the students to apply.

Waste to wealth, Biochemistry, Food Innovation