

An Indian-Australian research partnership

Project Title:	Development of scaffolds for in vitro culture of immune cells	
Project Number	IMURA0904	
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IITB Department:	Department of Biosciences & Bioengineering	

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	<u>Material Science/Engineering (including Nano, Metallurgy)</u>	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	<u>Bio, Stem Cells, Bio Chem, Pharma, Food</u>	6	<u>Biotechnology and Stem Cell Research</u>
7	Semi-Conductors, Optics, Photonics, Networks, Telecomm, Power Eng	7	Humanities and social sciences
8	HSS, Design, Management	8	Design

The research problem

Define the problem

Adoptive cell therapy, which involves extraction, manipulation, and administration of *ex vivo* generated autologous T cells to patients, requires laborious and expensive laboratory procedures which makes their use in clinics difficult. With an objective to improve the *ex vivo* expansion of large amount of specific T cells, we propose the use of three-dimensional (3D) scaffolds to present a microenvironment resembling the natural environment of secondary lymphoid organs. Here, we propose to develop relevant scaffold system to study the activation, proliferation, and differentiation of T cells when cultured on these 3D scaffolds to show an increase in cell proliferation compared to standard suspension systems.

Project aims

Define the aims of the project

- (1) Development and optimization of scaffolds
- (2) Optimization of culture of immune cells on scaffolds
- (3) Development of this system as a platform for in vitro expansion of immune cells

Expected outcomes

Highlight the expected outcomes of the project including likelihood of patents

- A highly trained PhD student with broad expertise in materials science and engineering and cell biology
- High impact publications
- Commercially exploitable IP

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.

Biotechnology and stem cell research: the project concerns the development of biotechnological devices (scaffolds) for the culture of cells of the immune system, including those derived from stem cells sources.

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.

The student should have a background in either materials chemistry or a bioscience related subject (preferably with expertise in cell and molecular biology).

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

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.

BioScience, Bio Medical Engineering; Materials Chemistry/Science; Bio Chemistry