

An Indian-Australian research partnership

Project Title:	Ophthalmic drug delivery with porous silicon	
Project Number	IMURA0694	
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Research Clusters:

Highlight which of the Academy's CLUSTERS this project will address? (Please nominate JUST <u>one</u> . For more information)	
1	Material Science/Engineering (including Nano, Metallurgy)
2	Energy, Green Chem, Chemistry, Catalysis, Reaction Eng
3	Math, CFD, Modelling, Manufacturing
4	CSE, IT, Optimisation, Data, Sensors, Systems, Signal Processing, Control
5	Earth Sciences and Civil Engineering (Geo, Water, Climate)
6	Bio, Stem Cells, Bio Chem, Pharma, Food
7	Semi-Conductors, Optics, Photonics, Networks, Telecomm, Power Eng
8	HSS, Design, Management

The research problem

Define the problem

We aim to deliver drugs non-invasively to the internal structure of the eye using porous silicon nanoparticles. The project spans fundamental materials science like production of such nanoparticles, drug release studies, through in-vitro and in-vivo studies, leading to preclinical studies, and finally human clinical trials. The target would be the posterior as well as the anterior chamber of the eye. The drugs used would be those whose bioavailability to the eye is limited and would include anti-cancer drugs like carboplatin for retinoblastoma and antioxidants like polyphenols for macular degeneration and lens opacification.

Project aims

Define the aims of the project

1. Make silicon nanoparticles of controlled porosity and size
2. Load with model drugs and real drugs
3. Perform drug delivery studies in vitro in diffusion cells, cell culture models and explanted eyeballs
4. Perform pre-clinical studies in a small animal model
5. Perform human clinical trials

Expected outcomes

Highlight the expected outcomes of the project

A nanoparticulate formulation based on porous silicon for ophthalmic drug delivery. Bench, animal and human clinical trials.

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 is a project squarely addressing an urgent healthcare need through a drug delivery technique based on novel nanomaterials.

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.

Bachelors or Masters degree in engineering or medicine with experience in chemical synthesis and ability to handle sophisticated instruments like microscopes. Willing to work with cadaveric tissues, animals and humans.

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.

Angus Johnston, MIPS

Select up to **(4)** keywords from the Academy's approved keyword list (**available at www.iitbmonash.org**) relating to this project to make it easier for the students to apply.

1. Novel Functional Materials and 11. BioScience, Bio Medical Engineering