

An Indian-Australian research partnership

Project Title:	Halide Perovskites for Optoelectronic Applications	
Project Number	IMURA0878	
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Research Clusters:

Research Themes:

Highlight which of the Academy's CLUSTERS this project will address? <i>(Please nominate JUST one. 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

Define the problem

Energy crises and global warming both of these factors are pushing the attentions towards development of cost-effective green energy solutions. Among many renewable energy photovoltaics are natural choice for country like India and Australia. Hence, generating the electrical energy using sunlight in cost effective manner requires low energy budget technology to compliment most widely used Si based expensive technology. It can be complimented via two ways either by making tandem solar cells or utilising those UV photons to down convert with quantum efficiency more than one which are less responsive for Si cell using recently discovered halide perovskite semiconductors.

Project aims

Define the aims of the project

This project aims to boost the efficiency of polycrystalline Silicon solar cells to 25% or more via

- (i) making tandem solar cell with front cell being made up of halide perovskite semiconductors.
- (ii) Boosting responsivity in UV region by having a layer of halide perovskites which can down convert the photons with quantum efficiency more than one.

(Silicon solar cell will be supplied by the collaborators)

Expected outcomes

Highlight the expected outcomes of the project including likelihood of patents

State of art Tandem solar cell geometry to enhance device performance as compare to single absorber cell.

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.

It is going direct impact of energy theme by converting solar energy into electricity with efficient way.

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.

BE or BTech in EP or EE, M.E. or MTech in EE, MSc in Phys or Electronics

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.

Prof. Anil K.G. and Prof. Pradeep Nair from EE
Prof. Anil Kumar and Prof. C. Subrahmanyam from Chem. IITB

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.

Energy, Energy materials, Semi-conductors, Novel functional materials