

An Indian-Australian research partnership

Project Title:
Project Number
Monash Main Supervisor

(Name, Email Id, Phone)

glen.deacon@monash.edu"/>

Full name, Email
Monash Co-supervisor(s)

(Name, Email Id, Phone)

Monash Department:

IITB Main Supervisor

(Name, Email Id, Phone)

Full name, Email
IITB Co-supervisor(s)

(Name, Email Id, Phone)

IITB Department:

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
7. Humanities and Social Sciences

The research problem

Define the problem

Thorium nuclear reactors offer an alternative green energy source to uranium fuelled reactors and have the major security advantage of low plutonium generation. In this context, a greater understanding of thorium chemistry is needed for recycling and isotope separation. This project will focus particularly on reactions of thorium oxide (with ceria as a non radioactive proxy) and thorium metal and will include use of protic ionic liquids and metal-organic compounds to achieve these ends.

Project aims

Define the aims of the project

- 1 Investigate the reactions of ceria and thoria and of thorium metal with protic ionic liquids as a means of recovery and recycling of thorium.
- 2 Investigate reactions of thorium metal in generation of halides and metal-organic compounds, and examine preparations of volatile metal-organic compounds from the free metal or the oxide.

Expected outcomes

Highlight the expected outcomes of the project

New reaction chemistry of thoria and thorium metal including ones that relate to recycling and separation

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.

Nuclear reactors provide carbon free energy but there are the twin problems of waste and security. U-based reactors produce a large amount of plutonium with attendant security problems. Thorium based reactors produce far less and hence one component of security problems is reduced

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.

Capability in Inorganic, organometallic and physical chemistry. Knowledge of standard spectroscopic techniques and their application. Experience in X-ray crystallography would be an advantage but not essential. 1st class Honours or a 1st class masters degree in general or inorganic 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.

Prof Douglas Macfarlane and Dr Vijayaraghavan Ranganathan will collaborate in the project

Please provide a few key words relating to this project to make it easier for the students to apply.

Thorium, metal-organic, ionic liquids, recycling