

An Indian-Australian research partnership

Project Title: Room Temperature Sodium Sulphur Battery for Large Scale Storage

Project Number IMURA0475

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IITB Department:

Department of Energy Science and Engineering

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

The research problem

Define the problem

Development of advanced, low cost energy storage is important in current energy scenario. High capacity sulphur has gathered of research interest as sulphur electrode can exhibit 1675 mA h g⁻¹ capacity which is much higher than any existing cathode materials in battery technology. As a result, the much research activity has been observed on Li-S battery over the past few years since this battery technology can be used at ambient temperature. However, from economic and sustainability point of view, elemental sodium is much better choice compare to lithium. In literature, high temperature Na-S battery exists to deliver storage solution for large scale grid applications. However, the high temperature operation restricts this technology due to safety, reliability and maintenance problems. Therefore, the development of room temperature Na-S battery is a great thrust, however poses several fundamental problems to solve before commercialization.

Project aims

This project will focus on

- 1) *development of advanced sulphur cathode and sodium anode using nanotechnology*
- 2) *development of polymer based electrolyte*
- 3) *development of room temperature Na-S battery cell and in depth cell characterization*

Expected outcomes

This project outcomes will be

- *development of advanced sulphur cathode and sodium anode*
- *development of polymer based electrolyte for a Na/S battery*
- *demonstration of a room temperature Na-S battery cell and in depth cell characterization*

How will the project address the Goals of the above Themes?

The proposed project will connect both the expertise from Monash and IITB on electrochemistry, battery fabrication and testing, ionic liquid and polymer electrolyte membrane

Capabilities and Degrees Required

Applicant must have following expertise

- *materials synthesis*
- *advanced knowledge on nano materials characterization*
- *must have analytical knowledge*
- *degree in Chemical Engineering or Materials Science or related subjects*

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.