Lithium-Ion and Sodium-Ion Battery Prototyping at IIT Bombay

Problem Statement: Barring a few organisations, the knowledge of battery cell technology and how to manufacture them is largely lacking in Indian organisations, including the IITs. India needs to be self-reliant in developing and manufacturing energy storage technologies that meet the unique requirements of the electric mobility and renewable energy sectors.

Uniqueness of the Solution: The current project team at IIT B-Monash Research Academy is the first to make a world-class facility to fabricate batteries in the IIT ecosystem. The Battery Prototyping Lab is a unique facility that will help bridge the gap between industry and academia by facilitating the prototyping and scaling up of energy storage technologies researched and developed in the institute. The lab has a full prototyping capacity of 4 kWh per day in the format of 10Ah pouch cells of 1kWh per day in the format of 2.5 Ah 18650 cylindrical cells. The team is working on prototyping advanced anode-free, ultra-fast, ultra-safe battery technology for EVs and long cycle life battery technology based on Li-ion and Na-ion. They are developing Si-C and NMC/LFP chemistry for more than 280 Wh/kg battery. They are conducting trials on the advancement of known cathodes such as LCO, LMO, NCA, NNMC for their long cycle life and fast charge capability.

Current Status of Technology: All prototype Li-ion cells are tested in the field. They are ready to be used in pilot-scale production. Indigenous Na-ion battery technology and cell development are in progress with Industry partners. 220 Wh/kg cell chemistry and 10 Ah pouch cell development are under process with collaboration for Indian industry partners.

Societal Impact: Indigenous cell technology and know-how are essential to grow and support India's EV program. The IITB-Monash Research Academy's workforce training and support for cell manufacturing, cell testing and analysis can help meet the ever-increasing demand for technical know-how and help the industry make battery cells.

Patent(s): Filed.

Relevant Industries: Batteries, Energy Storage.

Faculty: Prof. Sagar Mitra, Energy Science & Engineering.