

## Research Colloquium

### Tweaking the Redox-active Organic Material Properties and Electrode Engineering for Rechargeable Battery Applications

**Speaker Name:** M R Chinmaya (CY16D043)

**Date/Time:** 01-04-2021 / 3:00 pm

**Guide:** Dr. Kothandaraman R

**Venue:** Online

#### Abstract

Increasing demand for energy consumption has to be responsibly handled, and this needs to be quenched by minimizing the usage of fossil fuels. As a consequence, there is a need for tapping renewable sources to meet energy demands. Due to the limited availability of metals in specific geographical regions, metal-based energy storage devices take a back seat and becomes economically non-viable. Organic materials that can be synthesized as per requirement offer an advantage in modifying its property by incorporating suitable substituents on the organic core. Renewable energy sources are intermittent; hence it is imperative to develop load shifting methodologies for efficient use of harvested energy. Energy storage devices based on redox flow chemistry is the key to establish low-cost large-scale systems for grid applications.

Redox flow batteries (RFBs), whose energy and power capability can be varied independently, is an ideal choice for storing excess energy available in the grid and deliver it to the grid when the demand arises. Presently, there are established RFB technologies available in the market for storing a bulk amount of energy (Vanadium redox flow battery) based on inorganic electroactive material dissolved in an aqueous medium. In the second chapter, we aim to convert irreversible redox molecule into reversibly redox-active by suitable substitutions on the carbazole core. The use of a non-aqueous medium extends the potential window. The third chapter deals with scrutinizing anthraquinone and naphthoquinone derivatives and choosing the right molecule based on its reversibility and stability for RFB application. The fourth chapter is the extension of the preceding work, where we have identified suitable substitution to increase the solubility of the molecule in an aqueous basic medium and achieved higher energy density.

Guide / seminar coordinator:

Head of the Department



(Dr. Kothandaraman R)

(Prof. Mangala Sunder K)