

## **Students' Annual Seminar**

### **Towards Scalable Methods for High Rate and Cyclability Liquid and Solid-State Lithium Metal Batteries**

**Preeti Yadav**

Lithium metal batteries (LMBs) hold promise amid the energy crisis with their high specific capacity ( $3860 \text{ mAhg}^{-1}$ ) and low anode potential ( $-3.04 \text{ V}$ ). Yet, safety issues like dendrite growth and electrolyte degradation persist due to unstable solid electrolyte interface (SEI), leading to safety concerns in their usage. To address such issues, we have proposed some methods such as *via* LiF/C-based artificial SEI formation using fluorinated carbon layers on a battery separator. This SEI, formed during cycling, prolongs cell life by suppressing dendrite growth and electrolyte decomposition. Galvanostatic cycling shows over 1500 cycles at  $3 \text{ mAcm}^{-2}$ , surpassing unmodified cells (50 cycles). The modified separator exhibits compatibility for high power-density applications, with commercial viability supported by  $\text{LiFePO}_4$  full cells studies. This study also expands the potential application of the LiF/C-rich SEI to solid-state electrolytes, and the results will be discussed.

***Friday, Mar 22<sup>nd</sup> 2024***

***11:30 Hrs (Tea / Coffee 11:15 Hrs)***

***Seminar Hall, TIFR-H***