

## **Students' Annual Seminar**

### **Understanding the Role of Oxygen in Zinc-Anode Passivation for Zn-Air (O<sub>2</sub>) Batteries**

#### **Subhra Ranjita Pattanayak**

Alkaline zinc air batteries (ZAB) have emerged as a promising candidate for efficient and sustainable energy storage system owing to its high energy density, high abundance of zinc, and safe-operation in comparison with conventional Li-ion batteries (LIBs). Oxygen is used as the cathodic reactant in ZAB or any metal air battery. Our recent research indicates the effect of the oxygen on the anodic site of the ZAB, which was unexplored so far. Through a series of experiments including cyclic voltammetry tests, cyclic charge discharge tests, and in situ gas chromatography, the impact of oxygen gas on the zinc surface and thereby on the battery performance is analysed. The results reveal a drastic difference in cell performance in between anodic oxygen and nitrogen environments, with oxygen promoting early passivation and hindering battery longevity. This study unfolds that not only parasitic hydrogen evolution reaction (HER) but also parasitic oxygen reduction reaction (ORR) can be a major contributor towards zinc passivation. I will be explaining in my talk about this crucial yet overlooked phenomena of oxygen interaction with the anodic zinc leading to early anodic passivation which hugely limits battery capacity.

***Friday, Apr 19<sup>th</sup> 2024***

***14:30 Hrs (Tea / Coffee 14:15 Hrs)***

***CR-4, TIFR-H***