

Seminar

On the Development of Novel Cathodes for Next Generation Batteries: Solar to Organic Batteries

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Development of new methods for storing solar energy is receiving tremendous attention due to the growing interest towards renewable energy based ecosystem. In this context, electrochemical systems that can be directly charged under solar radiation is getting importance. Development of a photo-rechargeable battery (PRB) signifies a transformative breakthrough in the contemporary energy conversion and storage landscape. In this talk, I will be discussing on our efforts towards the realisation of a two-electrode photo rechargeable lithium ion (Li⁺) battery followed by the mechanistic understanding of charging and discharging processes. We proposed a type II semiconductor heterostructure having staggered band alignment as cathode material for such photo batteries. Semiconductor heterostructures ensure chemical stability and high light-matter interaction cross-section, and hence high photo efficiency towards solar battery charging. Heating effect of solar radiation, active and passive, on electrochemical cells is another important issue to be addressed in this proposition. A detailed investigation probing the roles of light and heat in the de-intercalation of Li⁺ ions from cathode (charging of a battery) is conducted. These discussions will follow a method development for new cathodes based on organic materials and their crystallisation. Ambient air stable organic crystals' development helped us to demonstrate the electrochemical properties, indicating the potential of such structures for different battery chemistries. The talk will be ending with discussions on future directions of these works.

Wednesday, Oct 30th 2024

16:00 Hrs (Tea / Coffee 15:45 Hrs)

Auditorium, TIFR-H