



**S N BOSE NATIONAL CENTRE
FOR BASIC SCIENCES**
Block JD, Sector III, Salt Lake, Kolkata 700 106

JOINT DEPARTMENTAL SEMINAR

Condensed Matter and Materials Physics & Chemical and Biological Sciences

25th June 2025

4.00 PM

ONLINE / FERMION

SPEAKER



**Dr. Prakash Chandra Mondal, Associate Professor
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TITLE OF THE TALK

Charge Transport in Large-Scale Molecular Junctions

Molecules act as nanogaps between the two electrical contacts, followed by current-voltage (I-V) analysis, which is often termed “molecular electronics”. [1] Understanding the charge transport mechanisms, for which many of the concepts were developed from electrochemistry, is the foundation stone of molecular electronics. [2] Electrochemistry plays a pivotal role in scrutinizing electrode-electrolyte interface phenomena and electrochemical properties of molecular species.

Inherent endowments possessed by molecules, such as small size, solution-processability, tuneable electronics, and suitable anchoring groups, offer great advantages in conjunction with fascinating electronic functionalities. Interface stability and control of molecular film thickness at the nanoscale are paramount for semiconductor devices, easily achievable by electrochemically driven reduction of aryl diazonium salts.

In this talk, I will discuss how the electrochemical grafting method can be employed in growing controllable molecular nano-architectures on technologically relevant ITO electrodes for large-scale molecular junctions. Molecular junctions composed of small organic molecules, metal complexes, and molecule-nanoparticle heterostructures sandwiched between two electrodes will be highlighted. The importance and diverse applications of electrochemically grafted molecular layers in charge transport, memory, charge storage, and spintronic applications will be discussed. [3-8]

References

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