TIFR Centre for Interdisciplinary Sciences
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Seminar

Electron transport through single molecular junctions: Molecular wires, switches to energy production/storage devices

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The idea of building electronic devices using single molecule as active component was first proposed by Aviram and Ratner in the early seventies. Indeed, molecules are of great interest for application in electronic devices because of their small size, their recognition properties, their ability of self-organization and their possibility of chemical modification and customisation. Thus, the ability to measure and control charge transport across metal/molecule/metal junction is of considerable fundamental interest and represents a key step towards the development of molecular electronic devices.

During my PhD, I have employed STM break junctions (STM-BJ) and a complimentary mechanically controllable break junction (MCBJ) technique to scrutinise the electron transport properties of metal/molecule/metal junctions under well controlled experimental conditions (in liquid at room temperature). Using the results from several case studies, I will try to demonstrate the device independence and reproducibility of the charge transport characteristics of metal/molecule/metal junctions at single molecular level.

In the later part of my presentation, I will try to discuss the results from my postdoc work, which is mainly focusing on the developing self-assembly assembly procedures of the functional molecules (both redox active and Photo active) on Au, Pt single crystal electrode surfaces and transparent electrodes like ITO, FTO surfaces in a smart/controlled manner without losing their functionality which is observed at single molecular level and studying their charge properties under electrochemical conditions (or under the influence of external trigger by employing EC-STM break junction and CP-AFM techniques), building the devices from these assembled smart molecular surfaces. These studies offer a huge potential for energy production/storage, electrocatalysis and molecular electronics applications.

Wednesday, Jan 21st 2015

4:00 PM (Tea/Coffee at 3:30 PM)

Seminar Hall, TCIS