Tata Institute of Fundamental Research
Survey No. 36/P, Gopanpally Village, Serilingampally, Ranga Reddy Dist., Hyderabad – 500 046

Students' Annual Seminar

Doping of Organic Semiconductors for Efficient Optoelectronic Devices

Brijesh Kumar Patel

Organic semiconductors (OSCs) have emerged as promising alternatives to traditional inorganic semiconductors because of their unique advantages. Molecular doping of OSCs is a significant technological process for controlling the electrical conductivity of optoelectronic devices and improving their performance. However, the existing class of dopants faces several issues, including low efficiency, instability, and a limited selection of counter anions. In our research, we employed thianthrene radical cation as a dopant for OSCs with deep HOMO levels, such as Poly Vinyl Carbazole (PVK). Additionally, we developed a dopant that is ambient-stable, sublimable, and capable of doping most of the hole transport layer (HTL) materials used in solar cells. Confirmation of doping in these OSCs was achieved through various techniques, including EPR (Electron Paramagnetic Resonance), UV-visible spectrometry, I-V measurements, X-Ray photoelectron spectroscopy (XPS), and Hall measurements. I will discuss the importance of doping an OSC with a deep HOMO level, the challenges in doping OSCs, the effect of different counter-anions on the doping efficiency of OSCs and the methods to overcome these difficulties to make efficient optoelectronic devices.

Thursday, Mar 21st 2024

14:00 Hrs (Tea / Coffee 13:45 Hrs)

Seminar Hall, TIFR-H