SCDT – FlexE Centre Webinar Series

The webinars aim to bring together researchers in Flexible Electronics and allied areas from across India (and other countries) on a single platform to promote professional interaction.

Webinar by

Dr. Dinesh Kabra
Department of Physics,
Indian Institute of Technology Bombay

on
"Exciton Conduction in Polymeric Semiconductor Solids"

Date: 10th May, 2022
Time: 7:30 PM to 8:30 PM

Visit www.iitk.ac.in/scdt/webinars.html to access the zoom link to join the webinar.

The event will be chaired by
Dr. Sumitra Singh
CSIR-Central Electronics Engineering Research Institute (CSIR-CEERI)

Abstract of the Webinar

Organic semiconductors are proven to be useful for various optoelectronic devices whether on solid or flexible substrates. As OLED technology crossing the small-area display market share of ~ $40B by 2021 and a rapid improvement in single junction solar cells efficiency towards 20% equivalent to their inorganic counter-part is attracting a lot of attention world-wide from academia and industrial laboratories. Being low density materials, the primary excitation is electron-hole bound pair, i.e., Frenkel excitons - which sets up a new level of exotic photo-physics for this class of semiconductors.

Prof. Dinesh Kabra's group deals with this class of semiconductors and halide perovskites semiconductors where they study fundamental semiconductors physics and then transfer this knowledge to develop high performance state of art optoelectronic devices. In this talk, with a brief overview of the group's research activities the focus will be on transport physics of non-emissive dark triplet excitons, which are in general considered to be highly localized and lossy channel. It has been demonstrated that with chemical structure design and right processing conditions one can not only make these triplets highly conducting but also make them emissive via bimolecular fusion process without the use of high Z metal. In order to visualize these dark triplets, a customized unique optoelectronic technique has been developed, which allows the tracking of triplet's motion normal to substrate and in-plane diffusion which was studied via delayed PL imaging. Anisotropic diffusion transport is correlated with structural studies. These findings could shed a light on puzzling highly efficient unusually thick emissive layers (1200 nm as compare to usual 15-80 nm), which are technologically highly relevant for better yield. [References]

Information about the speaker

Dr. Dinesh Kabra (DK) is Professor at Department of Physics, IIT Bombay. He is also a recipient of best research paper award 2016 and early research achiever award 2015 of IIT Bombay. DK is at the forefront of optoelectronics technology research and is highly experienced at translating lab ideas into impactful industrial applications. In particular, he is recognised for electroluminescence studies and photo-physics of emerging photonic materials by his numerous highly cited papers and patents filing. DK is specialized in developing customized advanced spectroscopic tools to target specific research problems linked with unconventional semiconductors like; halide perovskites and organic semiconductors. His group is pioneering in the development of spectroscopy on state-of-the-art optoelectronic devices. DK has published more than 100 peer reviewed research papers and 10 national & international patents in the field of electronic materials and devices, many of which are licensed to the industries.