



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.

Abstract of the Webinar

The last decade witnessed extensive research on perovskite based optoelectronic devices like solar cells and light emitting diodes. As a consequence, perovskite solar cells now report efficiencies comparable to champion c-Si solar cells. Interestingly, these devices can be fabricated on flexible substrates and hold immense potential towards building integrated applications as well. It is well known that performance of solar cells is critically influenced by the recombination mechanisms. A solar cell offers best performance when it is limited by band-band or bimolecular recombination. On the other hand, practical solar cells are often limited by trap assisted recombination. Hence, it is crucial to identify the dominant recombination mechanism for further optimization. Usually, this is achieved through a wide variety of spectroscopy characterization schemes at a thin film or material level. However, device fabrication involves multiple materials with different process conditions and thermal budgets. As such, it is immensely beneficial to identify and characterize the recombination mechanisms at a device level as well.

In this context, here we address a few important questions related to solar cells: What are the practical limits of efficiency? Is it possible to unambiguously identify the dominant recombination mechanism in solar cells? Can one back extract recombination parameters from terminal electrical characteristics? What might be the influence of phenomena like ion migration on annual energy yields? We address these broad system level concerns through a combination of analytical modeling and detailed numerical simulations. Transient as well as steady state optoelectrical measurements confirm our theoretical predictions. We further identify novel characterization schemes to back extract the key parameters associated with carrier recombination in such solar cells. Indeed, these results are of broad interest towards further optimization of perovskite based solar cells – including Perovskite/Si tandem solar cells.

Information about the speaker

Pradeep R. Nair is a faculty with the Dept. of Electrical Engineering, Indian Institute of Technology Bombay, India. His current research interests include modeling and simulation of perovskite based solar cells and light emitting diodes, biosensors, and semiconductor device physics. Prof. Nair received B. Tech. degree in Electronics and Communication Engineering from National Institute of Technology, Calicut, India (2002), the M. Tech. degree in Electrical Engineering from the Indian Institute of Technology (IIT), Bombay, Mumbai, India, (2004), and his Ph.D from School of ECE, Purdue University, West Lafayette, IN USA (2009).

Webinar by



Dr. Pradeep R. Nair

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“Perovskite based solar cells: From recombination phenomena to Annual Energy Yields”

Date: 13th August, 2024

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. Samatha Benedict

Indian Institute of Technology Dharwad