



MSE Faculty Seminar

Exploiting the ionic and electronic properties of halide perovskites

Associate Professor Nripan Mathews

Abstract

Halide perovskites have been under the focus for photovoltaic applications where their power conversion efficiencies have soared to efficiencies exceeding 25%. They have also garnered tremendous research interest over recent years for the development of next-generation light-emitting diodes (PeLED) in optical displays and light sources. The spotlight on this class of semiconducting material stems from several of its enviable traits such as long carrier diffusion length, defect tolerance, high colour purity, and spectral bandgap tunability which spans across the visible and infrared spectrum. This talk will cover our recent efforts in scaling photovoltaic devices and our efforts in enabling blue light emitting diodes. This entails the careful tailoring of the perovskite compositions and processing conditions. Finally, we would point to our efforts in utilising the ionic characteristics of halide perovskites to enable memristive devices that can be employed for neuromorphic applications.

Biography

Nripan Mathews is an Associate Professor at the School of Materials Science and Engineering as well as the Energy Research Institute @ NTU at Nanyang Technological University, Singapore. He is also Associate Director of the Institute of Advanced Studies and Appointed as Provost's chair professor in Materials Science and Engineering. He obtained his first degree in Materials Engineering from NTU and his MSc under the Singapore-MIT alliance. Following his PhD at Paris VI University, he was also a Visiting Scientist at École Polytechnique Fédérale de Lausanne (EPFL). His interest lies in making cheap abundant unconventional electronic materials through cost-effective techniques for making electricity and fuels from solar power. Other interests include sustainable electronic recycling technologies. He has published more than 200 papers and he has been recognised by multiple awards including the National Young Scientist Award, MIT-TR35 award and is listed as a highly cited researcher (among 1% in the world) for multiple years.

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MSE Meeting Room 1 (N4.1-01-28)

Hosted by: Associate Professor Kedar Hippalgaonkar