DEPARTMENT OF PHYSICS
ANNA UNIVERSITY, CHENNAI - 25

We Cordially Invite You to the Guest Lecture on

" Emerging Low-dimensional Semiconductors for Novel Optoelectronic Devices "

By

Dr. SURENDRA B. ANANTHARAMAN

Dr. Surendra B. Anantharaman, before joining (AMO) Automatisierung Messtechnik Optik, he was a Postdoctoral Researcher at the University of Pennsylvania, USA. He investigated exciton-polariton dynamics upon strong light-matter coupling without an external cavity from two-dimensional (2D) perovskites, transition metal-dichalcogenides, and emerging 2D hybrid materials. He received his Ph.D. from the Swiss Federal Institute of Technology Lausanne (EPFL), Switzerland, in 2019 on "Exciton Dynamics in 2D Organic Assemblies for Realization of Next-Generation Optoelectronic Devices". His research focuses broadly on light-emitting devices, energy harvesting systems, and spin/charge injection in the perovskite optoelectronic devices.

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Date – 08 March 2023 & Time – 09.30 A.M to 10.30 A.M
Venue - Physics Auditorium

Abstract - Low-dimensional semiconductors from 0D quantum dots to 1D carbon nanotubes and 2D layered semiconductors (transition metal dichalcogenides, hybrid perovskites, molecular assemblies) possess a strong exciton binding energy at room-temperature. 2D molecular assemblies, called J-aggregates, possess strong exciton-exciton dipole coupling, which leads to narrow linewidth (<15 nm) in absorption and photoluminescence. The exciton dynamics and novel molecular assembly strategy to enhance the photoluminescence quantum yield (PLQY) in J-aggregate thin films and recent progress in forming exciton-polaritons in all low-dimensional semiconductors will be discussed. In thin films, exciton-charge quenching was identified as a non-radiative decay channel, which can be circumvented in micron-size J-aggregate crystals with PLQY ~5.Conventional polariton architecture involves a semiconductor placed between external optical mirrors hindering the feasibility of integrating electrical contacts in optoelectronic devices. Further, new strategies to form exciton-polaritons without an external cavity in 2D perovskites will be discussed. 2D perovskites as a model semiconductor, and the potential of strong light-matter coupling for energy harvesting applications will be discussed.