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ECE 2024 Colloquium Series

Friday, April 12, 2024
11:15pm – 12:05pm
ITE 336
(Refreshments in ITE 301 at 11 am)

Building Heterostructures from Solution-Processed Semiconductors for Next-Generation Optoelectronics

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Abstract:
Solution-processed semiconductors, including metal halide perovskites, colloidal quantum dots, and organic molecules, offer a promising platform for scalable optoelectronic device manufacturing. While each material offers distinctive optoelectronic advantages, they also pose limitations. Building heterostructures with diverse semiconductor types can effectively mitigate these limitations inherent in single-material platforms and create unprecedented properties. In this talk, I will delve into our recent research focusing on the development of solution-processed heterostructures with the aim of regulating light, charge, and spin dynamics for future optoelectronic and computing technologies. Specifically, I will highlight the epitaxial integration between quantum dots and perovskites, resulting in the formation of a quantum well structure that facilitates efficient charge injection and enables exceptional light emission properties. Additionally, I will discuss the incorporation of chiral organic molecules into metal halide perovskite lattices for spin manipulation, which drives advancements in circularly polarized light emission and photodetection. These examples underscore the immense potential of heterostructure design in shaping the future landscape of optoelectronic and spintronic devices.

Bio:
Dr. Mengxia Liu *is an Assistant Professor at the Department of Electrical Engineering and Energy Sciences Institute at Yale University. She received her PhD degree in the Department of Electrical and Computer Engineering at the University of Toronto in 2018. She spent three years in the Cavendish Laboratory at the University of Cambridge as a post-doctoral fellow and joined Yale in July 2022. Her research group focuses on developing solution-processed infrared optoelectronic materials and devices for optical sensing and communication. Her studies involve novel materials design, device manufacturing, and ultrafast spectroscopies.*