

University of Miami, Physics Department Colloquium

Date: Wednesday, Sep 30, 2026
Time: 4:00 pm – 5:00 pm
Location: Physics Library – Rm 335, Knight Physics Building

Molecular Architects for Two-dimensional Perovskites

Dr. Letian Dou

Department of Chemistry, Emory University

Abstract

Two-dimensional (2D) halide perovskites represent a structurally extensible class of hybrid semiconductors with growing importance in optoelectronic research. Compared with their three-dimensional counterparts, 2D perovskites offer enhanced compositional and structural flexibility arising from reduced constraints on organic ligands, enabling molecular-level design of structure and function. In this talk, I will examine recent advances in 2D perovskites from the perspective of organic ligand design. We focus on conjugated, chiral, and multidentate ligands, and discuss how noncovalent interactions introduced by ligand design govern crystallization behavior and inorganic framework assembly, enabling control over structure, morphology and properties in 2D perovskites. These ligand-driven structural features regulate electronic structure, charge transport, excitonic behavior, and light-matter interactions, thereby influencing stability and performance in optoelectronic, photonic, and quantum devices.

Biography



Dr. Letian Dou is currently the Paul & Phyllis Fireman Professor of Chemistry at Emory University. Prior to that, he was Charles Davidson Associate Professor of Chemical Engineering and Chemistry (by courtesy) at Purdue University. He obtained his B.S. in Chemistry from Peking University in 2009 and Ph. D in Materials Science and Engineering from UCLA in 2014. From 2014 to 2017, he was a postdoctoral fellow at University of California-Berkeley and Lawrence Berkeley National Laboratory. His research interest includes the design and synthesis of novel polymers, organic-inorganic hybrid materials and low-dimensional materials, fundamental understanding of the structure-property relationships, as well as applications in high performance electronic and optoelectronic devices. He is a recipient of Small Young Innovator Award (2025), ACS Photonics Young Investigator Lectureship award (2025), Humboldt Research Fellowship (2024), Waterloo Institute for Nanotechnology (WIN) Rising Star Award (2022), AIChE Owens Corning Early Career Award (2022), NSF CAREER Award (2021), Advanced Materials Rising Stars Award (2021), Office of Naval Research Young Investigator Award (2019), Highly Cited Researcher in Cross-Fields (2019-present), MIT Technology Review Innovators Under 35-China Award (2018), among others.