

Materials Chemistry Seminar

Friday, March 8, 2024
11:30 a.m. ~ BRWN 4102

"Topological Modification at the Organic-Inorganic Interface"



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Abstract:

The past few decades have witnessed the rise of halide perovskites in the fields of electronics and photonics. These hybrid materials offer the opportunity to synergize chemical tunability and solution processability of organics with optical and electronic properties of traditional inorganic crystals. Molecular manipulation at the well-defined organic-inorganic interface can also enabled traditionally inaccessible crystal self-assembly and morphology. In this talk, I will present the development of a new subclass of layered halide perovskites via topologically modification of organic packing motifs by engineering supramolecular synthons. Specifically, the molecular-level crystal design facilitated tunable and scalable fabrication of various 1D morphologies from 2D perovskites, including nanowires, helical nanoribbons, and beyond. These 1D structures with well-defined cavities motivated a wide range of unusual optical properties, including polarization control, low-loss waveguiding, and efficient low-threshold light amplification.

Bio:

Dr. Wenhao Shao is currently a Postdoctoral Associate with Prof. Letian Dou at the Davidson School of Chemical Engineering, Purdue University. He obtained his B.S. from Fudan University in 2017 and Ph.D. from University of Michigan in 2022, both in Chemistry. His research focuses on designing organic building blocks for purely organic and organic-inorganic hybrid semiconductors. The design transfers molecular orbital manipulation and molecular-level interactions to the structures and morphologies, and ultimately the photonic and electronic properties.