

UCSD NANOENGINEERING/CHEMICAL ENGINEERING
Hybrid **SEMINAR SERIES**
Tuesday, August 23rd, 2022
Seminar Presentation: 11:00am - 12:00pm PDT
CMRR Jack Keil Wolf Auditorium



“Organic Semiconductor-Incorporated Perovskites (OSiP) – A New Family of Hybrid Electronic Materials”

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Abstract:

Halide perovskites are exciting new semiconductors that show great promising in low cost and high-performance optoelectronics devices including solar cells, LEDs, photodetectors, lasers, etc. However, the poor stability is limiting their practical use. In this talk, I will present the development of a new family of stable organic-inorganic hybrid electronic materials, namely, Organic Semiconductor-Incorporated Perovskites (OSiP). Energy transfer and charge transfer between adjacent organic and inorganic layers are extremely fast and efficient, owing to the atomically-flat interface and ultra-small interlayer distance. Importantly, this rigid conjugated ligand design dramatically enhances materials' chemical stability and suppresses solid-state ion migration and diffusion, making them promising for real-world applications. Based on this, we demonstrate for the first time an epitaxial halide perovskite heterostructure with near atomically-sharp interface, which pave the way for perovskite nanoelectronics and nanophotonics. Finally, using this stable and solution-processable OSiPs, we demonstrate the fabrication of high-quality thin films, which enable highly stable and efficient solar cells and LEDs.

Biosketch:

Dr. Letian Dou is currently the Charles Davidson Associate Professor of Chemical Engineering 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 the Department of Chemistry, University of California-Berkeley and Materials Science Division, Lawrence Berkeley National Laboratory. His research interest includes the design and synthesis of 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 NSF CAREER award (2021), Advanced Materials Rising Stars award (2021), Office of Naval Research Young Investigator Award (2019), Highly Cited Researcher in Cross-Fields (2019-2021), MIT Technology Review Innovators Under 35-China Award (2018), and MRS Graduate Student