

## Ligand Engineering for Modulating the Crystal Structure and Optoelectronic Properties of Two-Dimensional Metal Halide Perovskites



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Hosted by: Prof. Yongqing CAI

### Abstract

Two-dimensional (2D) metal halide perovskites are a unique class of organic-inorganic hybrid ionic semiconductors. Their structure can be viewed as 3D perovskite frameworks intercalated with layered organic cationic ligands, making the choice of ligands crucial in determining the properties of 2D perovskites. Ligand selection directly influences the crystal structure, optical characteristics, and electronic behavior of these materials, rendering it a key focus in perovskite research. This presentation will highlight a novel class of organic zwitterionic ligands and related chemical reactions developed by our research group, along with the resulting series of unprecedented 2D perovskite structures. The discussion will cover the discovery and development of these ligands and their reactions, their impact on perovskite dimensionality and bonding modes, as well as the optoelectronic properties of the derived materials.

### Biography

Prof. Zhenyu YANG is a Professor and Doctoral Advisor at Sun Yat-sen University. He obtained his B.Sc. from Nankai University in 2009 and later pursued his Ph.D. at the University of Alberta under the supervision of Prof. Jonathan Veinot, a leading expert in solid-state silicon chemistry. After earning his doctorate in 2014, he joined the laboratory of Prof. Edward Sargent at the University of Toronto as a postdoctoral researcher. In 2018, he was awarded the National "Young Thousand Talents Plan" Fellowship and returned to China to establish his independent research group at Sun Yat-sen University. His current research focuses on the synthesis and surface chemistry of silicon/germanium semiconductors, as well as the design and optimization of related optoelectronic devices. Prof. Yang holds four international patents and six domestic patents. As a corresponding author, he has published over 20 papers in prestigious journals such as Nature Communications, Journal of the American Chemical Society, Angewandte Chemie, Nano Letters, and ACS Nano, with total citations exceeding 10,000. He serves as a Youth Editorial Board Member for Journal of Semiconductors and Materials Futures. Additionally, he has been recognized as a Young Top Talent in the Pearl River Talent Program and listed as a Highly Cited Researcher by Clarivate Analytics.