Setting the Stage for Electroactive Organic Framework Materials: Bonding, Structures and Form Factors

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Porous two-dimensional (2D) and three-dimensional (3D) organic frameworks have garnered great interests for their potential as a new catalog of multifunctional materials, on account of well-defined structural precision, high periodicity and long-range ordering. The unlimited choice of electroactive building blocks enables rational design and synthesis of functional frameworks as promising candidates for applications in optoelectronics, solar fuel and energy storage, though there are practical issues that limit the materials performance. In this talk, I will outline several of such roadblocks and our approaches in addressing these challenges. A few case studies include soluble supramolecular frameworks, porous graphitic frameworks and thin film covalent organic frameworks. Through the control of bonding, framework structure and form factor, we demonstrate the development of framework materials with enhanced properties, including efficient photocatalysts, high performance cathodes for lithium ion batteries and responsive organic semiconductors.

Yi's biosketch

Yi Liu is a Career Staff Scientist and the Organic Facility Director at the Molecular Foundry, Lawrence Berkeley National Laboratory, USA. He obtained his Ph.D. degree in Chemistry in 2004 from the University of California, Los Angeles. After his post-doctoral research at the Scripps Research Institute, he joined the Molecular Foundry in 2006 as an independent principal investigator. His research interests include design and self-assembly of functional organic and organic-inorganic hybrid framework materials, chemistry for framework materials and organic electronics, and fundamental understanding of the associated electronic processes.