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IAPME Seminar

Beyond Perovskite Solar Cells: Can Perovskite LEDs Lead the Way in Lighting and Communication Applications?



27 September 2024

Prof. Hin-Lap YIP
City University of Hong Kong
Venue: N23-4018
Time: 14:00 - 15:00
Hosted by: Prof. Guichuan XING

Abstract

Organic-inorganic hybrid perovskites have rapidly advanced as versatile semiconductors for solar cells and LEDs, with their properties tunable through composition and crystal structure modifications. This talk will outline our strategies to control perovskite dimensions and nanostructures using small molecules with tailored functional groups, leading to developing highly stable and efficient quasi-2D perovskite solar cells. We also leverage interface engineering techniques from organic solar cells to enhance charge collection and defect passivation in perovskite solar cells and organic/perovskite tandem solar cells.

Extending beyond solar cells, our research focuses on perovskite light-emitting diodes (PeLEDs) for lighting, display technologies, and visible light communication (VLC). For green PeLEDs, we employ interfacial chemistry-assisted in-situ growth of high-quality perovskite films with ultra-low trap densities, significantly improving brightness, operational lifetimes, and efficiency. In blue and white PeLEDs, we use self-assembled monolayers (SAMs) to enhance stability, efficiency, and color purity, as well as a downconversion approach for high-quality white light. These advancements highlight the potential of perovskite materials in various optoelectronic applications, including VLC and possibility lasing.

Biography

Prof. Angus Hin-Lap Yip joined the Department of Materials Science and Engineering and the School of Energy and Environment at the City University of Hong Kong as a Professor in 2021. He has also served as the Associate Director for the Hong Kong Institute for Clean Energy since 2022. He is an elected member of the Hong Kong Young Academy of Sciences. From 2013-2020, he was a Professor at the State Key Laboratory of Luminescent Materials and Devices (SKLLMD) and the School of Materials Science and Engineering (MSE) at the South China University of Technology (SCUT). He got his BSc (2001) and MPhil (2003) degrees in Materials Science from the Chinese University of Hong Kong (CUHK), and completed his PhD degree in MSE in 2008 at the University of Washington (UW), Seattle. His research uses an integrated approach combining materials, interface, and device engineering to improve polymer and perovskite optoelectronic devices. He has published over 300 scientific papers with citations of ~45000 and an H-index of 107. He was also honored as ESI "Highly Cited Researcher" for 10 consecutive times from 2014-2023.