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Title: Solution-Processed Perovskite Electronics with Light-Responsive Mixed-Dimensional Heterostructures

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Abstract

In this talk, I will discuss the advances and challenges of using hybrid materials and heterostructures for high-performance solution-processed electronics. Hybrid organo-metal perovskites have been extensively explored for photovoltaic applications because of their unique physical properties such as superior light absorption, defect tolerance, and ferroelectric polarization. But perovskite-based devices are limited by charge mobility (often two or three orders of magnitude lower than common semiconductors like polycrystalline silicon). I will review various strategies towards enhancing device performance of hybrid perovskites via coupling with low-dimensional materials. We demonstrate that combining 3D hybrid perovskites with high-mobility 1D carbon nanotubes or 2D two-dimensional metal dichalcogenides significantly enhances charge transport and device performance.

Biography

Dr. Tom Wu (吴韬) received his B.S. degree from Zhejiang University in 1995 and Ph.D. degree from the University of Maryland, College Park in 2002. Before joining University of New South Wales (UNSW) in Sydney as a full professor, he worked as postdoc in Argonne National Laboratory in Chicago, assistant professor in Nanyang Technological University (NTU) Singapore, and associate professor in King Abdullah University of Science and Technology (KAUST). Dr. Wu has authored 280 peer-reviewed papers with over 15,000 citations and a H-index of 72 in the areas of oxide thin films, nanomaterials, and hybrid perovskites, with a focus on their electronic, magnetic and optical functionalities. He is among the 2019 Clarivate Analytics List of Highly Cited Researchers. His group has witnessed the career development of 18 PhD students and 30 postdocs. He also serves as an Associate Editor for ACS Applied Materials & Interfaces.