Opportunities and Challenges for Emerging 2D Electronics

Po-Hsun Ho

Department of Materials Science and Engineering, National Tsing Hua University, Hsinchu 300044, Taiwan

Email: pohsunho@mx.nthu.edu.tw

Abstract:

Over the past 15 years, a wide range of atomically thin two-dimensional (2D) materials has been discovered and extensively studied. Among them, monolayer transition-metal dichalcogenides (TMDs) exhibit suitable bandgaps and high carrier mobility at the monolayer limit, making them strong candidates for post-silicon electronics. However, their dangling-bond-free surfaces hinder not only epitaxial growth by CVD but also uniform oxide formation through conventional ALD processes. Consequently, 2D transistors still face major challenges, including large contact resistance, unreliable gate stacks, and immature doping techniques. In this talk, I will highlight the key obstacles to realizing high-performance 2D transistors and outline our step-by-step strategies to address them.

Name: Po-Hsun Ho
Position: Assistant Professor
Department: Department of Materials Science and Engineering
Education: PhD, National Taiwan University

E-mail: pohsunho@mx.nthu.edu.tw
Phone number: +886-3-570-5131 #35397
Website: https://pohsunholab.wixsite.com/pohsunholab
Research areas:
Electronic/Optoelectronic materials, Low-Dimensional Materials, Oxide Semiconductors, Semiconductor Processing, Electronic Devices

Bio:

Po-Hsun Ho is an Assistant Professor in the Department of Materials Science and Engineering at National Tsing Hua University (NTHU). His research focuses on emerging low-dimensional materials, including two-dimensional materials, carbon nanotubes, and ultrathin oxide semiconductors. He received his Ph.D. in Materials Science and Engineering from National Taiwan University, where he studied the growth, doping, and optoelectronic device applications of graphene. He then further expanded his research into novel two-dimensional electronics during his postdoctoral training at the Center for Atomic Initiative of New Materials and at National Tsing Hua University. Dr. Ho later joined the IBM T. J. Watson Research Center and Stanford University as a visiting scholar and postdoctoral research fellow, where he developed assembly techniques for carbon-nanotube-based nanophotonic systems. Following his academic research, he served as a technical manager in the corporate research division of Taiwan Semiconductor Manufacturing Company (TSMC), working on pathfinding and process integration for high-performance 2D electronic devices. With his extensive multidisciplinary experience, Dr. Ho has published numerous research papers in top-tier journals, including *Nature Communications, Proceedings of the National Academy of Sciences of the United States of America (PNAS), Advanced Materials, ACS Nano, Nano Letters, Physical Review Applied, and Energy & Environmental Science.*