



中国科学院半导体研究所

黄昆半导体科学技术论坛

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报告题目: Van der Waals Material Devices for Logic, Memory and Computing
报告人: Prof. Han Wang (University of Hong Kong)

Abstract: In this talk, I will discuss the recent academic and industrial development of van der Waals material based devices for advanced logic, memory and computing technologies. Two-dimensional (2D) transition metal dichalcogenides materials are promising candidates for advanced logic transistor applications. It however still faces difficulties towards practical commercialization due to challenges in device contact resistance, gate dielectric technology, integration process development, as well as its reliability and yield. In the first part of the talk, I will discuss our recent work in addressing some of these issues. Moreover, the unique physical properties of 2D materials also offer opportunities for developing novel memory and computing device technologies that can result in substantial performance improvement over traditional semiconductor devices as well as enabling new device and circuit functionalities difficult to achieve using conventional technologies. In the second part of the talk, I will discuss our work in developing such new semiconductor devices including 2D material based ferroelectric tunneling junction memory and stochastic computing devices for efficiently solving combinatorial optimization problems. I will conclude with remarks on how van der Waals material devices are expected to benefit the next-generation electronics systems and the remaining roadblocks that need to be overcome.



报告人简介: Han Wang joined the University of Hong Kong (HKU) in 2023 as a full professor in the Department of Electrical and Electronic Engineering. He also serves as the Co-Director of the Institute of Mind at HKU. He received the B.A. degree in electrical and information science from Cambridge University in 2007 and his PhD degree from Massachusetts Institute of Technology (MIT) in 2013. From 2013 to 2014, he worked in the Nanoscale Science and Technology group at IBM T. J. Watson Research Center. From 2014 to 2023, he was with the Department of Electrical and Computer Engineering at the University of Southern California, first as an Assistant Professor and then as a tenured Associate Professor. In 2021-2023, he served as the head of the low dimensional materials research department at Taiwan Semiconductor Manufacturing Company (TSMC), in parallel to his faculty position at USC. His research interests include advanced microelectronics technology based on emerging semiconductor materials and devices for advanced AI hardware, communication and infrared sensing.

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