

Nano Seminar Series

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2D Devices and Systems for Energy-Efficient Sensing and Computing

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Abstract: Continuing scaling of transistors following Moore's law has been challenging, thus new types of technology are needed for today's applications requiring efficient generation and processing of large amounts of data. Two-dimensional (2D) materials, especially 2D semiconductors provide unique opportunities for advancing the computing and sensing technology, due to the atomic scale thickness and other interesting physical properties. In abundant-data computing, the energy and delay in computing largely attributes to the huge memory wall instead of the processors alone. A better integration of memory with logic is required for a more efficient computing system. 2D transistors and emerging memory technology such as resistive random-access memories (RRAMs) and are suitable for such integration. We have explored the ternary content-addressable memory (TCAM) based on MoS₂ transistors and metal-oxide RRAMs, toward efficient and parallel search of massive data. On the other hand, efficient sensing is also critical, and we have engineered single crystal and bicrystal metallic structures on amorphous insulating substrates toward more efficient plasmonics devices.

Biography: Prof. Rui Yang is currently a Tenure-Track Assistant Professor in University of Michigan – Shanghai Jiao Tong University Joint Institute (UM-SJTU JI) in Shanghai Jiao Tong University in China, since August 2018. Before that, he was a postdoctoral scholar in Electrical Engineering Department at Stanford University, working with Prof. H.-S. Philip Wong and Prof. Jonathan Fan. His research covers the integration of emerging nonvolatile memories with 2D transistors for efficient computing, as well as metallic material engineering. He obtained his PhD degree from Case Western Reserve University in 2016, working with Prof. Philip Feng on nanoelectromechanical systems (NEMS) and 2D devices. He serves as the Associate Editor of journal *Micro & Nano Letters*, and as the Reviews Editor of journal *Nanotechnology*.



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