



### Weekly Seminar

#### High Performance Electronics based on 2D heterostructure and ultrathin ITO

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*Institute of Microelectronics*



**Time: 4:00pm, Nov. 4, 2020 (Wednesday)**

**时间: 2020年11月4日 (周三) 下午4:00**

**Venue: Room W563, Physics building, Peking University**

**地点: 北京大学物理楼, 西563会议室**

#### Abstract

Electronic devices based on atomic layered two-dimensional materials and related heterostructures have recently attracted great research attention due to their unique electronic properties and the feasibility of hybrid integration, which provide the unprecedented opportunities for various van der Waals heterojunctions. We have studied the performance improvement based on black phosphorus and molybdenum disulfide from the carrier velocity and operating frequency. High frequency transistor and circuits operating at gigahertz range based on molybdenum disulfide are demonstrated with record high maximum oscillation frequency. Moreover, bandgap engineering using lateral heterojunctions has been carried out with multifunctionality for reconfigurable logic and transverse tunnelling operations, showing great promise for future electronics. Ultrathin indium tin oxide has been also systematically investigated for record high performance logic transistors down to 10 nm channel length with high on off ratio.

#### References:

- (1). Xiong Xiong, Mingqiang Huang, Ben Hu, Xuefei Li, Fei Liu, Sichao Li, Mengchuan Tian, Tiaoyang Li, Jian Song, Yanqing Wu\*. Nature Electronics, 2020, 3 (2): 106-112.
- (2). Shengman Li, Mengchuan Tian, Qingguo Gao, Mengfei Wang, Tiaoyang Li, Qianlan Hu, Xuefei Li & Yanqing Wu\*, Nature Materials, 2019, 18, 1091-1097.
- (3). Xuefei Li, Zhuoqing Yu, Xiong Xiong, Tiaoyang Li, Tingting Gao, Runsheng Wang, Ru Huang and Yanqing Wu\*, Science Advances, 2019, 5, eaau3194.
- (4). Qingguo Gao, Zhenfeng Zhang, Xiaole Xu, Jian Song, Xuefei Li & Yanqing Wu\*, Nature Communications, 2018, 9, 4778.
- (5). Mingqiang Huang, Shengman Li, Zhenfeng Zhang, Xiong Xiong, Xuefei Li and Yanqing Wu\*, Nature Nanotechnology, 2017, 12, 1148-1154.

#### About the speaker

吴燕庆, 北京大学信息科学技术研究员。2005年在复旦大学获本科学位, 2009年在美国普渡大学获得博士学位。博士毕业后曾在IBM沃森研究中心担任研究员及华中科技大学教授。围绕后摩尔新材料电子器件与电路开展了多项原创性工作。近五年来作为通讯作者在包括Nature Electronics Nature Materials, Nature Nanotechnology, Nature Communications, Science Advances等顶级国际学术期刊与国际电子器件会议IEDM在内的国际会议上发表论文50余篇。