量子材料科学中心
International Center for Quantum Materials
Weekly Seminar

Graphene Nanoribbon electronic devices and quantum wires

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Time: 4:00 pm,Dec.20, 2012 (Thursday)
时间：2012年12月20日（周四）下午 4:00
Venue: Conference Room A (607), No. 5 Science Building
地点：理科五号楼607会议室

Abstract

Graphene Nanoribbons (GNRs) have attracted much interest because of their unique one-dimensional structures with magnetic edge states and tunable bandgaps, which are desirable for electronic device applications. This talk will present our results on the synthesis, electron transport and devices of GNRs down to a few nanometers wide. We have developed several approaches to synthesize GNRs, including chemical sonication, unzipping carbon nanotubes and lithographic patterning. Chemical methods could obtain sub-5nm semiconducting GNRs. Based on the chemically derived GNRs, we have demonstrated both p- and n-type high on/off ratio field-effect transistors. On the other hand, lithographic patterned GNR arrays could be useful for large scale device integration. Finally, we employ unzipping of multi-walled carbon nanotubes to produce high quality GNRs. Many nanoribbons have ultrasmooth edges as revealed by aberration-corrected transmission electron microscopy. Different from lithographic with defects and dangling bonds along the edges, at low temperatures, some of the high quality GNRs exhibited well-defined quantum transport phenomena, including Coulomb blockade, the Kondo effect, clear excited states up to ~20 meV. Our data indicate that these nanoribbons behave as clean quantum wires at low temperatures, and are not dominated by defects.

About the Speaker

王欣然，南京大学电子科学与工程学院、固体微结构国家实验室教授、博士生导师。2004年本科毕业于南京大学物理系，2010年获斯坦福大学物理学博士学位，师从美国国家艺术与科学院院士Hongjie Dai教授。2010年-2011年在美国伊利诺伊大学香槟分校John Rogers教授组做博士后研究。2011年入选首批国家“青年千人计划”。王欣然教授主要从事微纳电子器件、集成技术以及量子调控研究。在石墨烯、硫化钼等低维材料的制备、电子器件与集成，以及量子输运等方向系统深入地开展了多项原创性工作。在Science、Nature、Nature系列、Phys.Rev.Lett.、JACS等国际顶级学术期刊发表论文20余篇，论文他人引用次数超过4000次。

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