



北京大学量子材料科学中心

International Center for Quantum Materials, PKU

Weekly Seminar

Ferroelectrics Assisted Electronics and Optoelectronics Devices of 1D/2D Materials

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Time: 4:00pm, Feb.22, 2017 (Wednesday)

时间: 2017年2月22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

Ferroelectricity is a property of certain materials that have a spontaneous electric polarization that can be reversed by the application of an external electric field. Ferroelectrics have been studied widely and used for different applications many years. In recent years, one and two dimensional (1/2D) materials have been also focused on for their potential in the next generation electronic/optoelectronic systems. In this talk, I will give a brief introduction on ferroelectrics, their typical properties and applications. A special ferroelectric, polyvinylidene fluoride (PVDF) will be addressed. The fabrication with precise control at the molecular scale, the dielectric properties, polarization switching processing and relaxor origin of PVDF based polymer will be discussed. Then two types of devices based on PVDF and their related mechanisms will be discussed. One is the PVDF based ferroelectric tunneling junctions. The tunneling mechanism of PVDF organic FTJ will be discussed [1]. Another type device is the ferroelectric field effect transistor (FeFET) with 1D and 2D semiconductor channel and PVDF gate dielectric. Two typical applications of PVDF FeFET, photodetector and memory, will be discussed [2-6]. On this type of photodetector, the band engineering of 2D materials will be covered and discussed. Finally, I will discuss a few promising future research directions on the FeFET structure with 2D materials.

About the speaker

Jianlu Wang received the PhD. Degree in microelectronics and solid state electronic from Shanghai Institute of Technical Physics (SITP), Chinese Academy of Sciences (CAS), Shanghai, China, in 2010. Then he joined National Laboratory for Infrared Physics of SITP, CAS. Currently, he is an associate professor in National Laboratory for Infrared Physics. He currently is focus on the application of uncooled infrared detector, ferroelectric related electronic and optoelectronic devices.