苏州大学功能纳米与软物质研究院鲍桥梁教授学术报告通知

报告题目：Photonics of two-dimensional materials beyond graphene

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欢迎老师和学生踊跃参加！

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About the Speaker

Dr. Qiaoliang Bao received his Ph. D degree from Department of Physics, Wuhan University in 2007. Since August 2008, he has started to work on graphene photonics in Graphene Research Centre, National University of Singapore (NUS). In September 2012, he joined FUNSOM, Soochow University as a professor. His main achievements include the invention of graphene-based mode-locked laser and graphen broadband polarizer. Dr. Bao's research is focused on 1) advanced low-dimensional optical materials and fundamental understanding of their optical properties; 2) photonic and optoelectronic devices based on two-dimensional functional materials including graphene, h-BN, layered transition metal dichalcogenides and topological insulators. He has received a few prestigious awards including *Lee Kuan Yew Postdoctoral Fellowship (Singapore, 2011), Awardee of Thousand Young Talents Program (China, 2012), Awardee of Excellent Young Researcher Grant of NSFC (China, 2012).* Dr. Bao has over 70 peer-review journal publications which include 1 in *Nature Photonics*, 1 in *Nature Chemistry*, 2 in *Nature Communications*, 3 in *Advanced Materials*, 2 in *Advanced Functional Materials*, 4 in *JACS*, 7 in *ACS Nano*, 5 in *Chemistry of Materials*, 3 in *Small*, *etc*. His publications have received >4600 citations, with an H-index of 35 as of July, 2014.

Photonics of two-dimensional materials beyond graphene

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The success in graphene with fascinating and technologically useful properties[1] has stimulated the study of two-dimensional (2D) atomic-layer materials other than graphene, such as single layers of transition metal dichalcogenides (TMDCs, e.g., MoS_2, WS_2, WSe_2, etc)[2] and a few quintuple layers of topological insulators (TIs, e.g., Bi_2Se_3, Bi_2Te_3, Sb_2Te_3 etc)[3]. The rapid pace of progress in graphene, TMDCs and TIs and some demonstrated applications have led to the exploration of new type of electric and optoelectronic devices constructed by vertically stacking different layered materials.[4,5]

Here we would like to review our recent progresses on the photonic applications of 2D layered materials other than graphene. A few photonics devices based on these 2D materials or their heterostructures have been successfully fabricated, including pulse laser, photodetector, solar cell, modulator and ring filter. Firstly, we use graphene as template to grow graphene/topological insulator heterostructure and investigate the linear and nonlinear optical properties. Strong saturable absorption was observed and the material was further applied for mode-locked laser to generate ultrafast laser pulse. Secondly, we directly grow large area TMDCs on graphene to form van deer waals hetero-junctions for efficient charge transfer and carrier separation at the interface [4], which is the basis for fabrication of new type of flexible thin film photodetectors and solar cell devices. Last, based on the good CMOS-compatibility of 2D materials [5], we fabricate chip-integrated modulator and resonator devices and incorporate graphene/TMDCs heterostructure for the signal modulation and processing. The advances of photonics of these new 2D materials may pave the way for the integration of next generation hybrid silicon photonic circuits.

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