北京大学量子材料科学中心

International Center for Quantum Materials, PKU

Seminar

Optomechanically controlling material geometries

Prof. Jian Zhou

Center for Advancing Materials Performance from the Nanoscale, Xi'an Jiaotong University

Time: 16: 00 pm, July. 12, 2019 (Friday)

时间：2019年7月12日 （周五）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

Diffusional phase-change materials, such as Ge-Sb-Te alloys, are used in rewritable nonvolatile memory devices (PC-RAM). This order-disorder transition contains a large latent heat and requires breaking of chemical bonds. It is thus highly desired to develop new phase change materials with diffusionless and order-to-order transitions to accelerate the read/write kinetics, reduce energy dissipation, and eliminate fatigue. Two-dimensional materials are considered as potential phase change materials. For example, one famous 2D material example is transition metal dichalcogenide monolayer which exists in 2H and 1T′ structures. However, it always requires mechanical, electrical, or electrochemical contacts and patterning to trigger phase transition. *Non-contacting* optical readout/write with focused laser would be preferable in many circumstances, especially for low-dimensional materials which are easily optically accessible. Here, we computationally illustrate an optomechanical strategy, which uses a linearly polarized laser pulse with selected frequency. We will give a few examples of such ultrafast diffusionless martensitic phase transition in various materials. With no or only a few chemical bonds breaking, the phase transition would occur very fast and requires low energy input.

About the speaker

Jian Zhou, Professor, Xi'an Jiaotong University, China. He received his BSc (2008) and PhD (2013) from Peking University. After appointments as postdoc associate at Virginia Commonwealth University and Massachusetts Institute of Technology, he joined Xi'an Jiaotong University in 2018, supported by 1,000 Young Program. Prof. Zhou has over 60 peer reviewed publications, including PNAS, PRL, JACS, Nano Lett., Nat. Communi., Angew. Chem., and etc. He has over 3,000 total citations and an *h*-index of 23. His research interest lies in theoretical and computational studies of low-dimensional quantum materials, with a most recent focus on optomechanics and topological materials.