



Seminar

Electron Scattering Probing Interfaces in Functional Materials

Peng Gao

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Time: 10:00am, Nov.10, 2020 (Tuesday)

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Venue: Room W563, Physics Building, Peking University

地点: 北京大学物理楼 西563



Abstract

The microscopy and spectroscopy based on electron scattering provides powerful tools to probe the atomic structure, electronic structure and phononic structures of interfaces in functional materials. In this talk, I show a few material systems studied by the vibrational electron energy loss spectroscopy (EELS), quantitative imaging, and atomic scale in situ tracking in transmission electron microscopes (TEM). We develop the 4D EELS to measure the local vibrational properties (phonon dispersion) for interfaces and nanostructures. Benefiting from the high spatial resolution, continuous excitation and detection, and large momentum transfer of EELS, we probe the surface phonon polaritons that are inaccessible to the nano-optics. Using quantitative imaging, we measure the lattice distortion of the surface, heterointerface, domain wall, and topological polar vortex with picometer precision, to reveal the screen mechanism. We also probe the domain dynamics and phase transition behaviors between polar topologies and trivial ferroelectrics by applying bias and stress inside the TEM.

About the Speaker

Dr. Peng GAO is an assistant professor in the International Center for Quantum Materials in School of Physics, Peking University since 2015. He received his Bachelor of Physics from University of Science and Technology of China in 2005 and Ph.D. of Physics in the Institute of Physics, Chinese Academy of Sciences in 2010. He was a postdoc in University of Michigan from 2010 to 2013, Research Associate in Brookhaven National Laboratory from 2013 to 2014, and Researcher Fellow in the University of Tokyo from 2014 to 2015. His primary research interest is probing the interfaces in functional materials by using electron scattering. Besides the developments of microscopy and spectroscopy techniques, his research also includes the low dimensional ferroics, solid state ionics and new energy materials, van der Waals epitaxially grown nitrides etc. He published 200+ peer-reviewed papers, including 70+ in Science/Nature and their sister journals, PRL, JACS, Adv Mater, and Nano Lett, with Google Scholar citation 7000+ and h-index 46. He was also awarded as 2015 JSPS fellow, 2017 TOP Breakthrough of the Year in ELECTRONIC SCIENCE and TECHNOLOGY of China, 2018 "Xin Rui" Scholar of 2018 China, and 2019 Youth Science of Technology Award of China Ceramic Society.