北京大学量子材料科学中心

International Center for Quantum Materials, PKU

ICQM Weekly Seminar

Emergent Phenomena at Complex Oxide Interfaces and Atomic-Scale Chemistry of Bimetallic Nanocatalyts

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Time: 4:00pm, Sept.19, 2012 (Wednesday)
时间：2012年9月19日 （周三）下午4:00
Venue: Room 607, Conference Room A , Science Building 5
地点：理科五号楼607会议室

Abstract

Scanning transmission electron microscopy (STEM) in combination with electron energy loss spectroscopy (EELS) has proven to be a powerful technique to study structural, compositional, and electronic information of materials at the atomic scale. With the recent addition of 3rd-order and now 5th-order aberration correction, the numerical aperture can be opened up by a factor of 2-3, allowing sub-Angstrom resolution to be achieved in a STEM. Additionally, the enlarged numerical aperture couple with the use of a cold-field-emission gun provides a factor of 100x increase in the usable current for probing inelastic scattering events, while still maintaining an Angstrom beam size. This allows for the acquisition of 2-D compositional and bonding maps of both bulk and nanostructured materials at atomic resolution. In addition, with the development of differentially pumped gas cell inside a transmission electron microscope (TEM), we can now visualize solid-gas chemical reactions *in situ*. This capacity in both imaging atomic-scale reaction dynamics and acquiring spectroscopic fingerprints allows us to reveal reaction pathways that could not be resolved by any other approaches. Here, I will give a background on my techniques, including STEM, EELS, electron tomography, and *in situ* environmental methods, and will present studies centered around emergent physics at complex oxide interfaces and Pt-M_{3d} bimetallic nanocatalysts before and after annealing, acid leaching, operational aging, gas oxidation, and reduction. I will also discuss the current challenges and future prospects for probing magnetism of materials at the atomic scale using electron vortex beams and achieving element-specific atom counting by quantitative STEM-EELS.

About the Speaker

忻获麟2005年本科毕业于北京大学物理学院物理学专业，随赴美留学康奈尔大学物理系，师从大卫.A.穆勒（David A. Muller）教授学习电镜显微学和电子能量损失谱学。2011年8月获得物理学博士学位，随后在劳伦斯伯克利国家实验室从事博士后工作。忻获麟在博士学习期间，从事原子级扫描投射电镜以及能谱相关的理论和技术研发，在原子级空间分辨非弹性散射定量理论，高能电子隧道理论，以及三维重建理论方面均有创新和建树。除了理论和方法论的研究，他应用原子级谱学方法和三维断层扫描技术对生物矿化物，二元金属催化剂以及复杂氧化物界面等多方面进行了深入的研究。