

许智 简历

姓名	许智	性别	男	出生日期	1980年 11月
最高学历	研究生			获得时间及专业	2008年 3月 专业：凝聚态物理
最高学位	博士			授予时间及单位	2008年 3月 单位：中科院物理所

学习及工作简历

教育经历：

起止时间	单位	专业	学历学位
1998.9-2002.6	武汉大学	物理学	学士
2002.9-2007.12	物理所	凝聚态物理	博士

工作经历：

起止时间	单位	职务职位
2008.3-2010.9	中科院物理所表面物理国家重点实验室	工程师
2010.9 至今	中科院物理所表面物理国家重点实验室	副主任工程师

主要工作成绩(包括技术成果、设备研发、专利情况等)

许智，致力于基于扫描探针技术的透射电子显微镜原位测量设备的研制与测量技术的发展。主导开发了多种透射电子显微镜原位样品杆、扫描探针控制系统。主要成果总结如下：

1、独立开发了基于 FPGA 实时控制系统的可用于 STM、调频 AFM、调幅 AFM 的通用型扫描探针控制器，包含压电陶瓷高压驱动、FPGA 的实时数据采集、锁相环路、反馈控制等全套核心功能。特别擅长受限空间内结构紧凑型压电驱动扫描头的设计。目前用于实际科研工作的具有三维粗进针和扫描功能的扫描头，其尺寸不超过 25mm*3.2mm*3.2mm。

2、基于以上的扫描控制单元和紧凑型扫描头，主导开发了多种用于透射电子显微镜中的原位测量样品杆。实现了在原子级高分辨观察的同时对感兴趣的纳米结构进行力热光电综合物性测量。包括：单倾、双倾室温下的电学和电化学生物性测量；首台 TEM 原位光电测量样品杆，实现了 TEM 原位的光谱采集和光电物性测量；首台低温 TEM-STM 样品杆，实现了液氮温区的变温电学性能测量；首台可将样品加热到超过 1100 摄氏度，并获得高温下拉伸、压缩应力应变曲线的 TEM 原位力学测量系统。

3、使用所开发的原位 TEM 测量系统开展纳米材料和纳米器件的相关物性研究。首次拍摄到了高分辨状态下，银离子基电阻转变存储器中导电通道的形成过程，提出了金属原子氧化-移动-还原的质量输运模型，两篇相关论文合计引用近 200 次。系统研究了单根碳纳米管场发射的几何增强效应和不同发射尖端的局域功函数，两篇相关论文引用超过 200 次。首次在高分辨状态下观察到了二硫化钼层状材料在锂离子嵌入时的相变过程，提出了相变原子模型，单篇文章引用近 200 次。

申请人以负责人和共同负责人身份承担项目 5 项，其中包括在研国家重大科研装备研制项目 1 项。作为学术骨干参与基金委、科技部项目超过 15 项。申请和获批发明专利 8 项，其

中 5 项已经转让实现产业化。撰写专著章节 1 章，发表期刊论文 70 余篇，总引用超过 2000 次。H 因子 29。

承担项目情况

项目名称	项目来源	起止时间	总经费额 度 (万元)	担任角色
超高时空分辨原位多尺度量子测量系统研制	国家重大科研装备研制项目	2016.1~2019.12	8687.66	共同项目负 责人
高频复合超声扫描探针显微镜研发与应用	国家重大科学仪器设备开发 专项	2013.10~2017.9	4533.00	学术骨干
特殊扫描探针针尖的制作及其在透射电镜原位测量中的应用	中国科学院国际合作局 对外合作重点项目	2015.10~2017.9	60.00	项目负责人
基于扫描探针技术的纳米表征新方法研究	国家重大科学研究计划	2012.1~2016.8	2800.00	学术骨干
原位低温电输运测量样品杆的研制	物理所仪器设备技术创新项 目	2015.1~2016.12	30.00	项目负责人
超紧凑压电驱动小型样品旋转装置	中国科学院仪器设备功能开 发技术创新项目	2015.11~2016.12	28.00	项目负责人
阻变存储器工作机理的原位透射电镜研究	国家自然科学基金委	2012.01-2015.12	59.00	项目负责人
透射电镜中石墨烯原位剪裁及电子结构调控的研究	国家自然科学基金委	2011.01-2013.12	23.00	项目负责人

代表性论文目录

1. Lei Zhang , Liang Zhu , Xiaomei Li , Zhi Xu , Wenlong Wang & Xuedong Bai, Resistive switching mechanism in the one diode-one resistor memory based on p + -Si/n-ZnO heterostructure revealed by in-situ TEM, Scientific Reports | 7:45143 | DOI: 10.1038/srep45143
2. Zhi Xu, Chao Zhang, Wenlong Wang, Yoshio Bando, Xuedong Bai, Dmitri Golberg , Lateral piezopotential-gated field-effect transistor of ZnO nanowires, Nano Energy 13, 233–239(2015).
3. Chao Zhang, Zhi Xu, Wei Tian, Dai-Ming Tang, Xi Wang, Yoshio Bando, Naoki Fukata, and Dmitri Golberg, “In situ fabrication and optoelectronic analysis of axial CdS/p-Si nanowire heterojunctions in a high-resolution transmission electron microscope”. Nanotechnology 26, 154001-8 (2015): doi: 10.1088/0957-4484/26/15/154001.
4. Feng Yang, Xiao Wang, Daqi Zhang, Kuo Qi, Juan Yang, Zhi Xu, Meihui Li, Xiulan Zhao, Xuedong Bai, and Yan Li, Growing Zigzag (16,0) Carbon Nanotubes with Structure-Defined Catalysts. JOURNAL OF THE AMERICAN CHEMICAL SOCIETY 137, 27, 8688-8691
5. Xiaomin Li, Kuo Qi, Muhua Sun, Qianming Huang, Zhi Xu, Wenlong Wang and Xuedong Bai Real-time observation of dynamic process of oxygen vacancy migration in cerium oxides under

- electric field. *Appl. Phys. Lett.* 107, 211902 (2015)
6. C. Zhang, Z. Xu, D. G. Kvashnin, D.-M. Tang, Y. M. Xue, Y. Bando, P. B. Sorokin and D. Golberg, Opto-mechano-electrical tripling in ZnO nanowires probed by photocurrent spectroscopy in a high-resolution transmission electron microscope. *Appl. Phys. Lett.* 107, 091103 (2015)
 7. Dai-Ming Tang, Cui-Lan Ren, Ruitao Lv, Wan-Jing Yu, Peng-Xiang Hou, Ming-Sheng Wang, Xianlong Wei, Zhi Xu, Naoyuki Kawamoto, Yoshio Bando, Masanori Mitome, Chang Liu, Hui-Ming Cheng, and Dmitri Golberg* Amorphization and Directional Crystallization of Metals Confined in Carbon Nanotubes Investigated by in Situ Transmission Electron Microscopy. *Nano Lett.*, 2015, 15 (8), pp 4922–4927
 8. Lifeng Wang, Zhi Xu, Wenlong Wang, Xuedong Bai, Atomic Mechanism of Dynamic Electrochemical Lithiation Processes of MoS₂ Nanosheets, *Journal of the American Chemical Society*, 136, 6693-6697 (2014)
 9. Xuezheng Tian, Shize Yang, Min Zeng, Lifeng Wang, Jiake Wei, Zhi Xu, Wenlong Wang, Xuedong Bai, Bipolar Electrochemical Mechanism for Mass Transfer in Nanoionic Resistive Memories, *Advanced Materials* 26, 3649-3654(2014)
 10. Feng Yang, Xiao Wang, Daqi Zhang, Juan Yang, Da Luo, Ziwei Xu, Jiake Wei, Jian-Qiang Wang, Zhi Xu, Fei Peng, Xuemei Li, Ruoming Li, Yilun Li, Meihui Li, Xuedong Bai, Feng Ding, Yan Li, Chirality-specific growth of single-walled carbon nanotubes on solid alloy catalysts, *Nature*, 510, 522-524 (2014).
 11. Chao Zhang, Wei Tian, Zhi Xu, Xi Wang, Jiangwei Liu, Song-Lin Li, Dai-Ming Tang, Dequan Liu, Meiyong Liao, Yoshio Bando, Dmitri Golberg, Photosensing performance of branched CdS/ZnO heterostructures as revealed by in situ TEM and photodetector tests, *Nanoscale* 6,8084(2014).
 12. Shize Yang, Xuezheng Tian, Lifeng Wang, Jiake Wei, Kuo Qi, Xiaomin Li, Zhi Xu, Wenlong Wang, Jimin Zhao, Xuedong Bai, and Enge Wang, In-situ optical transmission electron microscope study of exciton phonon replicas in ZnO nanowires by cathodoluminescence, *Applied Physics Letters* 105, 071901 (2014)
 13. Lifeng Wang, Donghua Liu, Shize Yang, Xuezheng Tian, Guangyu Zhang, Wenlong Wang, Enge Wang, Zhi Xu, Xuedong Bai, Exotic Reaction Front Migration and Stage Structure in Lithiated Silicon Nanowires, *ACS Nano* 8, 8249–8254(2014)
 14. Xuezheng Tian, Lifeng Wang, Jiake Wei, Shize Yang, Wenlong Wang, Zhi Xu, Xuedong Bai, Filament growth dynamics in solid electrolyte-based resistive memories revealed by in situ TEM, *Nano Research* 7, 1065–1072(2014)
 15. Dmitri Golberg, Chao Zhang, and Zhi Xu ,Cubic Lattice Nanosheets: Thickness-Driven Light Emission. *ACS Nano*, 2014, 8 (7), pp 6516–6519
 16. Jiake Wei, Zhi Xu, Hao Wang, Xuezheng Tian, Shize Yang, Lifeng Wang, Wenlong Wang and Xuedong Bai, In-situ TEM imaging of the anisotropic etching of graphene by metal nanoparticles. *Nanotechnology* 25 (2014) 465709
 17. Zhi Zhou, Ying Hu, Hao Wang, Zhi Xu, Wenlong Wang, Xuedong Bai, Xinya Shan, Xinghuau, DNA Translocation through Hydrophilic Nanopore in Hexagonal Boron Nitride. *SCIENTIFIC REPORTS* 3(2013), 3287
 18. Shize Yang, Lifeng Wang, Xuezheng Tian, Zhi Xu, Wenlong Wang, Xuedong Bai, Enge Wang, 'The Piezotronic Effect of Zinc Oxide Nanowires Studied by In Situ TEM', *Advanced Materials*, 24 (2012), 4676-4682.
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 20. Dmitri Golberg, Pedro M.F.J. Costa, Ming-Sheng Wang, Xianlong Wei, Dai-Ming Tang, Zhi Xu,

- Yang Huang, Ujjal K. Gautam, Baodan Liu, Haibo Zeng, Naoyki Kawamoto, Chunyi Zhi, Masanori Mitome, Yoshio Bando, 'Nanomaterial engineering and property studies in a transmission electron microscope', *Advanced Materials*, 24(2012),177-194.
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 22. Zhi Xu, Yoshio Bando, Lei Liu, Wenlong Wang, Xuedong Bai, and Dmitri Golberg, 'Electrical Conductivity, Chemistry, and Bonding Alternations under Graphene Oxide to Graphene Transition as Revealed by in Situ Tem', *Acs Nano*, 5 (2011), 4401-4406.
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 24. Z. Xu, D. Golberg, and Y. Bando, 'In Situ TEM-STM Recorded Kinetics of Boron Nitride Nanotube Failure under Current Flow', *Nano Letters*, 9 (2009), 2251-2254.
 25. Z. Xu, D. Golberg, and Y. Bando, 'Electrical Field-Assisted Thermal Decomposition of Boron Nitride Nanotube: Experiments and First Principle Calculations', *Chemical Physics Letters*, 480 (2009), 110-112.
 26. Kaihui Liu, Wenlong Wang, Zhi Xu, Xuedong Bai, Enge Wang, Yagang Yao, Jin Zhang, and Zhongfan Liu, 'Chirality-Dependent Transport Properties of Double-Walled Nanotubes Measured in Situ on Their Field-Effect Transistors', *Journal of the American Chemical Society*, 131 (2009), 62.
 27. Wangyang Fu, Zhi Xu, Xuedong Bai, Changzhi Gu, and Enge Wang, 'Intrinsic Memory Function of Carbon Nanotube-Based Ferroelectric Field-Effect Transistor', *Nano Letters*, 9 (2009), 921-925.
 28. Zhi Xu, Wengang Lu, Wenlong Wang, Changzhi Gu, Kaihui Liu, Xuedong Bai, Enge Wang, and Hongjie Dai, 'Converting Metallic Single-Walled Carbon Nanotubes into Semiconductors by Boron/Nitrogen Co-Doping', *Advanced Materials*, 20 (2008), 3615.
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 31. Z. Xu, X. D. Bai, and E. G. Wang, 'Geometrical Enhancement of Field Emission of Individual Nanotubes Studied by in Situ Transmission Electron Microscopy', *Applied Physics Letters*, 88 (2006).
 32. W. L. Wang, X. D. Bai, K. H. Liu, Z. Xu, D. Golberg, Y. Bando, and E. G. Wang, 'Direct Synthesis of B-C-N Single-Walled Nanotubes by Bias-Assisted Hot Filament Chemical Vapor Deposition', *Journal of the American Chemical Society*, 128 (2006), 6530-6531.
 33. Z. Xu, X. D. Bai, E. G. Wang, and Z. L. Wang, 'Dynamic in Situ Field Emission of a Nanotube at Electromechanical Resonance', *Journal of Physics-Condensed Matter*, 17 (2005), L507-L512.
 34. Z. Xu, X. D. Bai, E. G. Wang, and Z. L. Wang, 'Field Emission of Individual Carbon Nanotube with in Situ Tip Image and Real Work Function', *Applied Physics Letters*, 87 (2005).

专著章节:

Zhi Xu, Wenlong Wang, Xuedong Bai (2013). *Synthesis and Properties of BCN Nanosheets and*

Nanotubes. In Ying Chen (Ed.) NANOTUBES AND NANOSHEETS Functionalization and Applications. Taylor and Francis.