纳米器件物理与化学教育部重点实验室

2014 年度报告

2014 年度重点实验室总结报告

重点实验室名称：纳米器件物理与化学教育部重点实验室

实验室主任：彭练矛　　副主任：陈清　张锦

学术委员会主任：解思深　　副主任：王占国　薛增泉　刘忠范

总结报告内容：

一、研究水平与贡献

本重点实验室 2003 年底验收成立，2007 和 2012 年两次通过教育部组织的实验室评估。实验室自成立以来得到了北京大学 985、211 等专项的支持，围绕着纳米器件物理与化学相关领域开展研究，得到了很大的发展。在教育部 2012 年 9 月组织的重点实验室评估中，本实验室的工作得到了专家和领导的肯定，被评为优秀。如下图所示，自 2003 年实验室验收成立以来，共发表以实验室为单位的 SCI 论文 608 篇，论文数目平稳上升，近两年每年都在 70-80 篇左右。论文的引用以每年超过 200 次的增幅逐年增加，到 2014 年达到 2646 次。特别是，我们的文章水平不断上升，近几年每年都在 Nature 子刊上有发表文章。

1. **本年度新增项目和合同经费数（万元）**

2014 年彭练矛教授为首建立了第三批北京市国际科技合作基地（新材料领域）的碳基纳电子材料与器件北京市国际科技合作基地。近两年彭练矛教授等人在碳纳米管器件方面的研究得到了北京市科委的大力支持。

实验室成员目前共承担科研项目 46 项，总合同经费接近 1.3 亿元（12991 万元）；其中 2014 年新启动的项目有 15 项，新增合同经费 3192 万元。

2. **本年度获奖情况（其中：国家级奖，省部级奖）**

梁佳，郭耀，李强同学获得研究生国家奖学金，另有多位同学获得北京大学创新奖和各种商业奖。

魏贤龙老师获得中国工商银行教师奖.梁学磊老师获得王楚奖教金。

3. **本年度发表论文数（其中：SCI，EI 论文数）**

本年度实验室人员发表 SCI 论文有 80 余篇，其中影响因子大于 6 的杂志上的有 34 篇(分别是 Nature 1 篇，Chem. Soc. Rev. 1 篇, Acc. Chem. Res. 1 篇，Adv. Mater. 5 篇，Nano Lett. 6 篇, ACS Nano 5 篇, Mater. Today 1 篇，Nano Energy 1 篇, Small 5 篇，Nano Res. 3 篇，Nanoscale 4 篇，Chem. Commun. 1 篇), 影响因子大于 3 小于 6 的杂志上的有约 30 篇。

实验室骨干 2014 年在国际会议上做邀请报告 45 次，一般报告或墙报 15 次；在全国性重要学术会议上做邀请报告 11 次。

4. **本年度申请及授权专利数**

本年度实验室有 1 项中国国家发明专利申请获得授权，新申请了 10 项中国国家发明专利项。

二、队伍建设与人才培养

1. **人才队伍情况：总人数，其中院士、长江学者、杰出青年人数，教授、副教授人数**

2014 年陈清教授入选国家百千万人才工程，被授予“有突出贡献中青年专家”称号。

胡又凡博士作为北京大学百人计划特聘研究员新加入实验室，并已在青年千人计划评选中通过最后的评审，目前在公示阶段。

张志勇教授晋升为正教授。董立军晋升为高级工程师

到 2014 年底，实验室有 11 名正教授、3 位特聘研究员、123 名副教授或副研究员、2 名高工和 1 名讲师~~或工程师~~共 29 位固定人员。学术骨干中有 3 位长江特聘教授、1 位千人计划特聘教授、4 位国家杰出青年获得者、1 位青年千人、1 位中组部拔尖人才、1 位优青、6 位教育部新世纪优秀人才、2 名北京大学百人计划特聘研究员。实验室成员在 20 余个重要学术机构中任职。

2. 人才培养情况：在站博士后、在读博士生、硕士生人数

本年度实验室有 7 名在站博士后；有在读博士生 70 余人，在读硕士生 40 余人。

数据和成果：

一、实验室固定成员名单

序号	姓 名	性别	年龄	最后学位	所学专业	现从事专业	技术职称	在实验室工作期限
1	彭练矛	男	52	博士	物理电子	纳米电子学	教授	2000 年至今
2	张锦	男	45	博士	化学	纳米化学	教授	2002 年至今
3	陈清	女	49	博士	材料物理	纳米材料，电子显微学	教授	2000 年至今
4	徐洪起	男	58	博士	凝聚态物理	量子结构纳米电子学	教授	2010.9 至今
5	李彦	女	48	博士	化学	纳米材料化学	教授	2002 年至今
6	侯士敏	男	44	博士	物理电子	纳米电子	教授	2000 年至今
7	张耿民	男	45	博士	物理电子	物理电子	教授	2000 年至今
8	梁学磊	男	40	博士	凝聚态物理	纳米电子	教授	2003.7 至今
9	许胜勇	男	48	博士	物理	凝聚态物理	教授	2006.4 至今
10	叶安培	男	54	博士	原子与分子物理	纳米生物光子学	教授	2008.9 至今
13	张志勇	男	37	博士	物理电子	纳米电子学	教授	2008.7 至今
11	王永锋	男	35	博士	化学	扫描探针	特聘研究员	2012.6 至今
12	魏贤龙	男	32	博士	物理电子	纳米材料表征和物性	百人研究员	2012.9 至今
14	胡又凡	女	35	博士	物理电子	纳米电子学	百人研究员	2014.2 至今
15	王晶云	女	43	博士	材料物理	电子显微学	副教授	2000 年至今
16	申自勇	男	45	博士	物理化学	扫描探针	副教授	2000 年至今
17	郭等柱	男	47	博士	物理电子	物理电子	副研	2005.1 至今
18	潘华勇	男	46	博士	电子显微学	电子显微学	副研	2004 年至今
19	孙文涛	女	38	博士	物理化学	纳米电子学	副教授	2008.3 至今
20	王胜	男	37	博士	物理电子	纳米电子学	副研	2008.7 至今
21	邢英杰	男	44	博士	物理电子	物理电子	副教授	2008.9 至今
22	廖建辉	男	38	博士	分子电子学	纳米电子学	副研	2008.10 至今
23	叶林晖	男	46	博士	物理	理论计算	副教授	2008.11 至今

24	戴恩光	男	50	博士	光电子学	光电子学	副教授	2009 年至今
25	康宁	男	38	博士	物理	纳米电子学	副研	2011.4 至今
26	黄少云	男	40	博士	物理电子	纳电子学与纳米器件物理	副教授	2011.10 至今
27	高崧	男	47	博士	物理电子	扫描探针	讲师	2002 年至今
28	岳双林	女	38	博士	微纳加工	微纳加工	高工	2006.7 至今
29	董立军	男	40	学士	微电子	微纳加工	高工程师	2013.2 至今

二、实验室成员在学术机构任职情况

姓名	学术任职
彭练矛	国际显微学杂志“Ultramicroscopy”编委 国际显微学杂志“MICRON”编委 国际表面科学与纳米科技电子杂志“e-Journal of Surface Science and Nanotechnology”编委 国际晶体学会电子衍射专业委员会委员 中国电子显微学会副理事长 中国晶体学会副理事长 中国真空学会副理事长 中国仪器仪表学会微纳器件与系统技术分会副理事长
张锦	Carbon 杂志 副主编 Nano Research 编委 化学学报 编委 光散射学报 编委
陈清	“金属学报”编委 中国材料研究学会纳米材料与器件分会理事 中国仪表功能材料学会 ALD 学会委员 中国真空学会理事
李彦	“科学通报”编委 英国皇家化学会 Journal of Materials A, 副主编 Steering Committee of Nanotube Conferences (SCNC)
徐洪起	英文期刊 Frontiers of Physics 副主编 中国材料研究学会纳米材料与器件分会 理事
张耿民	中国真空学会副秘书长
叶安培	原子与分子物理学报编委 中国生物物理学会理事 中国生理学会仪器专业委员会委员
戴恩光	中国宇航学会光电子专业委员会常委

侯士敏	“真空科学与技术学报”副主编
王永锋	中国化学快报青年编委
郭等柱	中国真空学会质谱分析与检漏专委会委员 北京真空学会理事

三、2014 年实验室成员承担的主要课题目录

序号	批准号	类别	项目名称	负责人	起止时间	总经费(万元)
1.	2011CB933002	国家重大科学研究计划"纳米研究"专项项目	碳基无掺杂纳电子器件和集成电路/新型纳米光电子器件	彭练矛	2010.1-2015.12	829
2.	2011CB933003	科技部重大研究计划纳米专项	碳纳米结构的可控制备和表征	李彦	2011.1-2015.12	592
3.	2011CB933001	科技部重大研究计划纳米专项	高性能碳基 CMOS 器件和集成电路	张志勇	2011.1-2015.12	711
4.	2012CB932700	国家重大科学研究计划"纳米研究"专项项目	新型高性能半导体纳米线电子器件和量子器件	徐洪起	2012.1-2016.12	2900
5.	2012CB932702	国家重大科学研究计划"纳米研究"专项项目	环栅半导体纳米线超高频器件的基础研究	陈清	2012.1-2016.08	750
6.	2011CB932601	国家重大科学研究计划课题	碳纳米管的结构调控、生长机制与应用探索	张锦	2011-2015	297
7.	2013CB933604	国家重大科学研究计划课题	新型场发射纳米材料及物理机制研究	张耿民	2013.1-2017.8	216
8.	2013CB933404	国家重大科学研究计划"纳米研究"专项项目	单分子纳米磁体自旋态检测与输运性质调控	王永锋	2013.01-2017.08	516
9.	2012BAF14B14	国家科技支撑项目	全自动光镊-光刀显微操纵系统	叶安培	2012.7-2016.06	414.6
10.	2011YQ030124020 1	国家重大科学仪器设备开发专项	基于石墨烯壳层的 SHINERS 技术及基底制备	张锦	2011-2015	250
11.	2011CB9219	973	基于 Dirac 费米子系统的新型器件的物理	梁学磊参加	2011.1-2015.12	187.5

	04		原理研究与应用探索			
12.	91221202	重大研究计划重点项目	纳米线复合量子结构中的电子纠缠及其器件研究	徐洪起	2013.1-2016.12	320
13.	61321001	基金委创新群体项目	纳米尺度的高性能电子与量子器件的理论与方法	彭练矛	2014.1-2016.12	600
14.	50821061	基金委创新群体项目	表界面工程学	刘忠范	2012.1-2015.12	21
15.	61390504	国家自然科学基金委员会重大项目	介电衬底上高质量大面积石墨烯信息器件的构筑与特性研究，课题名称：高性能石墨烯器件与电路的批量制备与优化	彭练矛	2014.1-2018.12	550
16.	21233001	国家自然科学基金委重点项目	平整基底上的拉曼信号增强技术及其应用	张锦	2013-2017	300
17.	21125103	国家自然科学基金杰出青年基金	无机化学	李彦	2012.1-2015.12	200
18.	61322105	自然科学基金优秀青年项目	碳基纳米电子学	张志勇	2014.1-2017.12	100
19.	21129001	海外及港澳学者合作研究基金	二维氮化硼材料的控制生长及其在拉曼光谱中的应用	张锦	2012-2015	120
20.	11179011	国家自然科学基金面上项目	金-氧化物-碳纳米管/石墨烯纳米复合结构的可控合成和电催化性能研究	李彦	2012.1-2014.12	52
21.	61171023	国家自然科学基金面上项目	金属氧化物有序纳米结构阵列在染料电池中的应用	张耿民	2012.1-2015.12	60
22.	61271051	国家自然科学基金面上项目	基于平行阵列碳纳米管的射频晶体管和电路	彭练矛	2013.1 2016.12	95
23.	51272006	国家自然科学基金委面上项目	碳纳米管异质结构的控制制备及其在光电转换器件中的应用	张锦	2013.1-2016.12	80
24.	61271050	国家自然科学基金面上项目	高介电氧化物薄膜局域阻变特性和机理研究	申自勇	2013.1-2016.12	76

25.	61371001	国家自然科学基金面上项目	内电场驱动下石墨烯表面电子发射特性的实验研究	魏贤龙	2014.1-2017.12	83
26.	61376126	国家自然科学基金面上项目	亚 20 纳米碳纳米管 CMOS 器件研究	张志勇	2014.1-2018.12	82
27.	11374016	国家自然科学基金面上项目	软物质波导与神经信号传输物理机制研究	许胜勇	2014.1-2017.12	89
28.	11374022	国家自然科学基金面上项目	应变对单层/少层 MoS2 纳米片及其器件的性能的影响	陈清	2014.1-2017.12	89
29.	11374019	国家自然科学基金面上项目	基于石墨烯三端和多端纳米器件的量子输运研究	康宁	2014.1-2017.12	88
30.	21373020	国家自然科学基金面上项目	自旋交叉配合物自旋双稳态的可逆调控	王永锋	2014.1-2017.12	83
31.	61106073	国家自然科学基金青年项目	基于有序氧化物纳米线的柔性气敏传感器制备与性能研究	岳双林	2012.1-2014.12	30
32.	F040306	国家自然科学基金青年基金	钙钛矿结构有机金属卤化物量子点太阳能电池的研究	孙文涛	2014.1-2016.12	25
33.	11304003	国家自然科学基金青年基金项目	电子显微镜中同一单个纳米结构多种物性的综合研究	魏贤龙	2014.1-2016.12	26
34.	7021403008	青年科学基金项目	单分子磁体自旋态的磁交换力显微镜研究	李娜	2015.1-2017.12	25
35.	2616140100 6	青年科学基金项目	基于碳纳米管的极低开启电压二极管及其射频电路	丁力	2015.1-2017.12	8
36.	Z131100003 213021	北京市科学技术委员会	碳纳米管集成电路 CMOS 器件研制	彭练矛	2013.1-2014.12	500
37.	D141100000 614001	北京市科学技术委员会	碳基集成电路用碳纳米管材料规模化制备技术研究	彭练矛	2014.3-2015.12	900
38.	D141100000 61400	北京市科学技术委员会	碳基集成电路用碳纳米管材料规模化制备技术研究	张锦	2014.6-2015.12	225

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39.	Z141100003814006	北京市	显示驱动用碳纳米管薄膜晶体管研制	梁学磊	2014.1-2015.12	100
40.	201241	全国优秀博士学位论文作者专项基金	单原子层碳纳米材料表面的电子发射特性和机理研究	魏贤龙	2012.1-2016.12	42
41.	2012100010 2	北京市优秀博士学位论文指导教师科技项目	高性能碳基纳米光电器件	彭练矛	2012.10 - 2014.9	50
42.	113003A	教育部	基于碳纳米管材料的高性能电子器件	梁学磊	2013.8-2015.8	50
43.	2012000111 0093	高等学校博士学科点专项基金	光镊诱导表面增强拉曼光谱技术及其在蛋白结构检测中的应用	叶安培	2014.1-2017.08	12
44.	2013000111 0030	高等学校博士学科点专项基金	扫描电子显微镜中同一单根纳米结构多种物性的综合研究	魏贤龙	2014.1-2016.12	12
45.		横向项目	碱金属微结构气室研制	郭等柱	2013.7-2015.06	140
46.		横向项目	飞行时间质谱仪研制	郭等柱	2014.11-2015.06	95

四、2014 年实验室发表的高影响因子论文的刊物分布

刊物	篇数		刊物	篇数
Nature	**1**		**Small**	**5**
Chem. Soc. Rev.	**1**		**Nano Research**	**3**
Acc. Chem. Res.	**1**		**Nanoscale**	**4**
Adv. Mater.	**5**		**Chem. Commun.**	**1**
Nano Lett.	**6**		**ACS Appl. Mater.**	**1**
ACS Nano	**5**		**J. Power Sources**	**1**
Mater. Today	**1**		**Sci. Rep.**	**3**
Nano Energy	**1**		**MRS Bulletin**	**1**

五、主要研究成果目录

（一）2014 年 SCI 论文目录

1. F. Yang, X. Wang, D. Q. Zhang, J. Yang, D. Luo, Z. W. Xu, J. K. Wei, J. Q. Wang, Z. Xu, F. Peng, X. M. Li, R. M. Li, Y. L. Li, M. H. Li, X. D. Bai, F. Ding, Y. Li, “Chirality-specific growth of single-walled carbon nanotubes on solid alloy catalysts”, **NATURE**, 510,7506 (2014) 522-524
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（二）邀请报告

1. L. M. Peng, "High-Performance Gate Dielectric for Carbon-based Nanoelectronics", **March 2014 American Physical Society Meeting**, Denver, USA, March 3-7, 2014(Invited talk)
2. L. M. Peng, "CNT-based photovoltaic and light emitting diodes", **Brazil-China Scientific Symposium PKU&FAPESP**, Beijing, China, April 16-28, 2014(Invited talk)
3. L. M. Peng, "Characterizing Individual Nanostructures: Structure, Electrical, Mechanical and Optical Properties", **Spring 2014 Materials Research Society Meeting,** USA, April 21-25, 2014(Invited talk)

4. L. M. Peng, "Light emission and detection with carbon nanotubes", **2nd Carbon Nanotube Thin Film Electronics and Applications Symposium**, University of Southern California, USA, June 1-6, 2014(Invited talk)

5. L. M. Peng, "Carbon Nanotube Electronics - Extending Moore's Law to the End and Beyond the Roadmap", **The World Conference on Carbon (Carbon 2014)**, Jeju, Korea, June 29- July 4, 2014(Invited talk)

6. L. M. Peng, "Carbon Nanotubes for Electronics Applications", **Fall 2014 Materials Research Society Meeting**, Boston, USA, November 30-December 5, 2014(Invited talk)

7. L. M. Peng, "Fundamental limits to Si CMOS and merits for carbon nanotube electronics", Oxford University, August 15, 2014(Invited talk)

8. H. Q. Xu, "Signatures of Majorana fermions in topological superconductor nanowires,Nano Saclay Nanoelectronics", **Workshop Paris 2013**, Paris, France, December 10-13, 2013(Invited talk)

9. H. Q. Xu, "Majorana fermions in semiconductor nanowire-superconductor hybrid quantum devices", **the 8th International Conference on Advanced Materials and Devices**, Jeju, Korea, December 11-13, 2013(Invited talk)

10. H. Q. Xu, "Majorana fermions in topological superconducting nanowires, Workshop on Exploring the Physics of Small Devices", **The EPSD Network closing meeting**, Capri, Italy, April 22-24, 2014(Invited talk)

11. H. Q. Xu, "Piezoelectric photovoltaics with semiconductor core-shell nanowire arrays", **2014 International Conference on Solar Cell Technology and Applications**, Beijing, China, May 14-15, 2014(Invited talk)

12. H. Q. Xu, "Majorana fermions in topological superconductor nanowires", **Symposium on Topological States of Matter**, Chalmers, Gothenburg, Sweden, June 10-11, 2014(Invited talk)

13. H. Q. Xu, "Majorana fermions in topological superconducting nanowire", **Nobel Symposium on New Forms of Matter—Topological Insulators and Superconductors**, Höogberga Gåard, Lidingö, Stockholm, Sweden, June 12-15, 2014(Invited talk)

14. H. Q. Xu, "Signatures of Majorana Fermions in Topological Superconducting Nanowires", **KITPC Workshop on Quantum Computing with Electron Spin Qubits**, Beijing, China, July 7-25, 2014(Invited talk)

15. H. Q. Xu, "Topological superconducting nanowires and Majorana fermions", **ICSNN 2014**, Savannah, Georgia, USA, 3-8 August 2014(Invited lectures)

16. H. Q. Xu, "Signatures of Majorana fermions in topological superconducting nanowires", **SSDM 2014**, Tsukuba, Japan, September 8-11, 2014(Invited talk)

17. H. Q. Xu, "Current development in the experimental search for Majorana fermions in solid state", **Oxford Workshop on Bring the Nanoworld Together**, Beijing, China September 24-25, 2014(Plenary talk)

18. H. Q. Xu, "Piezoelectric photovoltaics with semiconductor core-shell nanowires", **Multifunctional Nanomaterials Forum between PKU of China and SKKU of Korea**, Beijing, China, September 25-26, 2014(Invited talk)

19. H. Q. Xu, "Piezoelectric photovoltaics with semiconductor core-shell nanowires", **Sino-German Workshop on Nano-Photonics and Nano-Optoelectronics**, Changsha, China October 23-25, 2014(Invited talk)

20. J. Zhang, "Growth of Single-walled Carbon Nanotubes with Controlled Structures", **4th Molecular Materials Meeting**, Singapore, January 14-16, 2014(Invited talk)

21. J. Zhang, "CVD Growth of Single-walled Carbon Nanotubes with Controlled Structures for Nanodevice Applications, International Symposium on Optoelectronics", **Materials and Energy(iSOME-2014)**, Nanjing, China, March 25-28, 2014(Ivited talk)

22. J. Zhang, “Graphene: A Platform for Surface Enhanced Raman Spectroscopy”, **The 2nd Sino-European Workshop on Graphene Applications**, Madrid, Spain, May 11-13, 2014(Invited talk)

23. J. Zhang, “Graphene Enhanced Raman Spectroscopy”, **97th Canadian Chemistry Conference and Exhibition**, Vancouver, Canada, June 1-5, 2014(Invited talk)

24. J. Zhang, “CVD Growth of Single-walled Carbon Nanotubes with Controlled Structures for Nanodevice Applications”, **The World Conference on Carbon (Carbon2014)**, Jeju, Korea, June 29-July 4, 2014(Invited talk)

25. J. Zhang, “CVD Growth of Single-walled Carbon Nanotubes with Controlled Structures for Nanodevice Applications”, **9th Sino-US Nano Forum**, Tianjin, China, July 16-18, 2014(Ivited talk)

26. J. Zhang, “CVD Growth of Single-walled Carbon Nanotubes with Controlled Structures for Nanodevice Applications”, **The Inaugural Inorganic and Nanomaterials Forum (INF2014)**, Singapore, July 25-26, 2014(Invited talk)

27. J. Zhang, “State of the Art of Single-walled Carbon Nanotube Synthesis on Surfaces”, **Asian Conference of Nanoscience and Nanotechnology 2014 (AsiaNANO2014)**, Jeju, Korea, September 26-29, 2014(Invited talk)

28. J. Zhang, “CVD Growth of Single-walled Carbon Nanotubes with Controlled Structures”, **A3 Symposium on Emerging Materials: sp2Nanocarbon for Energy**, Tianjin, China, October 19-21, 2014(Invited talk)

29. Y. Li, “Chirality Specific Growth of Single-Walled Carbon Nanotubes Molecular Chirality”, **Asia 2014**, Beijing, October 29-31, 2014(Plenary lecture)

30. Y. Li, “Catalysts for Controlled Growth of Single-Walled Carbon Nanotubes Workshop on Nanoparticles in Reactive Environment”, Marseille, France, January 27-29, 2014(Invited talk)

31. Y. Li, “Structure Controlled Growth of Single-Walled Carbon Nanotubes, 1st Inorganic Chemistry Frontiers International Symposium”, Beijing, February 27, 2014(Invited talk)

32. Y. Li, “Structure and Property Controlled Growth of Single-Walled Carbon Nanotubes on Substrates”, **The 46th Fullerenes-Nanotubes-Graphene General Symposium**, Tokyo, Japan, March 3-5, 2014(Invited talk)

33. Y. Li, “Chirality-specific growth of single-walled carbon nanotubes on solid alloy catalysts”, **9th Sino-US Nano Forum**, Tianjin, July 16-18, 2014(Invited talk)

34. Y. Li, “Chirality Controlled growth of single-walled carbon nanotubes”, **NPO2014**, Joensuu, Finland, July 28-August 1, 2014(Invited talk)

35. Y. Li, “Chirality-Specific growth of single-walled carbon nanotubes on Solid Alloy Catalysts”, **Multifunctional Nanomaterials Forum between PKU and SKKU**, Beijing, Sep. 25-26, 2014(Invited talk)

36. Y. Li, “Carbon Nanomaterials Combined with Inorganic Nanomaterials for Energy Applications”, **The 5th A3 Symposium on Emerging Materials**, Tianjin, Oct. 19-21,2014(Invited talk)

37. S. Y. Xu, “Single-Metal Dual-Stripe Sensor and Its Application in 3D Temperature Sensing”, **4th Annual World Congress of Nano Science & Technology (Nano S&T-2014)**, Qingdao, China, October 29-31, 2014(Invited talk)

38. S. Y. Xu, “Application of electromagnetic waves in softmaterials”, **Progress in Electromagnetics Research Symposium (PIERS 2014)**, Guangzhou, China August 25-28 2014(Invited talk)

39. S. Y. Xu, “A promising submicron sensor for in situ temperature sensing in lab-on-a-chip systems”, **3rd AnalytiX-2014**, Dalian, China, April 25-28, 2014(Invited talk)

40. S. Y. Xu, "The thermopower of metallic nano-strips and its application in local temperature sensing", **International Conference on Small Science (ICSS 2013)**, Las Vegas, NV, USA, December 16-18, 2013(Invited talk)

41. J. H. Liao, "Fabrication and charge transport in close-packed nanoparticle arrays: from 2D to 3D", **International Conference on Small Science**, HongKong, December 8-11, 2014(Invited talk)

42. X. L. Wei, "In-Situ Engineering and Properties Study of Individual Nanomaterials inside an Electron Microscope", **Second International Conference of Young Researchers on Advanced Materials (IUMRS-ICYRAM 2014)**, Haikou, China, October 24-29, 2014(Invited talk)

43. Y. F. Hu, "Temperature Dependence of the Piezotronic Effect in ZnO Nanowires", **The 2nd International Conference on Nanogenerators and Piezotronics**, Atlanta, USA，June 2014(Session Chair)

44. Y. F. Hu, "Temperature Dependence of the Piezotronic Effect in ZnO Nanowires", **MRS Spring Meeting**, San Francisco, USA, April 2014(Session Chair)

45. Y. F. Hu, "The Applications of Piezophototronics: from ZnO Nanowire to GaN Thin Film", **First International Conference on Nanoenergy and Nanosystems 2014 (NENS2014)**, Beijing, China, December, 2014(Invited talk)

46. 彭练矛, "Carbon Nanotube Digital Electronics: Advances and Prospectives", **2014 年首届全国纳米科技前沿论坛**，苏州，4 月 25-28 日, 2014(邀请报告)

47. 张锦，"Graphene: A Platform for Surface Enhanced Raman Spectroscopy"，**6th International Symposium on Bioanalysis, Biomedical Engineering and Nanotechnology(ISBBN 2014)**，湖南长沙，2014 年 5 月 29-31 日(邀请报告)

48. 张锦，"单壁碳纳米管的结构控制生长方法研究"，**中国化学院第 29 届学术年会**，北京，2014 年 8 月 24-27 日(邀请报告)

49. 李彦，“基于合金催化剂的单壁碳纳米管结构可控合成”，**上海光源第四届用户学术年会**，上海，2014 年 9 月 24-25 日(大会报告)

50. 李彦，“单壁碳纳米管的结构可控合成”，**香山科学会议第 512 次学术讨论会——手性科学与技术**，北京，2014 年 11 月 19-20 日(邀请报告)

51. 李彦，“Chirality-Specific growth of single-walled carbon nanotubes”，**泰山学术论坛**，济南，2014 年 11 月 13-14 日(邀请报告)

52. 魏贤龙，“电镜中单体纳米结构的原位加工和物性表征”， **2014 年全国电子显微学年会**，南宁，2014 年 10 月 14-18 日(邀请报告)

53. 王永锋，“1/2 自旋体系扫描隧道显微学研究”，**中国真空学会 2014 学术年会**，广州，2014 年 11 月 7-9 日(邀请报告)

54. 叶安培，“Raman-光镊在空间生命科学研究中”，**中国空间科学学会空间生命专业委员会第二十届学术研讨会**，南宁，2014 年 11 月 5-8 日(邀请报告)

55. 康宁，“Coherent Charge Transport in InSb Nanowire”，**2014 年牛津仪器用户研讨会**，北京，2014 年 7 月 1-2(邀请报告)

56. 康宁，“Coherent Charge Transport in MBE-grown InSb Nanowire”，**2014 年湖南省量子结构与量子输运研究生暑期学校**，长沙，2014 年 7 月 27-28（邀请报告）

（三）国际会议一般报告

1. X. Li, X. L. Wei, Q. Chen, “Current enhancement of InAs nanowire by axial tensile strains and relationship with crystal structure”, T**he 2014 Asian Conference on Nanoscience and Nanotechnology (AsiaNANO 2014)**, Jeju, Korea, Oct. 26-29, 2014

2. M. Q. Fu, D. Pan, J. H. Zhao, Q. Chen, “MOSFETs based on individual ultrathin InAs nanowire”, **The 2014 Asian Conference on Nanoscience and Nanotechnology (AsiaNANO 2014)**, Jeju, Korea, Oct. 26-29, 2014

3. Z. Y. Ning, Q. Chen, "Electromechanical property of individual carbon nanotubes studied in situ in SEM and correlated with the atomic structures", **2014 MRS Fall Meeting & Exhibit**, Boston, Massachusetts, USA, Nov. 30-Dec. 5, 2014
4. X. Li, X. L. Wei, Q. Chen, "Modulating the electrical properties of thin InAs nanowires by in situ tension", **2014 MRS Fall Meeting & Exhibit**, Boston, Massachusetts, USA, Nov. 30-Dec. 5, 2014
5. M. Q. Fu, D. Pan, J. H. Zhao, Q. Chen, "Field effect transistors based on individual ultrathin InAs nanowire", **2014 MRS Fall Meeting & Exhibit**, Boston, Massachusetts, USA, Nov. 30-Dec. 5, 2014
6. X. L. Wei, Q. Chen, L. M. Peng, "Electron Emission from the Side Surface of Individual Joule-Heated Carbon Nanotubes", 2**014 MRS Fall Meeting & Exhibit**, Boston, Massachusetts, USA, Nov. 30-Dec. 5, 2014
7. X. Li, X. L. Wei, Q. Chen, "Modulating the electrical properties of thin InAs nanowires by in situ tension", **the First International Conference on Nanoenergy and Nanosystems 2014 (NENS2014)**, Beijing, China, Dec. 8-10, 2014
8. Y. M. Jing, K. Zhang, S. Y. Huang, H. L. Peng, H. Q. Xu, "Quantum Phase Coherence Effects in Topological Insulator Bi2Se3 Thin Films", 3**2nd International Conference on the Physics of Semiconductors (ICPS2014)**, Austin, USA, August 10-15, 2014
9. J. Zhang, "Chirality-dependent Single-walled Carbon Nanotube Alignment on Graphite for Helical Angle and Handedness Recognition", **2014 MRS Spring Meeting**, San Francisco, USA, April 21-26, 2014
10. J. Zhang, "Graphene: A Platform for Surface Enhanced Raman Spectroscopy", **Graphene-2014**, Toulouse, France, May 6-9, 2014
11. J. Zhang, "CVD Growth of Single-Walled Carbon Nanotubes with Controlled Structures for Nanodevice Applications", **The 5th Australis- China Conference**

on Science, Technology and Education & The 5th Australis-China Symposium for Materials Science(5thACSMS), Wollongong, Australia, July 20-23, 2014

12. S. Y. Xu, X. Y. Huo, H. X. Liu, W. Q. Sun, "A novel sensor for in situ local temperature sensing at micro/nano scales", **Materials Science and Engineering Conference 2014,Symposium: Materials for Thermometry in the Nanoscale**, Darmstadt, Germany, September,23-25, 2014
13. S. Y. Xu, X. Y. Huo, "A promising submicron sensor for in situ temperature sensing in lab-on-a-chip systems", **Advances in Microfluidics & Nanofluidics 2014**, Taiwan, May 21-23, 2014
14. W. B. Gao, D. Z. Guo, G. M. Zhang, "Pulsed strip-shaped electron beam from cold cathode for time-of-flight mass spectrometer application", **The 10th International Vacuum Electron Sources Conference**, Saint-Petersburg, Russia, June 30-July 4, 2014
15. L. D. Jin, J. Yu, X. L. Tong, C. B. Li, Y. N. Huang, A. P. Ye, "Investigation of apoA-I /ABCA1 specific interaction on living cells", **18th International Biophysics conference**, Australia, August 3-7, 2014

（四）专利

2014 年度授权专利

1. 蒋玉洁，薛炯微，叶剑文，许胜勇，"便携式户外直饮净水膜及其制备方法"，专利号：201210167750.9

2014 年度申请专利

1. 岳双林，"一种干法制备纳米线阵列气敏元件的方法"，申请号 2014100620216
2. 张锦，胡悦，康黎星，张树辰，赵秋辰，"一种超高密度单壁碳纳米管水平阵列及其可控制备方法"，申请号 201410594881.4

3. 张锦，康黎星，胡悦，张树辰，赵秋辰，“单壁碳纳米管水平阵列及其制备方法与应用”,申请号 201410594882.9
4. 张锦，康黎星，胡悦，张树辰，赵秋辰，“一种高密度半导体性单壁碳纳米管水平阵列及其制备方法”,申请号 201410594398.6
5. 张锦，杜然，“共轭微孔高分子气凝胶及其制备方法与应用”，申请号 201410468668.9
6. 张锦，胡悦，康黎星，张树辰，赵秋辰，“一种超高密度单壁碳纳米管水平阵列及其可控制备方法”，国际专利，申请号 PCT/CN2014/001040
7. 郭等柱，“一种基于动量分析器的飞行时间质谱计”，申请号 201410126379.0
8. 郭等柱，“用于飞行时间质谱计的场发射电离源”，申请号 201410232295.5
9. 刘旸，王胜，魏楠，彭练矛，“基于量子点-碳纳米管的红外成像探测器及其制备方法”，申请号 201410320148.3
10. 李强，黄少云，徐洪起，“一种基于纳米线的平面环栅晶体管及其制备方法”，申请号 2014100811961

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