



2017 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

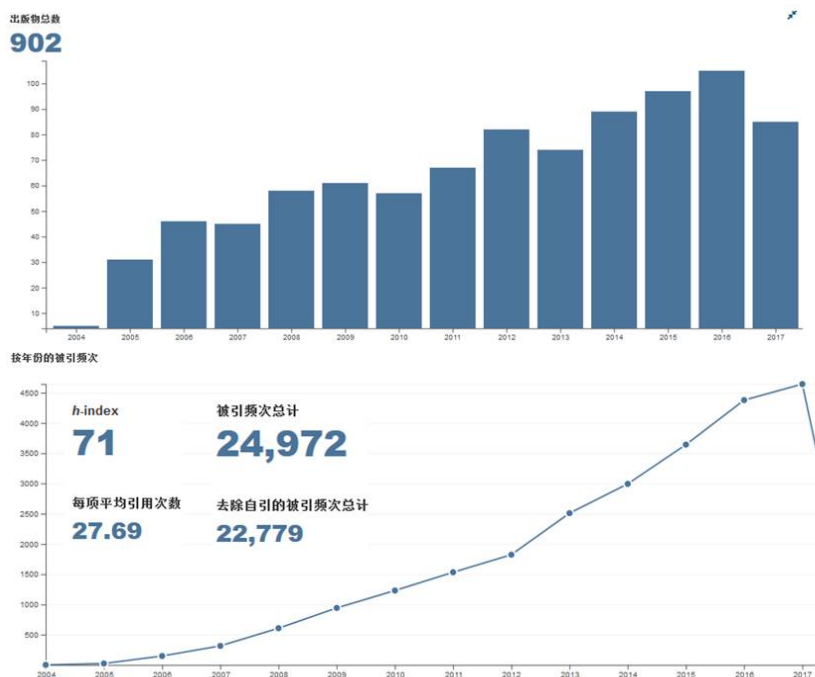
学术委员会主任：解思深

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

实验室自成立以来得到了科技部、基金委、教育部、北京市科委和北京大学的 985、211 等各专项的支持，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。自 2003 年实验室验收成立至 2017 年底，共发表以实验室为单位的 SCI 论文 902 篇，论文数目平稳上升；论文的引用也逐年增加，2017 年达到 4644 次/年，如下图所示。2017 年发表 SCI 文章 91 篇，见后面文章目录。特别是，近几年每年都有研究成果在国际顶级刊物上发表，2017 年有一篇论文在 Science 正刊发表，显良好发展态势。





1. 本年度新增项目和合同经费数（万元）

2017 年实验室成员承担的科研项目有 62 项，总合同经费达到 2.4 亿多元；其中 2017 和 2018 年新启动的项目有 26 项，新增合同经费 4000 余万元。

本年度彭练矛教授领导的基金委创新群体获得了连续资助，张锦教授申请到自然科学基金重大项目，李彦教授新增基金委自然科学基金重点项目。

2. 本年度获奖情况（其中：国家级奖，省部级奖）

张锦、刘忠范、童廉明、彭海琳，获得 2017 国家自然科学奖二等奖。

李彦等人的“单壁碳纳米管可控生长与修饰”项目获 2017 年度高等学校自然科学一等奖

李彦获第四届中国化学会-赢创化学创新杰出科学家奖

彭练矛、张志勇等人的“5 纳米碳纳米管 CMOS 器件”工作被选为 2017 年“中国高校十大科技进展”。

彭练矛获得 2017 年度首届全国创新争先奖状奖。

胡又凡获得 IAAM（国际先进材料协会）的 2017 年度科学家奖章。

实验室的学生们也获得了不少奖励：

李星的博士论文获得 2017 年度中国电子学会优秀博士学位论文。

吴功涛的文章获得 2017 年真空学会真空科学硕士、博士优秀论文奖。

另有多位同学获得北京大学及信息科学技术学院的多个奖项。

3. 本年度发表 SCI 论文数

本年度实验室人员发表 SCI 论文有 111 篇，其中影响因子大于 6 的杂志上的有 55 篇（特别是影响因子大于 10 的有 29 篇，分别是 NATURE 1 篇，SCIENCE 1 篇，NATURE NANOTECHNOLOGY 1 篇，CHEMICAL SOCIETY REVIEWS 1 篇，ADVANCED MATERIALS 7 篇，ACS NANO 9 篇，JOURNAL OF THE AMERICAN CHEMICAL SOCIETY 1 篇，NANO LETTERS 3 篇，NANO ENERGY 1 篇，NATURE COMMUNICATIONS 1 篇，ADVANCED FUNCTIONAL MATERIALS 1 篇，ANGEWANDTE CHEMIE- INTERNATIONAL EDITION 1 篇



和 ACS CATALYSIS 1 篇。

实验室骨干 2017 年在国际会议上做 6 次大会报告(Plenary talk), 54 次邀请报告和 32 次一般报告或墙报; 在全国性重要学术会议上做 2 次大会报告(Plenary talk) 和 4 次邀请报告。

4. 本年度申请及授权专利数

本年度实验室有 3 项中国国家发明专利申请获得授权, 新申请了 5 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

本年度新加入了一位青年千人特聘研究员孙伟博士和一位助研李娜博士。到 2017 年底, 实验室有 11 名正教授、4 位特聘研究员、13 名副教授或副研究员、2 名高工、2 名助研和 1 名讲师, 共 33 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、3 位青年千人、1 位中组部拔尖人才、2 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 50 多个重要学术机构中任职, 特别是新增多位年青教师在各种重要学术机构中任职, 体现出实验室年青人的成长和实验室成员影响力的扩大。

2. 人才培养情况: 在站博士后、在读博士生、硕士生人数

本年度实验室现有 12 名在站博士后; 有在读博士生 90 余人, 在读硕士生 20 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	称号	研究方向	技术职称	在实验室工作期限
1	彭练矛	男	55	博士	长江、杰青、百千万人才	纳米电子学	教授	2000 年至今
2	张锦	男	48	博士	长江、杰青、新世纪人才	纳米化学	教授	2002 年至今
3	陈清	女	52	博士	杰青、百千万人才、新世纪人才	纳米材料, 电子显微学	教授	2000 年至今
4	徐洪起	男	61	博士	中组部千人	量子结构 纳米电子学	教授	2010 年至今
5	李彦	女	51	博士	长江、杰青、新世纪人才	纳米材料化学	教授	2002 年至今
6	侯士敏	男	47	博士	新世纪人才	纳米电子学	教授	2000 年至今
7	张志勇	男	40	博士	拔尖、优青、新世纪人才	纳米电子学	教授	2008 年至今
8	张耿民	男	48	博士		物理电子学	教授	2000 年至今
9	梁学磊	男	43	博士		纳米电子学	教授	2003 年至今
10	许胜勇	男	51	博士		凝聚态物理	教授	2006 年至今
11	叶安培	男	57	博士		纳米生物 光子学	教授	2008 年至今
12	王永锋	男	38	博士	青千、优青	分子电子学	特聘研究员	2012 年至今
13	魏贤龙	男	35	博士	全国优博、北大百人	纳米材料表征和物性	特聘研究员	2012 年至今
14	胡又凡	女	38	博士	青千、北大百人	纳米电子学	特聘研究员	2014 年至今
15	孙伟	男	37	博士	青千	导向组装及 纳电子学	特聘研究员	2017 年至今
16	王胜	男	40	博士	新世纪人才	纳米电子学	副研	2008 年至今
17	邢英杰	男	47	博士	全国优博	物理电子学	副教授	2008 年至今
18	王晶云	女	46	博士		电子显微学	副教授	2000 年至今
19	申自勇	男	48	博士		扫描探针	副教授	2000 年至今
20	潘华勇	男	49	博士		电子显微学	副研	2004 年至今



21	郭等柱	男	50	博士		物理电子学	副研	2005 年至今
22	叶林晖	男	48	博士		理论计算	副教授	2008 年至今
23	孙文涛	女	41	博士		纳米电子学	副教授	2008 年至今
24	廖建辉	男	41	博士		纳米电子学	副研	2008 年至今
25	戴恩光	男	53	博士		光电子学	副教授	2009 年至今
26	康宁	男	41	博士		纳米电子学	副研	2011 年至今
27	黄少云	男	43	博士		纳电子学与 纳米器件物 理	副教授	2011 年至今
28	黄珏华	男	55	博士		物理电子	副教授	2014 年至今
29	高崧	男	50	博士		扫描探针	讲师	2002 年至今
30	丁力	男	33	博士	全国优博提 名, 北京市 优博	纳米电子学	助研	2015 年至今
31	李娜	女	34	博士	北京大学博 雅博士后	分子电子学	助研	2017 年至今
32	岳双林	女	41	博士		微纳加工	高工	2006 年至今
33	董立军	男	43	学士		微纳加工	高工	2013 年至今



二、实验室成员在学术机构任职情况

姓名	学术任职
彭练矛	国际物理学杂志“Journal of Applied Physics”的副主编 国际显微学杂志“Ultramicroscopy”编委 国际晶体学会电子衍射专业委员会顾问 中国真空学会副理事长
张锦	英国皇家化学会会士 Carbon 杂志副主编 Nano Research 杂志编委 Particles 和 Chemistry of Graphene 的顾问编委 化学学报和光散射学报编委 北京市低维碳材料科学与工程研究中心副主任 北京石墨烯研究院副院长
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
李彦	ACS Nano 杂志顾问编委 Journal of Materials Chemistry A 杂志副主编 Materials Horizons 顾问编委 国际碳纳米管系列学术会议指导委员会委员 中国化学会女化学工作者委员会副主任
徐洪起	Frontiers of Physics 副主编 Nature-Scientific Reports 编委 中国物理学会低温物理专业委员会委员 中国材料研究学会纳米材料与器件分会理事



侯士敏	真空科学与技术学报副主编
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
许胜勇	IET Nanodielectrics 副主编
张志勇	中国电子学会青年科学家联盟会员
王永锋	物理化学学报第四届编委 中国化学快报青年编委
魏贤龙	中国计量测试学会真空计量专委会委员
胡又凡	IEEE 纳米技术杂志副主编 纳米科技咨询委员会委员
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
黄少云	“半导体学报”第12届编辑委员会委员 日本理化学研究所访问研究员



三、2017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	2016YFA0200104	国家重点研发计划“纳米科技”专项	纳米碳材料产业化关键技术及重大科学前沿	张锦 (首席)	2016.7-2021.6	9494
2	2016YFA0201902	国家重点研发计划“纳米科技”专项	基于纳米碳及相关材料的新型纳米光电器件	彭练矛 (首席)	2016.7-2021.6	1120
3	2017YFA0205003	国家重点研发计划	亚纳米尺度结构和相互作用的高分辨谱学研究	魏贤龙	2017.7-2022.6	832
4	2017YFC0209504	国家重点研发计划“大气污染成因与控制技术研究”专项	纳米颗粒物物化特性测量	叶安培	2017.7-2020.12	372
5	2016YFA0201901	国家重点研发计划“纳米科技”专项	高性能碳基纳米晶体管的制备及大规模集成	张志勇	2016.8-2021.7	960
6	2016YFA0201904	国家重点研发计划“纳米科技”专项	芯片用碳管材料的可控和批量制备	李彦	2016.7-2021.6	640
7	2013CB933404	国家重大科学研究计划“纳米研究”专项项目课题	单分子纳米磁体自旋态检测与输运性质调控	王永锋	2013.1-2017.8	561
8	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	414



9	2017Y FA030 3304	国家重点研发计划	基于拓扑复合小体系的原型量子器件构筑	徐洪起 (参加)	2017.7- 2022.6	175
10	2017Y FA030 3304	国家重点研发计划	基于拓扑复合小体系的原型量子器件构筑	康宁 (参加)	2017.7- 2022.6	132
11	2017Y FA020 4901	国家重点研发计划“纳米科技”重点专项	单分子器件的精准制备和原位高灵敏测量技术	黄少云 (参加)	2017.7- 2022.6	150
13	2016Y FA020 0802	国家重点研发计划“纳米研究”专项课题	外场诱导下纳米结构电子过程原位测量研究	陈清 (参加)	2016.6- 2021.5	308
14	2016Y FA030 0601	国家重点研发计划	拓扑量子器件的制备和调控	徐洪起 (参加)	2016.9- 2021.8	500
15	2016Y FA030 0800	国家重点研发计划“量子调控与量子信息”重点专项	自旋波电子学物理、材料与器件	黄少云 邢英杰 (参加)	2016.7- 2021.6	150
16	61621 061	国家自然科学基金创新研究群体项目	纳米尺度的高性能电子与量子器件的理论与方法	彭练矛	2017.1- 2019.12	525
17	21790 052	国家自然科学基金重大项目	高品质石墨炔的控制制备及其基本物性研究	张锦	2018.1- 2022.12	573
18	61390 504	国家自然科学基金重大项目	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	440



19	21631002	国家自然科学基金重点项目	晶元尺寸基底上单一手性单壁碳纳米管的生长	李彦	2017.1-2021.1	291
20	91421303	国家自然科学基金重点项目	复合量子结构中的拓扑量子态和量子纠缠态研究	徐洪起	2015.1-2017-12	500
21	21233001	国家自然科学基金重点项目	平整基底上的拉曼信号增强技术及其应用	张锦	2013.1-2017.12	300
22	21433011	国家自然科学基金重点项目	单层二维共价网络结构的构筑策略与性质研究	王永峰 (参加)	2015.1-2019.12	140
23	61427901-002	国家自然科学基金重大项目	二维电子材料及纳米量子器件的研究和原位分析仪器	彭练矛 (参加)	2015.1-2019.12	800
24	21522301	国家自然科学基金优秀青年	表面自组装	王永峰	2016.1-2018.8	150
25	61322105	国家自然科学基金优秀青年	碳基纳米电子学	张志勇	2014.1-2017.12	100
26	61775006	国家自然科学基金面上项目	金属纳米颗粒对MoS ₂ 等二维半导体材料的增强光学效应及其应用研究	陈清	2018.1-2021.12	69
27	11774005	国家自然科学基金面上项目	基于石墨烯/二维超导异质结构器件的量子输运研究	康宁	2018.1-2021.12	64
28	U1636110	国家自然科学基金面上项目	从孕妇外周血中无标记准确分离单个胎儿有核红细胞研究	叶安培	2017.1-2019.12	80



29	61671020	国家自然科学基金面上项目	碳纳米管数模混合集成电路研究	丁力	2017.1-2020.12	58
30	61671021	国家自然科学基金面上项目	电子-分子振动相互作用对分子器件稳定性和电学性质影响理论研究	侯士敏	2017.1-2020.12	62
31	61671022	国家自然科学基金面上项目	“锂掺杂氧化锌铁电纳米材料的制备及其在光伏领域的应用”	张耿民	2017.1-2020.12	60
32	61671023	国家自然科学基金面上项目	基于等动量加速与场发射电子源的空间用微型飞行时间质谱计研究	郭等柱	2017.1-2020.12	60
33	61571016	国家自然科学基金面上项目	高性能碳基瞬态电子器件和集成电路	胡又凡	2016.1-2019.12	76.8
34	21573014	国家自然科学基金面上项目	单分子自旋电子器件的构建和输运性质测量	廖建辉	2016.1-2019.12	80
35	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
36	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
37	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
38	11374022	国家自然科学基金面上项目	应变对单层/少层 MoS ₂ 纳米片及其器件的性能的影响	陈清	2014.1-2017.12	89



39	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
40	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
41	61370009	国家自然科学基金面上项目	表面等离激元增强碳纳米管光电器件性能研究	王胜	2014.1-2017.12	81
42	61376059	国家自然科学基金面上项目	用阴极缓冲层提高小分子有机太阳能电池性能的研究	邢英杰	2014.1-2017.12	83
43	7021403008	国家自然科学基金青年基金项目	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
44	26161401006	国家自然科学基金青年基金项目	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
45	U1632119	国家自然科学基金联合基金项目	铜、铁和钴催化生长碳纳米管的XAFS研究	李彦	2017.1-2019.12	52
46	2171101315	国家自然科学基金委国际合作交流项目	中墨纳米材料双边会	李彦	2017.8-2019-8	3
47	51720105003	国家自然科学基金海外合作项目	扫描近场光谱新技术及其在纳米碳材料结构与性能表征中的应用	张锦	2018.1-2022.12	229
48	11528407	基金委海外及港澳学者合作研究基金	二维半导体的制备, 优化和光电器件应用	楼峻 (陈清为国内合作者)	2016.1-2017.12	20
49		青年千人计划		孙伟	2018.1-2020.12.	300



50		青年千人计划	智能化纳米集成传感系统	胡又凡	2015.1-2017.12	300
51	Z171100002017001	北京市科委科技计划	碳纳米管薄膜晶体管中试工艺研究	梁学磊	2017.1-2018.12.	100
52		北京市科委科技计划	二维有机杂化金属卤化物光电功能材料研究	孙文涛	2017.1-2018.12.	90
53	Z171100002217093	北京市科委科技计划	半导体多量子点器件研究	徐洪起	2017.5-2018.5	50
54	D161100002616002	北京市科委科技计划	碳纳米管集成电路自动化设计 / 仿真工具包开发	丁力	2016.1-2017.12	117
55	Z15110000331501	北京市科委科技计划	集成电路用碳纳米管工程化制备化学气相沉积设备研制	张志勇	2015.7-2017.12	100
56	20120001110093	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	2014.1-2017.8	12
57	17-H863-04-ZT-002-005-01	军委科技委项目	高速碳基电子器件	彭练矛	2017.6-2018.4	173.7
58	保密	军口预研项目	保密	王胜	2017.1-2020.12	185
59		中科院微生物资源前期开发国家重点实验室开放课题	用于海洋微生物分选的激光诱导表面增强 Raman 光谱技术探索	叶安培	2014.7-2017.6	20



60		横向项目	高温阈值机理研究	许胜勇	2017.06- 2018.06	5
61		横向项目	一种微型原子气室封装工艺方法	郭等住	2016.5- 2018.4	30
62	HQ-14 12-CT 0-TE- 026	横向项目	CNT-TFT 显示技术研究	梁学磊	2014.12- 2017.6	400



四、2017 年实验室发表的高影响因子论文的刊物分布（影响因子大于 6 的）

刊物	篇数	刊物	篇数
NATURE (IF40.137)	1	SCIENCE (IF37.205)	1
NATURE NANOTECHNOLOGY (IF38.986)	1	CHEMICAL SOCIETY REVIEWS (IF38.618)	1
ADVANCED MATERIALS (IF19.791)	7	ACS NANO (IF13.942)	9
JOURNAL OF THE AMERICAN CHEMICAL SOCIETY (IF13.858)	1	NANO LETTERS (IF12.712)	3
NANO ENERGY (IF12.343)	1	NATURE COMMUNICATIONS (IF12.124)	1
ADVANCED FUNCTIONAL MATERIALS (IF12.124)	1	ANGEWANDTE CHEMIE INTERNATIONAL EDITION (IF11.994)	1
ACS CATALYSIS (IF10.614)	1	CHEMISTRY OF MATERIALS (IF9.466)	1
ADVANCED SCIENCE (IF9.034)	1	SMALL (IF8.643)	3
PHYSICAL REVIEW LETTERS (IF8.462)	1	NATIONAL SCIENCE REVIEW (IF8.434)	1
BIOSENSORS & BIOELECTRONICS (IF7.78)	1	ACS APPLIED MATERIALS & INTERFACES (IF7.504)	4
NANOSCALE (IF7.367)	3	NANO RESEARCH (IF7.354)	5
ADVANCED OPTICAL MATERIALS (IF6.875)	1	ACS PHOTONICS (IF6.756)	1
CARBON (IF6.337)	1	CHEMICAL COMMUNICATIONS (IF6.319)	3



五、主要研究成果目录

(一) 2017 年 SCI 论文目录

1. Shuchen Zhang, Lixing Kang, Xiao Wang, Lianming Tong, Liangwei Yang, Zequn Wang, Kuo Qi, Shibin Deng, Qingwen Li, Xuedong Bai, Feng Ding, Jin Zhang, “Arrays of horizontal carbon nanotubes of controlled chirality grown using designed catalysts”, **NATURE**, 543 (2017) 234-238
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109. Huihui Tian, Na Zhang, Lianming Tong, Jin Zhang, “In Situ Quantitative Graphene-Based Surface-Enhanced Raman Spectroscopy”, **SMALL METHODS**, 1 (2017) 1700126

(二) 邀请报告

1. Lian-Mao Peng, “Carbon nanotube devices: the importance of high performance for flexible electronics”, **Third Small Science Symposium**, at The Hong Kong Polytechnic University, May 14-17, 2017 (**Plenary**)
2. Lian-Mao Peng, “Electronics in the post Moorish era: opportunities and challenges for carbon based electronics”, **2017 Beijing microelectronics International Symposium**, Beijing, September 7, 2017 (**Keynote speaker**)
3. Jin Zhang, “Chiral Angle Controlled Growth of Single-Walled Carbon Nanotubes”, **AMN8**, Queenstown, New Zealand, February 12-16, 2017 (**Keynote Speaker**)
4. Jin Zhang, “(2m, m) Carbon Nanotubes Arrays”, **4th International Forum on Graphene**, Shenzhen, April 9-12, 2017 (**Keynote speaker**)
5. Yan Li, “Chirality Specific Growth of Single-Walled Carbon Nanotubes”, **Mexico-China Workshop on NANO Materials/Science/Technology (NANOMXCN-2017)**, Cancun, Mexico, August 19-21, 2017 (**Keynote speaker**)
6. Qing Chen, “The structure-dependent properties of InAs nanowires and their devices”, **the 17th Beijing Conference and Exhibition on Instrumental Analysis (BCEIA 2017)**, Beijing, China, October 9-11, 2017 (**Keynote presentation**)
7. Lian-Mao Peng, “Fundamental limits to Si CMOS and merits for carbon nanotube electronics”, **Symposium on “Carbon-based Nanodevices and Flexible Electronics”**, Peking University, Beijing, China, July 22, 2017 (**Invited Talk**)
8. Lian-Mao Peng, “Carbon nanotube based CMOS and optoelectronic devices and circuits”, **12th Topical Workshop on Heterostructure Microelectronics**, Hotel



- Kyocera, Kirishima, Kyushuu, Japan, August 28-31, 2017 (**Invited Talk**)
9. Lian-Mao Peng, “Carbon nanotube film based CMOS: performance limits and comparison with Si CMOS”, **International Symposium of Nanocarbon Materials**, Aalto University, September 1, 2017 (**Invited Talk**)
 10. Lian-Mao Peng, Yang Liu and Sheng Wang, “Carbon nanotube based optoelectronic devices and integrated systems”, **12th IEEE Nanotechnology Materials and Devices Conference**, Singapore, October 2-4, 2017 (**Invited Talk**)
 11. Lian-Mao Peng, “Carbon nanotube electronics: towards fundamental limits and large-scale integration”, **Pre-IEDM Seminars at Stanford**, Packard 204, Stanford, December 1, 2017 (**Invited Talk**)
 12. Lian-Mao Peng, “Scaling of carbon nanotube CMOS devices: toward fundamental limits”, **63rd International Electron Devices Meeting (2017 IEDM)**, Hilton San Francisco Union Square, San Francisco, CA, December 4-6, 2017 (**Invited Talk**)
 13. Jin Zhang, “Growth of horizontal carbon nanotube arrays with specific chirality using designed catalysts”, **KAUST workshop**, Saudi Arabia, February 18-22, 2017 (**Invited speaker**)
 14. Jin Zhang, “(2m, m) Carbon Nanotubes Arrays”, **Guadalupe Workshop 2017**, Houston, April 21-25, 2017 (**Invited speaker**)
 15. Jin Zhang, “Growth of horizontal carbon nanotube arrays with specific chirality using designed catalysts”, **The 18th International Conference on the Science and Application of Nanotubes (NT17)**, Brazil, June 25-30, 2017 (**Invited speaker**)
 16. Jin Zhang, “Growth of horizontal single-walled carbon nanotube arrays with specific chirality using designed catalysts”, **ISECSM-2017**, Brisbane, July 30-August 3, 2017 (**Invited speaker**)
 17. Jin Zhang, “Graphdiyne: Synthesis and Its applications”, **Catalyst and Catalysis Forum 2017**, Queensland, Australia, August 4 -5, 2017 (**Invited speaker**)



18. Jin Zhang, “(2m, m) Carbon Nanotubes Arrays”, **International Symposium of Nanocarbon Materials**, Finland, August 30- September 2, 2017 (**Invited speaker**)
19. Jin Zhang, “Chirality Predicted Growth of Singled-walled Carbon Nanotubes Array”, **Australia-China Joint Symposium on Advanced Materials**, Adelaide, Australia, October 11-12, 2017 (**Invited speaker**)
20. Jin Zhang, “Chirality Predicted Growth of Singled-walled Carbon Nanotubes Array”, **Australia-China Joint Symposium on Advanced Materials**, Melbourne , Australia, October 13-15, 2017 (**Invited speaker**)
21. Jin Zhang, “Chirality Predicted Growth of Singled-walled Carbon Nanotubes Array”, **Korea-China Joint Symposium on Frontie**, Seou, Korea, November 9-11, 2017 (**Invited speaker**)
22. Jin Zhang, “Graphdiyne: Synthesis and Applications”, **4th International Symposium for Frontiers of Nanostructured Functional Materials and Applications**, Suzhou, November 24-26, 2017 (**Invited Talk**)
23. Jin Zhang, “Chirality Predicted Growth of Singled-walled Carbon Nanotubes Array”, **2017 MRS Fall Meeting**, Boston, November 26- December 1, 2017 (**Invited speaker**)
24. Jin Zhang, “Chirality Predicted Growth of Singled-walled Carbon Nanotubes Array”, **Photocatalysis 2 & SIEMME'23**, Tokyo, December 1-3, 2017 (**Invited speaker**)
25. Jin Zhang, **3rd International Symposium on Bio, Organic & Nano Electronics, (ISBONE-2017)**, Nanjing, December 16-18, 2017 (**Invited Talk**)
26. Yan Li, “Chirality-Specific Synthesis and Spectroscopic Characterization of Single-Walled Carbon Nanotubes”, **The 6th International Workshop Nanocarbon Photonics and Optoelectronics**, Sochi Russia, March 19-24, 2017 (**Invited Talk**)
27. Yan Li, “Catalyst Design for Controlled Growth of Single-Walled Carbon Nanotubes”, **52th Conference of Fullerene-Nanotube-Graphene**, The



- University of Tokyo, Tokyo, Japan, March, 2017 (**Invited Talk**)
28. Yan Li, “Structure-controlled synthesis of single-walled carbon nanotubes”, **253rd American Chemical Society NATIONAL MEETING & EXPOSITION Advanced Materials, Technologies, Systems & Processes**, San Francisco, California, The United States, April 2-6, 2017 (**Invited Talk**)
 29. Yan Li, “Structure-controlled synthesis of single-walled carbon nanotubes”, **International Forum on Graphene**, Shenzhen, China, April 10-12, 2017 (**Invited Talk**)
 30. Yan Li, “Selective growth of single-walled carbon nanotubes using tungsten-based catalyst”, **Guadalupe Workshop VIII**, Flying L Ranch in Bandera, Texas, The United States, April 21-25, 2017 (**Invited Talk**)
 31. Yan Li, “Spectroscopic Characterization in Chirality-Specific Synthesis of Single-Walled Carbon Nanotubes”, **The 12th Sino-US Nano Symposium**, Beijing, China, May 25-28, 2017 (**Invited Talk**)
 32. Yan Li, “Tungsten-Based Intermetallic Compound as Catalyst for Structure-Specific Growth of Single-Walled Carbon Nanotube”, **231st ECS Meeting**, New Orleans, The United States, May 28-June 1, 2017 (**Invited Talk**)
 33. Yan Li, “Chirality Assignment and Quantification for Selective Growth of Single-Walled Carbon Nanotubes”, **The 18th International Conference on the Science & Application of Nanotubes (NT17)**, Belo Horizonte, Brazil, June 25-30, 2017 (**Invited Talk**)
 34. Yan Li, “Selective growth of single-walled carbon nanotubes using tungsten-based catalyst”, **CNTFA17 5th Carbon Nanotube Thin Film Electronics and Applications Satellite**, Belo Horizonte, Brazil, June 30, 2017 (**Invited Talk**)
 35. Yan Li, “Structure-controlled synthesis of single-walled carbon nanotubes”, **First UCL-PKU Forum on Materials, Energy and Catalysis**, Peking University, Beijing, China, July 17-19, 2017 (**Invited Talk**)
 36. Yan Li, “Structure-Controlled Growth of Single-Walled Carbon Nanotubes”, **The**



- 7th International Conference on Nanoscience and Technology (ChinaNANO 2017)**, Beijing International Convention Center, Beijing, China, August 29-31, 2017 (**Invited Talk**)
37. Yan Li, “Tungsten-Based Catalysts for Selective Growth of Single-Walled Carbon Nanotubes”, **The 7th International Conference on Nanoscience and Technology (ChinaNANO 2017)**, Beijing International Convention Center, Beijing, China, August 29-31, 2017 (**Invited Talk**)
38. Qing Chen, “In-situ characterizing carbon nanotubes and InAs nanowires with outstanding properties”, **4th Kleindiek User Meeting-20th Anniversary edition**, Reutlingen, Germany, April 25-26, 2017 (**Invited Talk**)
39. Qing Chen, “The Structure-Dependent Properties of InAs Nanowires and Their Devices”, **The First International Semiconductor Conference for Global Challenges**, Nanjing, China, July16-19, 2017 (**Invited Talk**)
40. Qing Chen, “The structure-dependent properties of InAs nanowires and their devices”, **The 8th MRS Trilateral Conference on Advances in Nanomaterials: Energy, Water & Healthcare**, Beijing, China, October 28-30, 2017 (**Invited Talk**)
41. Shengyong Xu, “Local temperature increase of individual cultured live cells in a liquid medium”, **7th Congress of Molecular & Cell Biology**, Xi’an, China, April 24-27, 2017 (**Invited Talk**)
42. Shengyong Xu, “Sensing Local Temperature at the Single-Cell Level: Artificial and Natural Ways”, **1st International Biotechnology Congress-2017**, Xi’an, China, April 24-27, 2017 (**Invited Talk**)
43. Shengyong Xu, “Electromagnetic pulsed waves in a natural biosystem: Generation and transmission mechanism and their functions for fast communication”, **BIT’s 4th Annual Global Congress of Knowledge Economy-2017 (GCKE-2017)**, Qingdao, China, September 19-21, 2017 (**Invited Talk**)
44. Shengyong Xu, “To map the local temperature distribution of a single live cell”, **EMN Summit Meeting 2017**, Chengdu, China, October 11-17, 2017 (**Invited**



Talk)

45. Shengyong Xu, “Biological Materials–Bio-membrane–Play Three Vital Roles in Electrical Communication in Living Organisms”, **International Conference on New Material and Chemical Industry (NMCI2017)**, Sanya, China, November 18-22, 2017 (**Invited Talk**)
46. Shengyong Xu, “To map the local temperature distribution of a single live cell”, **The 1st World Congress of Biomedical Engineering-2017**, Xi’an, China, November 9-11, 2017 (**Invited Talk**)
47. Xuelei Liang, “Challenges for carbon nanotube thin film transistors”, **International conference on display technology ICDT 2017**, Fuzhou, China, February 18-20, 2017 (**Invited Talk**)
48. Xuelei Liang, “Contact effect on the performance and scaling behavior of carbon nanotube thin film transistors”, **International workshop on computer aided design of thin film transistors (CAD-TFT)**, University of Cambridge, UK, June 28-30, 2017 (**Invited Talk**)
49. Xianlong Wei, “SEM as a versatile lab for in-situ nanomaterial research”, **the 3rd International Symposium on Advanced Inorganic Materials (ISAIM 2017)**, Tsukuba, Japan, August 2-5, 2017 (**Invited Talk**)
50. Xianlong Wei, “Scanning electron microscope as a versatile lab for in-situ nanomaterial research”, **the 7th International Conference Nanoscience & Nanotechnology of China (ChinaNANO 2017)**, Beijing, China, August 29-31, 2017 (**Invited Talk**)
51. Wei Sun, “Programmable Nano-Manufacturing with Structural DNA Nanotechnology”, **The Asian 3 Roundtable on Nucleic Acids (A3RONA)**, Xi’an, China, September 15-17, 2017 (**Invited Talk**)
52. Youfan Hu, “Transferable high performance flexible carbon nanotube thin film transistors for medium-scale integrated circuits”, **Small Science Symposium 2017**, Hong Kong, China, May 13-18, 2017 (**Invited Talk**)
53. Youfan Hu, “Machine-washable Textile Triboelectric Nanogenerator for Human



- Respiratory Monitoring”, **The European Advanced Materials Congress 2017**, Stockholm, Sweden, August 22-24, 2017 (**Invited Talk**)
54. Youfan Hu, “Harvesting Weak Mechanical Energy from the Environment for Self-powered Systems”, **The 3rd International Conference on Nanoenergy and Nanosystems**, Beijing, China, October 21-23, (**Invited Talk**)
55. Ning Kang, “Transport Properties of Highly Crystalline Two-Dimensional Superconductors”, **3rd Conference on Condensed Matter Physics (CCMP-2017)**, Shanghai, China, June 24-27, 2017 (**Invited Talk**)
56. Ning Kang, “Transport Properties of Two-Dimensional Superconducting Mo₂C Crystals and Heterostructures”, **SuperThin2017 workshop**, Lugano, Switzerland, November 20-23, 2017 (**Invited Talk**)
57. Juan Yang, “Raman spectroscopy of individual SWNTs”, **PKU-UTokyo Summer Camp**, The University of Tokyo, Japan, August, 2017 (**Invited Talk**)
58. Juan Yang, “Raman spectroscopy of individual SWNTs”, **18th Light Scattering Conference**, Guangzhou, China, December 1-5, 2017 (**Invited Talk**)
59. Feng Yang, “Characterization of the Chiral Structure of SWNTs on Substrates and TEM Study on W₆Co₇ Catalysts”, **PKU-UTokyo Summer Camp**, The University of Tokyo, Japan, August, 2017 (**Invited Talk**)
60. Feng Yang, “Chirality-Specific Growth of Single-Walled Carbon Nanotubes on Intermetallic W₆Co₇ Catalysts”, **1st International Symposium of Nanocarbon Materials**, Aalto University, Finland, September 1, 2017 (**Invited Talk**)
61. 彭练矛, “基于碳纳米管的电子和光电子器件”, **2017年微纳米加工技术讲习班**, 中国科学院物理研究所, 北京, 2017年7月12日, 2017 (专题报告)
62. 彭练矛, “碳纳米管电子学”, **21届全国半导体物理学术会议 (SPC 2017)**, 南京大学国际会议中心, 南京, 2017年7月19-21日, 2017 (大会报告)
63. 陈清, “原位扫描电子显微学及其在纳米科技方面的应用”, **第三届电镜网络会议 (iCEM 2017)**, 北京, 6月22日, 2017 (邀请报告)
64. 陈清, “纳米结构的原位分析”, **2017全国电子显微学年会**, “原位电子显微学表征分会”, 中国成都, 10月17-22日, 2017 (邀请报告)



65. 康宁, “基于 InSb 半导体纳米线超导复合器件的输运研究”, 第二十一届全国半导体物理学术会议, 南京, 2017 年 7 月 19-21 日, 2017 (邀请报告)
66. 魏贤龙, “二维材料层间滑动和摩擦特性的原位研究”, 2017 年全国电子显微学学术年会, 成都, 2017 年 10 月 17~22 日 2017 (邀请报告)

1. 国际会议一般报告和墙报 Juan Yang, “Raman Spectroscopy of Individual Single-Walled Carbon Nanotubes”, **52th Conference of Fullerene-Nanotube-Graphene**, The University of Tokyo, Tokyo, Japan, March 2017 (oral presentation)
2. Na Zhang, “Surface-enhanced Raman Scattering on Anisotropic 2D Layered Materials”, **ISPN2017**, Dalian, China, April 28-30, 2017 (oral presentation)
3. Youfan Hu, “Machine-washable Smart Fabric for Energy Harvesting and Human Respiratory Monitoring”, **MRS Spring Meeting, Phoenix**, USA, April 17-21, 2017 (oral presentation)
4. Xianlong Wei, “Periodic Pulsed Electron Emission from Single Hot Carbon Nanotubes”, **30th International Vacuum Nanoelectronics Conference**, Regensburg, Germany, July 10-14, 2017 (oral presentation)
5. Sen Li, Dingxun Fan, Ning Kang, P. Caroff, H. Q. Xu, “Study of $0-\pi$ phase transition in hybrid superconductor-InSb nanowire quantum dot devices”, **Mesoscopic Transport and Quantum Coherence**, Espoo, Finland, August 5-8, 2017 (oral presentation)
6. Xin Gao, Jin Zhang, “Graphdiyne: Synthesis and Its Applications”, **The 7th International Conference on Nanoscience and Nanotechnology (ChinaNANO 2017)**, Beijing, August 29-31, 2017 (oral presentation)
7. Yi Zeng, Jianhui Liao, Jun Lou, Qing Chen, “Highly enhanced photoluminescence of monolayer MoS₂ with self-assembled Au nanoparticle arrays”, **Flatlands beyond graphene 2017**, Lausanne, Switzerland, August 29-September 1, 2017 (oral presentation)
8. Feng Yang, “Chirality-Specific Growth of SWNTs using Intermetallic W₆Co₇



- Catalysts”, **53th Conference of Fullerene-Nanotube-Graphene**, Kyoto University, Kyoto, Japan, September, 2017 (**oral presentation**)
9. Danhong Han, Gang Li, Jingjing Xu and Shengyong Xu, “Performance Optimization of Thermoelectric Measurement Based on Wearable Materials”, **International Conference on New Material and Chemical Industry (NMCI2017)**, Sanya, China, November 18-22, 2017 (**oral presentation**)
 10. Juan Yang, “Raman spectroscopy of individual SWNTs”, **International Conference on SERS**, Xiamen, China, December 5-8, 2017 (**oral presentation**)
 11. Xiulan Zhao, “Growth of Semiconducting (14,4) Carbon Nanotubes Using W-Co Salts as Catalyst Precursor”, **The 52th Fullerenes-Nanotubes-Graphene General Symposium**, Tokyo, Japan, February 26- March 5, 2017 (**poster**)
 12. Liangwei Yang, Jin Zhang, “High-yield exfoliation of graphite into few-layer graphene via reduction of graphite edge”, **2017 International Forum on Graphene in Shenzhen**, Shenzhen, April 9-12, 2017 (**poster**)
 13. Jiaqiang Li, Jin Zhang and Zhongfan Liu, “Graphene as Template Assisted Synthesis of Few Layer β -Graphdiyne Film”, **The 2nd Frontier Forum for Physical Chemistry Graduates 2017**, Beijing, China, May 20-21, 2017 (**poster**)
 14. Na Zhang, “Surface-enhanced Raman Scattering on Anisotropic 2D Layered Materials”, **FNC2017**, Beijing, China, June 9-11, 2017 (**poster**)
 15. Jiaqiang Li, Ziqian Xie, Jin Zhang and Zhongfan Liu, “Architecture β -Graphdiyne on Copper Substrate and Graphene Using Alkyne Coupling Reaction”, **Frontiers of Nanochemistry 2017 (FNC-2017)**, Beijing, China, June 9-11, 2017 (**poster**)
 16. Shuchen Zhang, Liangwei Yang, Jin Zhang, “Arrays of horizontal carbon nanotubes of controlled chirality grown using designed catalysts”, **Frontiers of Nanochemistry-2017**, Beijing, June 9-11, 2017 (**poster**)
 17. Shuchen Zhang, “Mechanism of Growth of Single-Walled Carbon Nanotubes with Specific Chirality on Designed Solid Catalysts”, **The 18th International Conference on the Science and Application of Nanotubes (NT17)**, Brazil, June



- 25-30, 2017 (**poster**)
18. Qiuchen Zhao, Zequn Wang, Fengrui Yao, Kaihui Liu, Lianming Tong and Jin Zhang, “Gas-Phase Etching of Carbon Nanotubes: Kinetics, Thermodynamics and Beyond”, **NT17**, Brazil, June 25-30, 2017 (**poster**)
 19. Shengyong Xu, F. Yang and J. J. Xu, “The overlooked role of a protein channel: Generation of pulsed electromagnetic wave in a biosystem”, **14th International Conference on Nanosciences & Nanotechnologies**, Thansalonis, Greece, July 3-7, 2017 (**poster**)
 20. F. Yang, G. Li, J. M. Yang, Z. H. Wang, D. H. Han, F. J. Zheng and S. Y. Xu, "To map the temperature distribution of a single cell", **14th International Conference on Nanosciences & Nanotechnologies**, Thansalonis, Greece, July 3-7, 2017 (**poster**) Tong Li, Wenyuan Yang, Xianghai Ji, Tao Yang, Qing Chen, “All-metal electrode VGAA device with self-catalyst selective grown InAs NWs array”, **The First International Semiconductor Conference for Global Challenges**, Nanjing, China, July 16-19, 2017 (**poster**)
 21. Dewu Lin, “Metal-assisted Cloning of Single-walled Carbon Nanotubes”, **Frontiers of Nanochemistry-2017**, China, 2017 (**poster**)
 22. Qiuchen Zhao, Zequn Wang, Fengrui Yao, Kaihui Liu, Lianming Tong and Jin Zhang, “Etching Behavior of Carbon Nanotubes”, **FNC2017**, China, 2017 (**poster**) Na Zhang, “Surface-enhanced Raman Scattering on Anisotropic 2D Layered Materials”, **ChinaNANO2017**, Beijing, China, August 29-31, 2017 (**poster**)
 23. ZQ Wang, “Investigation of Etching Behavior of Single-Walled Carbon Nanotubes Using Different Etchants”, **The 7th International Conference on Nanoscience and Technology**, China, August 29-31, 2017 (**poster**)
 24. Liangwei Yang, Jin Zhang, “High-yield exfoliation of graphite into few-layer graphene via reduction of graphite edge”, **ChinaNANO**, Beijing, August 29-31 2017 (**poster**) Jiapei Shu, Qing Chen, “The hysteresis of MoS₂ field effect transistors and the effect of water”, **Flatlands beyond graphene 2017**, Lausanne,



- Switzerland, August 29- September 1, 2017 (**poster**)
25. Xiulan Zhao, “Selective growth of (14, 4)-enriched semiconducting carbon nanotubes on Si/SiO₂ wafer”, **The 53th Fullerenes-Nanotubes-Graphene General Symposium**, Kyoto, Japan, September 12-16, 2017 (**poster**) Qidong Liu, “Selective etching of single-walled carbon nanotubes produced by arc discharge method”, **The 8th A3 Symposium on Emerging Materials: Nanomaterials for Energy and Electronics**, Suzhou, China, October 25-28, 2017 (**poster**)
26. Yuguang Chen, “Sub-square-meter-sized hybrid organic semiconductor films assembled on water surface”, **The 8th A3 Symposium on Emerging Materials: Nanomaterials for Energy and Electronics**, Suzhou, China, October 25-28, 2017 (**poster**)
27. Na Zhang, “Double First-Layer Effect in Raman Enhancement on Two-dimensional Layered Materials”, **ICSERS2017**, Xiamen, China, December 5-9, 2017 (**poster**)
28. Shishu Zhang, “in-situ Quantitative Graphene-based Surface-enhanced Raman Spectroscopy (G-SERS)”, **ICSERS2017**, Xiamen, China, December 5-9, 2017 (**poster**)



(四) 专利

2017 年度授权专利

专利号	专利名称	发明人	授权日期
ZL201410468668.90	共轭微孔高分子气凝胶及其制备方法与应用	张锦、杜然	2017/8/11
201310544641.1	单壁碳纳米管的定位生长方法	李彦、秦校军、彭飞、杨娟	2017/1/11
ZL201510250562.6	一种电子发射体功函数可调的阴极及其阵列	魏贤龙、陈清吴功涛	2017

2017 年度申请专利

申请号	专利名称	申请人
201710947669.5	生产石墨烯粉体的设备	张锦;杨良伟;孙阳勇;刘海舟;韩东;黄欢
201711328062.5	石墨烯粉体及其制备方法	张锦;杨良伟;孙阳勇;赵福振
201710108655.4	一种基于石墨烯的柔性增强拉曼基底及其制备方法和拉曼分析方法	张锦、童廉明、田慧慧、张娜
201711134828.6	一种适合电气开关使用的电流控制微结构	戴恩光
201710390423.2	一种表面隧穿微型电子源极阵列和实现方法	魏贤龙、吴功涛



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