WUHAN UNIVERSITY

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Contact Information

武汉大学动力与机械学院

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Core Competencies & projects

申请人具有多学科的研究背景，在高分子材料（本科），分子生物学/分析化学（硕士），电子工程（博士）等专业接受过良好的系统训练。2003年，以总分第三（细胞生物学成绩第一）考取了武大分子生物学硕博连读，一年后转入武大化学院，师从庞代文教授，从事“生物分析化学”方面的研究，并在一年内发表了当时实验室影响因子最高的学术论文（在 Chemical Communications 上；成果被多个杂志 highlighted；且已有商业化产品在售）。申请人的经历显示其具备从事生物学科研和教学的潜力与能力。

博士期间，作为第一作者先后在 Applied Physics Letters，Nature Nanotechnology 等知名期刊上发表学术论文，最高单篇他引达330余次，包括 Nature Photonics, Physical Review Letters, Nano letters, Advanced Materials 等高影响力的学术杂志的引用；基于纳米线阵列的 Fabry-Perol 激光器被 Science Daily, Laser Focus World 等200余家知名专业媒体报道及转载，其中被 Science Daily 评价为“突破性（Breakthrough）”的成果。

申请人目前专注于表面等离激元、超表面、热电器件、光电传感器件及系统、双目视觉（医疗）导航等基础研究及其工程化应用，均与生物医学工程有非常好的学术契合点。

在2014年3月加入武汉大学以来，申请人在较短时间内，形成了“仿生机械电子”的研究方向，并已获得三个国家级项目，一个企业委托研究项目（500 万）。发表了8篇第一作者和通讯作者论文，其中影响因子10以上的有1篇：ACS Nano（申请人是第一作者和通讯作者）。 该文章报道了基于动态局域表面等离激元调控的机械变色龙。文章一经发表，迅即引起了国内外媒体的广泛关注，被多个主流媒体放在首页进行报道（科学网、百度、搜狐、凤凰网、网易、腾讯等）。以此为契机，申请人将机械变色龙与前期驱动控制、模块通信等部分成果相整合，提出了“对真实环境及路径具有自主伪装与避障功能的人形机器人\无人侦察机协同系统的开发应用”，获得了500万的企业委托研究项目。最近，又获中央 XX 科技委前沿 XX 项目资助，首期将一次性到账100万（2017年度）。

- Hand-on experience in wet chemistry synthesis of inorganic nano-crystals and nano-polymer materials （**化学合成: 量子点、磁性材料及其高分子合成**）
- Hand-on experience in molecular biology is strong plus for the future interdisciplinary research（**分子生物学: 融合蛋白表达等, 例如表达过 Anexin V-Core-streptavidin，Anexin-V 识别早期凋亡细胞表面的磷脂酰丝氨酸，Core-streptavidin 方便将蛋白偶联到生物素化的荧光磁性高分子纳米微球；蛋白的定向偶联，例如利用抗体 Fc 片段糖基氧化等** ）
- Solid hands-on experience in epitaxial growth, optoelectronic / Nanoelectronic device fabrications（**光电器件**）
- Solid hands-on experience in the design of thermoelectric materials with potential high ZT value（**热导率计算及其高 ZT 值的材料结构设计**）
- Solid knowledge of device physics on both theoretical and experimental aspects （**器件物理理论及实验**）
- Experience in failure diagnosis and wireless monitoring based on accelerometer **(失效诊断及其无线监控)**
- Research in SLAM (simultaneous localization and mapping) **(即时定位与地图构建)**

Projects in the field of material physics:

1) Dynamical plasmonics based mechanical soft machine with active response to the environment is achieved in the first time in the field （**基于动态表面等离激元的机械变色龙，能实时主动地适应环境颜色变化，该研究在 ACS NANO 发表后，被媒体广泛报道**）

2) Bio-targeting and separating apoptotic cells based on bio-functionalized fluorescent-magnetic-bifunctional nanospheres （**荧光-磁性-生物靶向三功能纳米球可视化识别、分选凋亡细胞, 在 Chem. Commun.发表后，被英国皇家化学会的 Chemical**

Technology 杂志和 Chemistry World 杂志同时作为重要进展/亮点文章进行评述报道，已被引用 60 次。 基于此文章的一个产品已经商业化，武汉珈源量子点技术开发有限公司产品编号 FNS-520,580,610;MNS-800）

3) Real-time continuous tunable quantum-dots doped liquid-crystal laser based on dynamic plasmonics **(动态表面等离激元增强的实时可调量子点掺杂液晶激光器)**

3) Epitaxial growth of ZnO film /nanowire array for the fabrication of Fabry Perot laser, LED and photodetector: The P-type ZnO nanowire array was achieved by Sb-doping, and n-type ZnO film was doped by Ga. The FP laser was accomplished through this structure for the first time in ZnO academic community and published in Nature Nanotechnology (Vol. 6, 506, 2011), which has been cited over **180 times**; More than two hundred news media and science and engineering magazines in different languages have commented on our paper, such as Materials today, Physics today, PhysOrg, NSF.org, Science daily, Laser Focus World, Press Enterprise.（**在 ZnO 材料体系里，首次实现 FP 激光器件，该成果在 Nature Nanotechnology 发表后被媒体广泛报道及转载，目前引用达 330 余次**）

4) InGaN/GaN LED: Alleviating the quantum-confined Stark effect(QCSE) induced by polarizations in multi- quantum well region by introducing the superlattice structure into the conventional structure for better hole injection and wave function overlapping, leading to higher efficiency of the device, verified both experimentally and theoretically（**在传统 GaN LED 外延器结构里引入超晶格结构，有效地抑制了量子限制斯塔克效应**）

5）Calculating the thermal conductivity of Si/Ge quantum dots-superlattice:

In order to improve ZT value (decreasing the thermal conductivity and retaining the electrical conductivity), the quantum-dot superlattice(QDSL) was adopted in this study. Started from Debye dispersion and introduced the relaxation time of quantum dots and

superlattice boundary, the thermal conductivity of quantum dot superlattices both in plane and cross-plane was calculated; Superlattice nanowire-array synthesis for the thermoelectrical applications.（量子点超晶格的热导率计算及其基于超晶格纳米线阵列的高 **ZT** 值材料制备）

6）Modeling and Simulation of intermediate band solar cell(ZnTeO) by numerically solving coupled Poisson and continuity equations **(**中间能带太阳能电池的理论模拟**)**

7） Monitoring the health of the gears in real time for avoiding abnormal situations during which larger periodic vibrations occur (detecting the amplitude and frequency of such anomalies based on accelerometer and wirelessly transmitting the data to the receiver, computer, mobile phone, etc. **(**实时监控齿轮的健康状况，避免出现异常情况。齿轮工作异常时，会产生较大的振动，而这样的振动是具有周期性的，通过检测出这样异常的振动幅值以及振动频率，可以判断出齿轮是否出现异常。由于是在齿轮工作的过程中对其进行监控，需要采用无线通信的方式将采集到的数据传输到接收端**)**

8）Achieving a smart cooperation between the drone and robot: the robot can choose an optimal path to avoid obstacles via SLAM with the capability of real-time active-camouflage.

（通过无人机与地面机器人的配合，机器人可以实时的选择最优路径避开障碍物，并且根据无人机探测到的环境颜色 **pattern**，实时地自主伪装。其中 无人机 和 机器人除了零部件是购买的，其他软件控制部分（比如飞控系统、姿态、通信、机器人舵机驱动等）都由我们自己团队开发，可以实现实际环境避障演示**(**基于激光雷达的自主定位与地图构建**)**。

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Education

2011 年 8 月	博士	电子工程	加州大学-河滨（UC, Riverside）
2006 年 6 月	硕士	分子生物学/化学	武汉大学
2003 年 6 月	学士	高分子材料工程	武汉理工大学

Appointments & Work Experience

2014.3-, 副教授, 武汉大学

2013.05- 2013.12, 高级工程师, 华为

2012.09-2013.01, Research Scientist, 新加坡南洋理工大学

2011.11-2012.08, 技术总负责人, 深圳市思钛新材料有限公司

Research Fundings

1）**“对真实环境及路径具有自主伪装与避障功能的人形机器人\无人侦察机协同系统的开发应用”，500 万**，2016-2018 年，（主持）

2）**“多环境 XXXXXXXXXXXXXXX”，100 万（首期），中央 XX 科技委，** 2017，（主持）

3）“表面等离激元增强的核壳型微纳米线阵列 LED”, 25 万，国家自然科学基金， 2015-2017，(主持)

4）**“光伏组件加速老化测试技术研究与测试设备研制 ”**，26 万, 国家科技部 863 子课题 , 2015-2017，(主持)

5）**“ 有源表面等离激元调控 ”**，50 万，武汉大学启动基金，2015-2017，(主持)

6）**“基于动态局域表面等离激元的彩色反射型显示器 ”**武汉大学青年基金，10 万，2014-2015，(主持)

7）**“量子点显示器的原型研发及其关键数据提取”**，企业横向项目（武汉珈源量子点技术开发有限公司），5 万，2016-2017 年，(主持)

Publications

1. **Guoping Wang,** Sheng Chu (co-first author，contributed equally to this work，In Alphabetical Order by Last Name) "Electrically pumped waveguide lasing in ZnO nanowires." **Nature Nanotechnology**, 6,506 (2011)
   (IF=34, Cited over 330 times)
2. **Guoping Wang[1,*]**, etc. "Mechanical Chameleon through Dynamic Real-Time Plasmonic Tuning", **ACS Nano.** DOI: 10.1021/acsnano.5b07472. Publication Date (Web): January 13, **2016, be selected as editors' choice + Chemical & Engineering News reported.** **（第一作者且通讯作者）（IF=12.88）**
3. "Superior fast electro-optical switching of hydrogen bonded smectic liquid crystals matrix encapsulated ZnO nanospikes" –K. Pal, B. Zhan, **Guoping Wang*(corresponding author)**. Journal of Materials Chemistry C, (2015,3, 11907-11917) **(IF=4.696)**
4. **Guoping Wang**, etc, "ZnO homojunction photodiodes based on Sb-doped p-type nanowire array and n-type film for ultraviolet detection" Appl. Phys. Lett. 98, 041107 (2011).(**IF=3.726**)
5. **Guoping Wang,** etc. "Synthesis and characterization of Ag-doped p-type ZnO nanowires." Appl. Phys. A： 103， 951 (2011). **(IF=1.76)**
6. **Guoping Wang**; Daiwen Pang; "Biofunctionalization of fluorescent-magnetic-bifunctional nanospheres and their applications." Chem. Commun. 34, 4276 (2005). The paper was cited by ***Chemical Technology*** and ***Chemistry World*** as a **highlight** of the field. **(IF=6.834 , Cited over 60 times)**
7. "Flexible Polymer Dispersed Liquid Crystal Module with Graphene Electrode" – F. Liu, **Guoping Wang*(corresponding author).** Journal of Nanoscience and Nanotechnology,Vol.15 (2015), pp.1-5 **(IF=1.556)**
8. "Optical and electrical investigation of ZnO nano-wires array centre micro-flowers turn to hierarchical nano-rose structures" – K. Pal, B. Zhan, X. Ma, **Guoping Wang*(corresponding author),**Journal of Nanoscience and Nanotechnology , Volume 16, Number 1, January 2016, pp. 400-409(10)**) (IF=1.556)**
9. Influence of ZnO Nanostructures in Liquid Crystal Interfaces for Bistable Switching Applications– K. Pal, B. Zhan, **Guoping Wang* (corresponding author).** Applied Surface Science, (Volume 357, Part B, 1 December 2015, Pages 1499–1510) **(IF=2.711)**
10. "Functionalized graphene oxide dispersed hydrogen bonded liquid crystals efficient

electro-optical switching" – K. Pal, B. Zhan, X. Ma, MLN M.Mohan, **Guoping Wang* (corresponding author).** IEEE-Journal of Display Technology, 2015 Issue:99 DOI:10.1109/JDT.2015.2499326) **(IF=2.241)**

11. "Investigations of CdS Nanostructures Encapsulated in Soft Self-Assembled Thermotropic Liquid Crystals Matrix " - K. Pal, **Guoping Wang*(corresponding author)**.Science of Advanced Materials, 8, 1947-2935, 2016 (**IF=2.598)**
12. "Switchable Assembly of Self-organization CdS Nanomaterials Imbedded in Liquid Crystals Cells for High Performance Static Memory Device" - K. Pal, X.Yang, **Guoping Wang* (corresponding author),** Materials Letters, **169, 37–41, 2016. (IF=2.489)**
13. "Versatile CdS nanostructures grown on surface stabilized liquid crystals switchable device",K. Pal, **Guoping Wang* (corresponding author)**, under review of Journal of Nanomaterials
14. "Ultrathin CdS nanowires dispersion to homologous liquid crystal network for electro-optically switchable device", K. Pal, **Guoping Wang* (corresponding author),** under review of Electronic Materials Letters
15. "Growth and Characterization of Sprayed Cobalt Doped ZnO Thin Films Exhibiting High Tc Ferromagnetism", Vikas Thakur, **Guoping Wang* (corresponding author),** under review of Electronic Materials Letters.
16. ErQun Song, **GuoPing Wang**, HaiYan Xie, ZhiLing Zhang, Jun Hu, Jun Peng, DaoCheng Wu, YunBo Shi, DaiWen Pang*. Visual Recognition and Efficient Isolation of Apoptotic Cells with Fluorescent-Magnetic-Biotargeting Multifunctional Nanospheres. Clinical Chemistry, 53,12, 2177 (2007).
17. DaiWen PANG, HaiYan XIE, **GuoPing Wang**, ZhiLing ZHANG, ErQun SONG, YunBo SHI. Tri-functional nanospheres. US patent(20060263906).
18. Sheng Chu, **Guoping Wang**, "*Realization of 479 nm (2.59 eV) emission CdZnO nanorods and the application on solar cells.*" Materials Letters, 85, 149 (2012)
19. Ning Zhan, Mario Olmedo, **Guoping Wang,** and Jianlin Liu， Graphene based nickel nanocrystal flash memory，Appl. Phys. Lett. 99, 113112 (2011)
20. Ning Zhan, **Guoping Wang** and Jianlin Liu，Cobalt-assisted large-area epitaxial graphene growth in thermal cracker enhanced gas source molecular beam epitaxy，Applied Physics A. 105,2,341,(2011)
21. Ning Zhan, Mario Olmedo, **Guoping Wang**, and Jianlin Liu, "Layer-by-layer

synthesis of large-area graphene films by thermal cracker enhanced gas source molecular beam epitaxy" Carbon 49, 2046(2011) (IF=4.89)

22. Jian Huang, Sheng Chu, Jieying Kong,Long Zhang, Casey M. Schwarz, **Guoping Wang**, Leonid Chernyak, Zhanghai Chen, Jianlin Liu; "ZnO p–n Homojunction Random Laser Diode Based on Nitrogen-Doped p-type Nanowires", Advanced Optical Materials,1,2, 179 (2013)
23. Zuxin Chen, Boya Lai, Junming Zhang, **Guoping Wang** and Sheng Chu, "Hybrid material based on plasmonic nanodisks decorated ZnO and its application on nanoscale lasers",Nanotechnology, 25,29,295203(2014)

The current Group members:

Two more postdocs Coming soon