

Curriculum vitae

Jinsheng Lu

Postdoctoral Fellow at Harvard University

Education

- Sep 2016 – Jun 2021 **Zhejiang University** (Hangzhou, China)
PhD, Optical engineering
- Sep 2012 – Jun 2016 **Zhejiang University** (Hangzhou, China)
BSc, Optical engineering, GPA: 3.94/4.0, Rank: 3/142

Research Experience

- Oct 2021 – present **Postdoctoral fellow**
Harvard University, Harvard John A. Paulson School of Engineering and Applied Sciences, Cambridge, USA
Supervisor: Prof. Federico Capasso
- Jan 2019 – Oct 2021 **Joint PhD student (visiting scholar)**
Harvard University, Harvard John A. Paulson School of Engineering and Applied Sciences, Cambridge, USA
Supervisor: Prof. Federico Capasso
My research activities are focused on the design, fabrication, and characterization of new on-chip nanophotonic devices including on-chip optical tweezers, metasurfaces, mode conversion resonators, and waveguides with well-designed near-field landscapes, which can be used for on-chip trapping, actuating and sensing.
- Sep 2016 – Jun 2021 **PhD student**
Zhejiang University, College of Optical Science and Engineering, Hangzhou, China
Supervisor: Prof. Min Qiu, Co-supervisor: Prof. Qiang Li
My research activities are focused on three areas:
- Optical micro/nano-manipulation in non-liquid environments.
 - Nanofabrication technology (including nano-welding, nano-breaking, nano-bonding, etc.) based on nanoscale strong photothermal effect.
 - Nanoscale interesting photothermal phenomenon including photothermal mechanical actuations, photophoretic forces, etc.
- May 2014 – Apr 2016 **Undergraduate**
Zhejiang University, College of Optical Science and Engineering, Hangzhou, China

Project 1: Designing microcavity structure using FDTD simulations for capturing quantum dots (supervisor: Prof. Wei Fang).

Achievement: a two-ring-microcavity structure is designed to create high-intensity EM field spots that can be tuned through modes conversion for quantum dots trapping.

Project 2: Research and Development of Video-Rate Atomic Force Microscope Based on Embedded System (supervisor: Prof. Haijun Zhang).

Achievement: an AFM system with an imaging speed of 20 fps has been developed.

Skills & Professional Activities

Clean Room	Experienced in several measurements and imaging setups, including:
Experimental Skills	<ul style="list-style-type: none">- Standard optical microscopy (bright field/dark field), near-field microscopy (NSOM), atomic force microscopy (AFM), spectroscopic ellipsometer.- Home-built optical systems including optical tweezer system, single-point nano-welding optical system, and real-space/Fourier-space imaging system
	Four years of clean room experience in Center for Nanoscale System (CNS) at Harvard University. Experienced in several fabrication techniques, including:
	<ul style="list-style-type: none">- Optical lithography- E-beam lithography (ZEP)- Reactive-ion etching (RIE)- Fabrication of micro/nano-fiber or tapered fiber probe- Chemical synthesis of gold nanoplates and nanowires
Softwares	Numerical EM/photonics software: COMSOL Multiphysics and Lumerical FDTD
Programming	Solutions. Experienced in simulating the process of light-matter interactions, including light
Languages	absorption/scattering/transmission/reflection (of nanoparticles, gratings and metasurfaces), light-induced heating, light-induced elastic expansion, optical forces, multipole decomposition of nanoparticles scattering, modes coupling and converting in waveguides.
	Programming languages: C, Matlab, and Python. Experienced in scripting for automatic generation of complex layout patterns for optical and e-beam lithography in GDS formats, website design.
	Graphical Softwares: Illustrator, Blender, Inkscape, SolidWorks
Teaching	Teaching assistant for the course <i>Field and Wave Electromagnetics</i> (66120011) from Jan 2017 to Sep 2018.
	Supervisor of Ms. Ebba Ahlgren Cederlof and Mr. Filip Klaesson from KTH Royal Institute of Technology under the (optical physics research experience for undergraduates) Summer Program
Journal Reviewing	Advances in Optics and Photonics, Light: Science & Applications, Optics Letters, Optics Express, iScience, Applied Physics Letters, Optics Communications, Applied Optics, Applied Physics A, Nanomaterials, Sensors, Micromachines, Materials, Heliyon, Crystals,

Journal of personalized medicine. See Peer review section in my profile in [ORCID](#) or [Web of Science](#).

Volunteer Review applications for the 2023 Siegman School on Lasers

Journal Editor Gest Editor of Sensors, special issue "[Optical Tweezers in Sensing Technologies](#)"

Membership American Physical Society, Optica, and Chinese Optical Society

Publication Highlights

[Jinsheng Lu](#), Vincent Ginis, Soon Wei Daniel Lim, and Federico Capasso*, [Helicity and polarization gradient optical trapping in evanescent fields](#). **Physical Review Letters**, 131, 143803 (2023).

[Jinsheng Lu](#), Vincent Ginis*, Cheng-Wei Qiu, and Federico Capasso*, [Polarization-Dependent Forces and Torques at Resonance in a Microfiber-Microcavity System](#). **Physical Review Letters**, 130, 183601 (2023). (Featured in [APS Physics](#) and [Nature Magazine](#))

Shaoliang Yu*†, [Jinsheng Lu](#)†, Vincent Ginis, Simon Kheifets, Soon Wei Daniel Lim, Min Qiu, Tian Gu, Juejun Hu*, and Federico Capasso*, [On-chip optical tweezers based on free-form optics](#), **Optica**, 8, 3, Pp. 409-414 (2021). (†Contributed equally)

[Jinsheng Lu](#), Qiang Li, Cheng-Wei Qiu, Yu Hong, Pintu Ghosh, and Min Qiu*, [Nanoscale Lamb wave-driven motors in nonliquid environments](#). **Science Advances**, 5, 3, Pp. eaau8271 (2019).

[Jinsheng Lu](#), Hangbo Yang, Lina Zhou, Yuanqing Yang, Si Luo, Qiang Li, and Min Qiu*, [Light-Induced Pulling and Pushing by the Synergic Effect of Optical Force and Photophoretic Force](#). **Physical Review Letters**, 118, 4, Pp. 043601 (2017). (Editors' Suggestion, [Cover Paper](#), featured in [APS Physics](#))

Journal Publications († = these authors contributed equally, *= corresponding author)

- [1] [Jinsheng Lu](#), Vincent Ginis, Soon Wei Daniel Lim, and Federico Capasso*, [Helicity and polarization gradient optical trapping in evanescent fields](#). **Physical Review Letters**, 131, 143803 (2023).
- [2] Qiannan Jia, Wei Lyu, Wei Yan*, Weiwei Tang*, [Jinsheng Lu](#)*, and Min Qiu*, [Optical manipulation: from fluid to solid domains](#), **Photonics Insights**, 2, R05 (2023).
- [3] [Jinsheng Lu](#), Vincent Ginis*, Cheng-Wei Qiu, and Federico Capasso*, [Polarization-Dependent Forces and Torques at Resonance in a Microfiber-Microcavity System](#). **Physical Review Letters**, 130, 183601 (2023).
- [4] Vincent Ginis†*, Ileana-Cristina Benea-Chelmuș†, [Jinsheng Lu](#), Marco Piccardo, and Federico Capasso*, [Resonators with Tailored Optical Path by Cascaded-Mode Conversions](#). **Nature Communications**, 14, 495 (2023).
- [5] Weiwei Tang†, Wei Lyu†, [Jinsheng Lu](#)†, Fengjiang Liu, Jiyong Wang, Wei Yan*, and Min Qiu*, [Micro-scale opto-thermo-mechanical actuation in the dry adhesive regime](#). **Light: Science & Applications**, 10, 193 (2021).
- [6] Shaoliang Yu†*, [Jinsheng Lu](#)†, Vincent Ginis, Simon Kheifets, Soon Wei Daniel Lim, Min Qiu, Tian Gu, Juejun Hu*, and Federico Capasso*, [On-chip optical tweezers based on free-form optics](#). **Optica**, 8, 3, Pp. 409-414 (2021).

- [7] Shuangyi Linghu†, Zhaoqi Gu†, [Jinsheng Lu](#), Wei Fang, Zongyin Yang, Huakang Yu, Zhiyuan Li, Runlin Zhu, Jian Peng, Qiwen Zhan, Songlin Zhuang, Min Gu, and Fuxing Gu*, [Plasmon-driven nanowire actuators for on-chip manipulation](#). **Nature Communications**, 12, 385, Pp. 1–8 (2021).
- [8] Yu Hong, Ding Zhao*, Jiyong Wang, [Jinsheng Lu](#), Guangnan Yao, Dongli Liu, Hao Luo, Qiang Li, and Min Qiu*, [Solvent-Free Nanofabrication Based on Ice-Assisted Electron-Beam Lithography](#). **Nano Letters**, 369, 6502, Pp. 436–440 (2020).
- [9] Vincent Ginis*, Marco Piccardo, Michele Tamagnone, [Jinsheng Lu](#), Min Qiu, Simon Kheifets, and Federico Capasso*, [Remote structuring of near-field landscapes](#). **Science**, 369, 6502, Pp. 436–440 (2020).
- [10] Mohammad Danesh, Mehdi Jafary Zadeh, Tianhang Zhang, Xiaohe Zhang, Bing Gu, [Jinsheng Lu](#), Tun Cao, Zhengtong Liu, Andrew TS Wee, Min Qiu, Qiaoliang Bao, Stefan Maier, and Cheng-Wei Qiu*, [Monolayer Conveyor for Stably Trapping and Transporting Sub-1 nm Particles](#). **Laser & Photonics Reviews**, 14, 8, Pp. 202000030 (2020)
- [11] Chunqi Zheng, [Jinsheng Lu](#), Jun Lv, and Qiang Li*, [Research Progress on Photoacoustic Conversion of Metal Nanomaterials](#), **Laser & Optoelectronics Progress**, 57, 13, Pp. 130002 (2020)
- [12] Pintu Ghosh, [Jinsheng Lu](#), Hao Luo, Wei Wang, Ziquan Xu, Min Qiu, and Qiang Li*, [Constructing Metal Arch Nanobridges Utilizing a Photothermal-Induced Nanobonding Technique](#). **Advanced Electronic Materials**, 5, 7, Pp. 1800807 (2019).
- [13] Weiqiang Zhang, Hongshuang Liu, [Jinsheng Lu](#), Lifa Ni, Haitao Liu, Qiang Li, Min Qiu, Bingqian Xu*, Takhee Lee*, Zhikai Zhao, Xianghui Wang, Maoning Wang, Tao Wang, Andreas Offenhäusser, Dirk Mayer, Wang-Taek Hwang, and Dong Xiang*, [Atomic switches of metallic point contacts by plasmonic heating](#). **Light: Science & Applications**, 8, 34, Pp. 1–8 (2019).
- [14] [Jinsheng Lu](#), Qiang Li, Cheng-Wei Qiu, Yu Hong, Pintu Ghosh, and Min Qiu*, [Nanoscale Lamb wave-driven motors in nonliquid environments](#). **Science Advances**, 5, 3, Pp. eaau8271 (2019).
- [15] Pintu Ghosh, [Jinsheng Lu](#), Hao Luo, Ziquan Xu, Xiaoyuan Yan, Yewu Wang, Jun Lu, Min Qiu, and Qiang Li*, [Fabrication of controllably variable sub-100 nm gaps in silver nanowires by photothermal-induced stress](#). **Optics Letters**, 43, 10, Pp. 2422–2425 (2018).
- [16] Hangbo Yang, [Jinsheng Lu](#), Pintu Ghosh, Ziyao Chen, Wei Wang, Hui Ye, Qian Yu, Min Qiu, and Qiang Li*, [Plasmonic-enhanced targeted nanohealing of metallic nanostructures](#). **Applied Physics Letters**, 112, 7, Pp. 071108 (2018).
- [17] Pintu Ghosh, [Jinsheng Lu](#), Ziyao Chen, Hangbo Yang, Min Qiu, and Qiang Li*, [Photothermal-Induced Nanowelding of Metal-Semiconductor Heterojunction in Integrated Nanowire Units](#). **Advanced Electronic Materials**, 4, 5, Pp. 1700614 (2018).
- [18] [Jinsheng Lu](#), Yu Hong, Qiang Li, Yingxin Xu, Wei Fang, and Min Qiu*, [Light-induced reversible expansion of individual gold nanoplates](#). **AIP Advances**, 7, 10, Pp. 105025 (2017).
- [19] Lina Zhou, [Jinsheng Lu](#), Hangbo Yang, Si Luo, Wei Wang, Jun Lv, Min Qiu, and Qiang Li*, [Optically controllable nanobreaking of metallic nanowires](#). **Applied Physics Letters**, 110, 8, Pp. 081101 (2017).

- [20] [Jinsheng Lu](#), Hangbo Yang, Lina Zhou, Yuanqing Yang, Si Luo, Qiang Li, and Min Qiu*, [Light-Induced Pulling and Pushing by the Synergic Effect of Optical Force and Photophoretic Force](#). *Physical Review Letters*, 118, 4, Pp. 043601 (2017).

Conferences and Talks

- [1] [Jinsheng Lu](#), Shaoliang Yu, Vincent Ginis, Simon Kheifets, Soon Wei Daniel Lim, Min Qiu, Tian Gu, Juejun Hu, and Federico Capasso, [On-chip optical tweezers based on free-form optics](#), The 4th Conference on Optical Tweezers in Vacuum (COTV 2021), October 15-18, 2021, Hangzhou, China + online (Invited).
- [2] [Jinsheng Lu](#), Shaoliang Yu, Vincent Ginis, Simon Kheifets, Soon Wei Daniel Lim, Min Qiu, Tian Gu, Juejun Hu, and Federico Capasso, [On-chip optical tweezers based on free-form optics](#), Optical Trapping and Optical Micromanipulation XVIII (SPIE NANOSCIENCE + ENGINEERING), August 1-5, 2021, online (Oral).
- [3] [Jinsheng Lu](#), Shaoliang Yu, Vincent Ginis, Simon Kheifets, Soon Wei Daniel Lim, Min Qiu, Tian Gu, Juejun Hu, and Federico Capasso, [On-chip optical tweezers based on Micro-Reflectors](#), Conference on Lasers and Electro-Optics (CLEO 2021), May 9-14, 2021, online (Oral).
- [4] [Jinsheng Lu](#), Qiang Li, and Min Qiu, [Photothermal Actuation in Non-liquid Environments](#), The International Symposium On Plasmonics and Nano-photonics (iSPN 2018), May 24-27, 2018, Hangzhou, China (Oral).
- [5] Vincent Ginis, Ileana-Cristina Benea-Chelmus, [Jinsheng Lu](#), Marco Piccardo, and Federico Capasso, [Mode-Independent Resonances in Cascaded-Mode Resonators](#). Conference on Lasers and Electro-Optics Europe & European Quantum Electronics Conference (CLEO/Europe-EQEC), June 26-30, 2023, Munich.
- [6] Vincent Ginis, Ileana-Cristina Benea-Chelmus, [Jinsheng Lu](#), Marco Piccardo, and Federico Capasso, [Cascaded-Mode Resonators](#). CLEO: Fundamental Science, May 7-12, 2023, San Jose.
- [7] Wenting Zhao, Pintu Ghosh, [Jinsheng Lu](#), Ziyao Chen, and Qiang Li, [Gold nanosprings formed by rolled-up technique](#), 14th National Conference on Laser Technology and Optoelectronics (LTO 2019), 11170, Pp. 1117042 (2019).
- [8] Hangbo Yang, Lina Zhou, [Jinsheng Lu](#), Shuowei Dai, Min Qiu, and Qiang Li, [Laser assisted welding of layered metallic nanostructure](#), 2016 15th International Conference on Optical Communications and Networks (ICOON), 11170, Pp. 1117042 (2016).

Patents

- [1] Vincent Ginis, Ileana-Cristina Benea-Chelmus, [Jinsheng Lu](#), Marco Piccardo, and Federico Capasso, [Cascaded-Mode Resonators](#), US20230258867A1.

Awards & Grants

- Feb 2023 Excellent Doctoral Dissertation Award of Chinese Optical Society
- Dec 2022 Excellent Doctoral Dissertation of Zhejiang Province
- Mar 2022 Excellent Doctoral Dissertation of Zhejiang University
- Jun 2018 Selected as "Top 10 Student's Academic Achievements" at Zhejiang University
- Dec 2017 Award of Honor for Graduate at Zhejiang University

- Dec 2017 Da Bei Nong Scholarship at Zhejiang University
- May 2017 Second Prize of College Students Extracurricular Academic Science and Technology Works Competition in Zhejiang Province
- Dec 2015 Heng Yi Scholarship
- Dec 2015 Scholarship for Excellence in Research and Innovation at Zhejiang University
- Dec 2015 First-Class Scholarship for Outstanding Students at Zhejiang University
- Dec 2014 First-Class Scholarship for Outstanding Students at Zhejiang University
- Dec 2014 Scholarship for Excellence in Research and Innovation at Zhejiang University
- Dec 2014 Excellent Student Awards
- Sep 2014 First Prize of National Electronics Design Competition
- Dec 2013 Second-Class Scholarship for Outstanding Merits at Zhejiang University