Qiushi Guo

Assistant Professor
Photonics Initiative, Advanced Science Research Center
Physics Program, The Graduate Center
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Personal website

PROFESSIONAL EXPERIENCE

Assistant Professor 1/2023 - now
Photonics Initiative, CUNY Advanced Science Research Center (ASRC)
Physics Program, CUNY Graduate Center

Postdoctoral Research Associate 2020 - 1/2023
California Institute of Technology
Research topic:"Integrated lithium niobate ultrafast and nonlinear photonics"
Advisor: Prof. Alireza Marandi

EDUCATION

Ph.D. Electrical Enginnering 2014-12/2019
Yale University
Thesis:"Mid-infrared Nanophotonics in van der Waal Materials and Heterostructures"
Thesis advisor: Prof. Fengnian Xia
Thesis committee: Fengnian Xia, Mark A. Reed, Hong X. Tang

M.S. Electrical Engineering 2012-2014
University of Pennsylvania
Research topic: "Graphene Functionalized Silicon-on-glass Nanophotonic Biosensors"
Advisor: Prof. Ertugrul Cubukcu

B.S. Electrical Engineering 2008-2012
Xi'an Jiaotong University

SELECTED HONORS AND AWARDS

- 1/2024 NSF CAREER Award
- 5/2023 PSC-CUNY Enhancement Award (The only awardee at CUNY ASRC)
- 10/2022 Rising Stars of Light (Awarded to 6 candidates out of 110 applicants across the world)
- 5/2020 Henry Prentiss Becton Prize for exceptional research achievement, Yale University (The only awardee from the entire Yale engineering school)

RESEARCH INTERESTS

- Integrated nonlinear and ultrafast photonics
- Materials and devices for mid-infrared/thermal photonics
- 2-dimensional material optoelectronics

PROFESSIONAL ACTIVITIES

- Editorial Board Member of *Micromachines*.
- Symposium Organizer: MRS 2024 Fall Meeting.
- Technical Program Committee: Nonlinear Photonics and Novel Optical Phenomena topic for the 2024 IEEE Photonics Conference (IPC)
- Grant Reviewer: NSF, Army Research Office
- Journal Reviewer of *Nature Photonics*; *Nature Communications*; *Science Advances*; *Advanced Materials*; *Nano Letters*; *ACS Applied Materials and Interfaces*; *Applied Physics Letters*; *Journal of Applied Physics*; *ACS Photonics*; *Physical Chemistry Chemical Physics*; *Optica*; *Optics Letters*; *Optics Express*; *Optical Material Express*; *Nanoscale*; *IEEE Electron Device Letters*; *IEEE Photonics Technology Letters*; *Scientific Reports*; *Nanophotonics*; *Light: Science & Applications*; *Semiconductor Science and Technology*

SELECTED PUBLICATIONS

11. Q. Guo, R. Sekine, J. A. Williams, B. Gutierrez, R. M. Gray, L. Ledezma, L. Costa, A. Roy, S. Zhou, M. Liu and A. Marandi, "Ultrafast mode-locked laser in nanophotonic lithium niobate", *Science* **382**, 708-713 (2023). (Cover story)

10. L. Ledezma, A. Roy, L. Costa, R. Sekine, R. Gray, Q. Guo, RM. Briggs, A. Marandi, "Octave-spanning tunable infrared parametric oscillators in nanophotonics", *Science Advances* **9**, eadf971 (2023).

9. R. Nehra*, R. Sekine*, L. Ledezma, Q. Guo, R.M. Gray, A. Roy and A. Marandi, "Few-cycle vacuum squeezing in nanophotonics", *Science* **377**, 1333-1337 (2022).

8. Q. Guo*, R. Sekine*, L. Ledezma*, D. Dean, R. Nehra, S. Jahani, A. Roy and A. Marandi, "Femtojoule, femtosecond all-optical switching in integrated lithium niobate photonics", *Nature Photonics* **16**, 625 (2022).

7. L. Ledezma*, R. Sekine*, Q. Guo*, R. Nehra, S. Jahani, and A. Marandi, "Intense optical parametric amplification in dispersion engineered nanophotonic lithium niobate waveguides", *Optica* **9**, 303-308 (2022).

6. Q. Guo*, R. Yu*, C. Li, S. Yuan, B. Deng, F. J. de Abajo and F. Xia, "Efficient electrical detection of mid-infrared graphene plasmons at room temperature", *Nature Materials* **17**, 986-992 (2018).

5. R. Yu, Q. Guo, F. Xia, F. J. Garcia de Abajo, "Photothermal engineering of graphene plasmons", *Physical Review Letters* **121**, 057404 (2018).

4. Q. Guo, C. Li, F. Guinea, B. Deng, S. Yuan, F. Xia, "Infrared nanophotonics based on graphene plasmonics (Invited review)", *ACS Photonics* **4**, 2989-2999 (2017).

3. Q. Guo, F. Guinea, B. Deng, I. Sarpkaya, C. Li, C. Chen, X. Ling, J. Kong and F. Xia , "Electrothermal control of graphene plasmon-phonon polaritons", *Advanced Materials* **29**, 1700655 (2017).

2. Q. Guo, A. Pospischil, M. Bhuiyan, H. Jiang, H. Tian, D. Farmer, B. Deng et al., "Black phosphorus mid-infrared photodetectors with high gain", *Nano Letters* **16**, 4648-4655 (2016).

1. H. Tian*, Q. Guo*, Y. Xie, H. Zhao, C. Li, Judy J. Cha, F. Xia, and Han Wang, "Anisotropic black phosphorus synaptic device for neuromorphic applications", *Advanced Materials* **28**, 4991-4997 (2016).

FULL LIST OF PUBLICATIONS

Qiushi Guo has authored/co-authored 45 peer-reviewed journal publications. He is the first (co-first author) of 11 journal publications. His publications in refereed journals have been cited more than 4400 times (from Google scholar). H-index: 30, *= co-first author

45. Q. Guo, R. Sekine, J. A. Williams, B. Gutierrez, R. M. Gray, L. Ledezma, L. Costa, A. Roy, S. Zhou, M. Liu and A. Marandi, "Ultrafast mode-locked laser in nanophotonic lithium niobate", *Science* **382**, 708-713 (2023). (Cover story)

44. T.-H. Wu, L. Ledezma, C. Fredrick, P. Sekhar, R. Sekine, Q. Guo, R. M. Briggs, A. Marandi, S. A. Diddams, "Visible to ultraviolet frequency comb generation in lithium niobate nanophotonic waveguides", *Nature Photonics* , (2024).

43. A. Roy, L. Ledezma, L. Costa, R. Gray, R. Sekine, Q. Guo, M. Liu, R. M. Briggs, A. Marandi, "Visible-to-mid-IR tunable frequency comb in nanophotonics", *Nature Communications* **14**, 6549 (2023).

42. L. Ledezma, A. Roy, L. Costa, R. Sekine, R. Gray, Q. Guo, RM. Briggs, A. Marandi, "Octave-spanning tunable infrared parametric oscillators in nanophotonics", *Science Advances* **9**, eadf971 (2023).

41. R. Nehra*, R. Sekine*, L. Ledezma, Q. Guo, R.M. Gray, A. Roy and A. Marandi, "Few-cycle vacuum squeezing in nanophotonics", *Science* **377**, 1333-1337 (2022).

40. Q. Guo*, R. Sekine*, L. Ledezma*, D. Dean, R. Nehra, S. Jahani, A. Roy and A. Marandi, "Femtojoule, femtosecond all-optical switching in integrated lithium niobate photonics", *Nature Photonics* **16**, 625 (2022).

39. G.H.Y. Li*, R. Sekine*, R. Nehra*, R.M. Gray*, L. Ledezma, Q. Guo, and A. Marandi, "All-optical ultrafast ReLU function for energy-efficient nanophotonic deep learning", *Nanophotonics* **12**, 847-855 (2022).

38. L. Ledezma*, R. Sekine*, Q. Guo*, R. Nehra, S. Jahani, and A. Marandi, "Intense optical parametric amplification in dispersion engineered nanophotonic lithium niobate waveguides", *Optica* **9**, 303-308 (2022).

37. C. Chen*, C. Li*, S. Min, Q. Guo, Z. Xia, D. Liu, Z. Ma, F. Xia, "Ultrafast silicon nanomembrane microbolometer for long-wavelength infrared light detection", *Nano Letters* **21**, 8385 (2021).

36. A. Roy, S. Jahani, Q. Guo, A. Dutt, S. Fan, M.-A. Miri, and A. Marandi, "Non-dissipative non-Hermitian dynamics and exceptional points in coupled optical parametric oscillators", *Optica* **8**, 415-421 (2021).

35. X. Tan, H. Zhang, J. Li, H. Wan, Q. Guo, H. Zhu, H. Liu, F. Yi, "Non-dispersive infrared multi-gas sensing via nanoantenna integrated narrowband detectors", *Nature Communications* **11**, 5245 (2020).

34. S. Yuan, C. Chen, Q. Guo, F. Xia, "Enhancing infrared emission of mercury telluride (HgTe) quantum dots by plasmonic structures", *Light: Science & Applications* **9**, 37 (2020).

33. C. Chen, X. Lu, B. Deng, X. Chen, Q. Guo, C. Li, C. Ma, S. Yuan, K. Watanabe, T. Taniguchi, L. Yang, F. Xia, "Widely tunable mid-infrared light emission in thin-film black phosphorus", *Science Advances* **6**, eaay6134 (2020).

32. S. Yuan, R. Yu, C. Ma, B. Deng, Q. Guo, X. Chen, C. Li, C. Chen, K. Watanabe, T. Taniguchi, F. J. Garcia de Abajo, F. Xia, "Room temperature graphene mid-infrared bolometer with a broad operational wavelength range", *ACS Photonics* **7**, 1206–1215 (2020).

31. C. Li, K. Xiong, L. Li, Q. Guo, X. Chen, A. Madjar, K. Watanabe, T. Taniguchi, J. Hwang, F. Xia, "Black phosphorus high-frequency transistors with local contact bias", *ACS Nano* **14**, 2118-2125 (2020).

30. Z.M. Abd El-Fattah, V. Mkhitaryan, J. Brede, L. Fernandez, C. Li, Q. Guo, A. Ghosh, A. R. Echarri, D. Naveh, F. Xia, J. E. Ortega, F. J. Garcia de Abajo, "Plasmonics in atomically-thin crystalline silver films", *ACS Nano* **13**, 7771-7779 (2019).

29. J. Li, L. Bao, S. Jiang, Q. Guo, D. Xu, B. Xiong, G. Zhang, F. Yi, "Inverse design of multifunctional plasmonic metamaterial absorbers for infrared polarimetric imaging", *Optics Express* **27**, 8375-8386 (2019).

28. C. Chen*, F. Chen*, X. Chen, B. Deng, B. Eng, D. Jung, Q. Guo, S. Yuan, K.Watanabe, T. Taniguchi, M. Lee, F. Xia, "Bright mid-infrared photoluminescence from thin-film black phosphorus", *Nano Letters* **19**, 1488-1493 (2019).

27. C. Chen, X. Chen, H. Yu, Y. Shao, Q. Guo, B. Deng, S. Lee, C. Ma, K. Watanabe, T. Taniguchi, J.-G.Park, S. Huang, W. Yao, F. Xia, "Symmetry-controlled electron-phonon interactions in van der Waals heterostructures", *ACS Nano* **13**, 552-559 (2019).

26. Q. Guo*, R. Yu*, C. Li, S. Yuan, B. Deng, F. J. de Abajo and F. Xia, "Efficient electrical detection of mid-infrared graphene plasmons at room temperature", *Nature Materials* **17**, 986-992 (2018).

25. C. Chen, X. Chen, Y. Shao, B. Deng, Q. Guo, C. Ma and F. Xia, "Valley-selective linear dichroism in layered tin Sulfide", *ACS Photonics* **5**, 3814-3819 (2018).

24. R. Yu, Q. Guo, F. Xia, F. J. Garcia de Abajo, "Photothermal engineering of graphene plasmons", *Physical Review Letters* **121**, 057404 (2018).

23. J. Li, R. Gan, Q. Guo, H. Liu, J. Xu, F. Yi, "Tailoring optical responses of infrared plasmonic metamaterial absorbers by optical phonons", *Optics Express* **26**, 16769-16781 (2018).

22. Y. Chen, H. Zhou, X. Tan, S. Jiang, A. Yang, J. Li, M. Hou, Q. Guo, S. Wang, F. Liu, H. Liu, F. Yi, "Meander line nanoantenna absorber for subwavelength terahertz detection", *IEEE Photonics Journal* **10**, 4600409 (2018).

21. S. Yuan, C. Shen, B. Deng, X. Chen, Q. Guo, Y. Ma, A. Abbas, B. Liu, R. Haiges, C. Ott, T. Nilges, K. Watanabe, T. Taniguchi, O. Sinai, D. Naveh, C. Zhou, F. Xia, "Air-stable room-temperature mid-infrared photodetectors based on hBN/black arsenic phosphorus/hBN heterostructures", *Nano Letters* **18**, 3172-3179 (2018).

20. C. Li, Y. Wu, B. Deng, Y. Xie, Q. Guo, S. Yuan, X. Chen, M. Bhuiyan, Z. Wu, K. Watanabe, T. Taniguchi, H. Wang, J. Cha, M. Snure, Y. Fei, and F. Xia, "Synthesis of crystalline black phosphorus thin film on sapphire", *Advanced Materials* **30**, 1703748 (2018).

19. Q. Guo, C. Li, F. Guinea, B. Deng, S. Yuan, F. Xia, "Infrared nanophotonics based on graphene plasmonics (Invited review)", *ACS Photonics* **4**, 2989-2999 (2017).

18. Q. Guo, F. Guinea, B. Deng, I. Sarpkaya, C. Li, C. Chen, X. Ling, J. Kong and F. Xia , "Electrothermal control of graphene plasmon-phonon polaritons", *Advanced Materials* **29**, 1700655 (2017).

17. B. Deng, V. Tran, H. Jiang, C. Li, Y. Xie, Q. Guo, X. Wang, H. Tian, H. Wang, J. Cha, Q. Xia, L. Yang, and F. Xia, "Efficient electrical control of thin-film black phosphorus Bandgap", *Nature Communications* **8**, 14474 (2017).

16. V. Artel*, Q. Guo*, H. Cohen, R. Gasper, A. Ramasubramaniam, F. Xia, D. Naveh, "Protective molecular passivation of black phosphorus", *NPJ 2D Materials and Applications* **1**, 6 (2017).

15. A. Yang, K. Yang, X. Tan, J. Li, S. Guo, L. Zhou, X. Tian, H. Liu, H. Song, J. Tang, F. Liu, A.Y. Zhu, Q. Guo, F. Yi, "Nanoantenna integrated thermomechanical infrared detector", *Plasmonics* **12**, 1921-1927 (2017).

14. B. Deng, Q. Guo, C. Li, H. Wang, X. Ling, D. B. Farmer, S. Han, J. Kong, F. Xia, "Coupling-enhanced broadband mid-infrared light absorption in graphene plasmonic nanostructures", *ACS Nano* **10**, 11172-11178 (2016).

13. Q. Guo, A. Pospischil, M. Bhuiyan, H. Jiang, H. Tian, D. Farmer, B. Deng et al., "Black phosphorus mid-infrared photodetectors with high gain", *Nano Letters* **16**, 4648-4655 (2016).

12. A. Yang, K. Yang, H. Yu, X. Tan, J. Li, L. Zhou, H. Liu, H. Song, J. Tang, F. Liu, A.Y. Zhu, Q. Guo, F. Yi, "Piezoelectric tuning of narrowband perfect plasmonic absorbers via an optomechanical cavity", *Optics Letters* **41**, 2803-2806 (2016).

11. H. Tian*, Q. Guo*, Y. Xie, H. Zhao, C. Li, Judy J. Cha, F. Xia, and Han Wang, "Anisotropic black phosphorus synaptic device for neuromorphic applications", *Advanced Materials* **28**, 4991-4997 (2016).

10. H. Tian, M. L. Chin, S. Najmaei, Q. Guo, F. Xia, H. Wang, and M. Dubey., "Optoelectronic devices based on two-dimensional transition metal dichalcogenides", *Nano Research* **9**, 1543-1560 (2016).

9. H. Zhao, J. Wu, H. Zhong, Q. Guo, X. Wang, F. Xia, L Yang, P. Tan, and H. Wang, "Interlayer interactions in anisotropic atomically thin rhenium diselenide", *Nano Research* **8**, 3651-3661 (2015).

8. Y. Jia, H. Zhao, Q. Guo, X. Wang, H. Wang, and F. Xia., "Tunable plasmon–phonon polaritons in layered graphene–hexagonal boron nitride heterostructures", *ACS Photonics* **2**, 907-912 (2015).

7. H. Zhao, Q. Guo, F. Xia, H. Wang, "Two-dimensional materials for nanophotonics application", *Nanophotonics* **4**, 128-142 (2015).

6. B. Liu, M. Köpf, A. N. Abbas, X. Wang, Q. Guo, Y. Jia, F. Xia et al., "Black arsenic–phosphorus: layered anisotropic infrared semiconductors with highly tunable compositions and properties", *Advanced Materials* **27**, 4423-4429 (2015).

5. F. Liu, L. Chen, Q. Guo, J. Chen, X. Zhao, and W. Shi, "Enhanced graphene absorption and linewidth sharpening enabled by Fano-like geometric resonance at near-infrared wavelengths", *Optical Express* **23**, 21097-21106 (2015).

4. Q. Guo, H. Zhu, F. Liu, A.Y. Zhu, J. C Reed, F. Yi, E. Cubukcu, "Silicon-on-glass graphene-functionalized leaky cavity mode nanophotonic biosensor", *ACS Photonics* **1**, 221-227 (2014).

3. Q. Guo, T. Kong, R. Su, Q. Zhang and G. Cheng, "Noise spectroscopy as an equilibrium analysis tool for highly-sensitive electrical biosensing", *Applied Physics Letters* **101**, 093704 (2012).

2. X. Lu, Q. Guo, Z. Xu, W. Ren and Z.-Y. Cheng, "Highly sensitive biosensor platform based on stress-improved piezoelectric membrane", *Sensors and Actuators A* **179**, 32-38 (2012).

1. X. Yin, W. Que, D. Fei, F. Shen, Q. Guo, "Ag nanoparticle/ZnO nanorods core/shell nanocomposites derived by a seed-mediated method and their photocatalytic properties", *Journal of Alloys and Compounds* **524**, 13-21 (2012).

PATENTS

2. "Chip-integrated mode-locked lasers based on thin-film nonlinear waveguide", Q. Guo, A. Marandi, (US Patent number 20220123516 A1)

1. "High-speed ultrathin silicon-on-insulator infrared bolometers and imagers", Q. Guo, C. Li, F. Xia, Z. Xia, Z. Ma, D. Liu, Z. Xia, (US Patent number: 20210389183A1)

SELECTED CONFERENCE PRESENTATIONS

7. Q. Guo, Active mode-locked laser in lithium niobate nanophotonics, CLEO 5/12/2023

6. Q. Guo, Novel graphene mid-infrared photodetectors and emitters: when hot carriers meet 2-D polaritons (invited talk), MRS Fall Meeting 12/1/2022

5. Q. Guo, R. Sekine*, L. Ledezma*, D. J. Dean, R. Nehra, S. Jahani, A. Marandi "Femtojoule, femtosecond all-optical switching in integrated lithium niobate photonics"(Oral Presentation), CLEO, 5/14/2021

4. L. Ledezma*, R. Sekine*, Q. Guo*, R. Nehra, S. Jahani, and A. Marandi "Intense optical parametric amplification in dispersion engineered nanophotonic lithium niobate waveguides" (Post-deadline), CLEO, 5/16/2021

3. Q. Guo, F. Xia, B. Deng, X. Chen "Graphene and black phosphorus infrared photodetectors"(Invited talk), APS March Meeting, 3/9/2019 Boston, MA

2. Q. Guo, A. Pospischil, M. Bhuiyan, H. Jiang, H. Tian, D. Farmer, B. Deng et al "Thin-film black phosphorus mid-infrared photodetectors with high gain", (Oral Presentation), MRS Fall Meeting, 12/1/2016 Boston, MA

1. Q. Guo, H. Zhu, F. Liu, A.Y. Zhu, J. C Reed, F. Yi, E. Cubukcu "Graphene functionalized leaky cavity mode biosensor based on silicon nanowires array". (Oral Presentation), SPIE Photonics West OPTO, 2/4/2015 San Francisco, CA

SELECTED INVITED SEMINARS AND COLLOQUIA

12. "Lithium niobate integrated nonlinear photonics: new devices and systems on an old material", University of Southern California, 4/13/23

11. "Lithium niobate integrated nonlinear photonics: new devices and systems on an old material", Cornell University, 10/12/22

10. "Lithium niobate integrated nonlinear photonics: new devices and systems on an old material", ASML Integrated Optics Competence Colloquium, 9/22/22

9. "Emergent active photonic platforms for next-generation mid-infrared and ultrafast photonics", Arizona State University, 6/8/22

8. "Emergent active photonic platforms for next-generation mid-infrared and ultrafast photonics", University of Pennsylvania, 4/5/22

7. "Emergent active photonic platforms for next-generation mid-infrared and ultrafast photonics", CUNY Advanced Science Research Center , 3/2/22

6. "Emergent active photonic platforms for next-generation mid-infrared and ultrafast photonics", University of Hong Kong, 2/14/22

5. "Emergent active photonic platforms for next-generation mid-infrared and ultrafast photonics", Northeastern University , 2/9/22

4. "Emergent active photonic platforms for next-generation mid-infrared and ultrafast photonics", HKUST, 1/25/22

3. "Ultra-low energy ultrafast photonics in integrated lithium niobite", Caltech, Early career seminar series, 2/1/21

2. "Mid-infrared nanophotonics in van der Waals materials and heterostructures", Caltech, Electrical Engineering Seminar, 8/20/19

1. "Mid-infrared light detection based on graphene plasmons", Yale University, YINQE Seminar, 11/30/18

RESEARCH HIGHLIGHTS

- Demonstrated the first mode-locked laser (MLL) integrated on a thin-film lithium niobate (TFLN) platform, featuring the highest on-chip output peak power of 0.5 W and pulse energy of 2.6 pJ among integrated MLLs (*Science, 2023*). The MLL also allows for the flexible on-chip control of the repetition rate and the carrier-envelope offset of the resulting frequency comb, and paves the way for the realization of fully integrated ultrafast nanophotonic systems on TFLN.

- Introduced and demonstrated a new TFLN-based device named *integrated nonlinear splitter*, which is a small-scale nonlinear photonic system on a chip that precisely and controllably cascades the second harmonic generation and the optical parametric amplification (*Nature Photonics, 2022*). This device achieved *cavity-free* ultra-low energy (80 fJ) and *fastest* (18 fs) all-optical switching on a chip, featuring a *record-low* switching energy-time product of 1.4×10^{-27} J·s. This work has opened up unprecedented opportunities for next-generation chip-scale ultrafast light sources and all-optical computing architectures.

- Demonstrated the first phase-sensitive optical parametric amplifier (OPA) in quasi-phase-matched TFLN waveguides (*Optica, 2022*). The amplifier offers ultra-high parametric gain (100 dB/cm) at mid-IR frequencies with the *widest* gain bandwidth of 600 nm. The OPA also requires remarkably low pump pulse energie of 5 picojoules, which is more than two orders of magnitude lower than conventional technologies.

- Discovered a new mechanism of detecting of long-wavelength (12 μm) mid-IR photons at room temperature, which is accomplished by harnessing the hot carriers generated by the mid-IR plasmons in graphene. The discovered underlying physical principle (*Physical Review Letters, 2018*) enables the development of the world's smallest and fastest thermal imager operating completely at room temperature, showing a response speed orders of magnitude higher than conventional technologies (*Nature Materials, 2018*). This work was featured by *Yale Engineering News*, *Phys.org*, *Nature Materials News & Views* and many other media outlets.

- Demonstrated *world's first* thin-film black phosphorus mid-infrared detectors. The detector offers an external responsivity of 82 A/W, a low noise equivalent power of 5 pW/$\sqrt{Hz}$ and strong polarization sensitivity. This work also discovered a trap-induced photoconductive gain mechanism in black phosphorus. (*Nano Letters, 2016*). This work has gained more than 500 citations, and is among the 20 most highly cited articles from 2016 in the journal *Nano Letters*.

SELECTED NEWS COVERAGE

- October 2023 "Photonics team develops high-performance ultrafast Lasers That Fit on a Fingertip", ***CUNY ASRC News***

- September 2022 "New photonic chip squeezes more out of light", ***Caltech News***

- August 2022 "New optical switch could lead to all-optical signal processing", ***Caltech News***

- August 2022 "An ultrafast and highly performing nonlinear splitter based on lithium niobate", ***Phys.org***
- September 2018 "Device uses graphene plasmons to convert mid-infrared light to electrical signal", ***Phys.org, Yale News, Nanowerk, R&D Magazine***
- September 2018 "Graphene sensor shows mid-IR potential", ***Optics.org***
- August 2018 "Graphene as an Infrared Detector", ***Science and Technology Research News, ICFO***
- April 2017 "Black phosphorus holds promise for the future of electronics" ***Phys.org***
- April 2017 "A once forgotten element holds promise for the future of electronics" " ***Yale News, Myscience.org, Technology.org***
- June 2017 "A new bandgap tuning knob" News & Views of ***Nature Photonics***
- June 2015, "Researchers introduce new layered semiconducting materials as silicon alternative ***Phys.org, Nanowerk.com***
- July 2015 "First Transistor Fabricated From Black-Arsenic Phosphorus", ***IEEE Spectrum***

TEACHING AND MENTORING

Courses taught at CUNY Graduate Center, Physics Program

- PHYS 85200: Lasers and Nonlinear Photonics (2024 Spring)
- PHYS 71200: Photonics I (2023 Fall)

Current postdoctoral scholars and Ph.D. students

- Guanyu Han, postdoctoral scholar, CUNY ASRC (2023-)
- Yu Wang, Ph.D. student, Physics Program, CUNY Graduate Center (2023-)
- Charanjot Singh, Ph.D. student, Physics Program, CUNY Graduate Center (2023-)

Students mentored at Caltech, Department of Electrical Engineering

- Devin J. Dean (Cornell University, Now Ph.D. student at Stanford University), undergraduate researcher, 2020 Caltech Summer Research Program
- Selina Zhou (Caltech), Ph.D. student
- Ryoto Sekine (Caltech), Ph.D. student

Teaching experience at Yale University, Department of Electrical Engineering

- Fall 2015: **EE 325 Microelectronic Circuits** **Instructor: Prof. Fengnian Xia**
  30-student undergraduate class; Led weekly lab sessions and held office hours; Graded homework and exams

- Spring 2016: **EE 203 Circuits and Systems Design** **Instructor: Prof. Fengnian Xia**
  50-student undergraduate class; Led weekly lab sessions and held office hours; Graded homework and exam

- Spring 2017/2019: **EE 406 Photovoltaic Energy** **Instructor: Prof. Fengnian Xia**
  10-student graduate level course; Held office hours and designed the lab session; Supervised and coached students to deliver academic-style talks as a final project; Graded homework and term papers

- Fall 2018: **EE 200 Introduction to Electronics** **Instructor: Prof. Mark A. Reed**
  60-student undergraduate level course; Led weekly lab sessions and held office hours; Graded homework and exam

OUTREACH ACTIVITIES

- **Family Science Night, New Haven Public School Science Fair Program, 2018**
  Presented simple experiment demonstrations to kids and their families.

- **Yale Pathways to Science orientation, Yale University, 2017**
  Host meetings and conversations with 5 middle & high school students and their families. Introduce Electrical Engineering major to them.

- **Girls' Science Investigation (GSI) event, 2016**
  Introduced basic optics principles to middle school girls with hands-on demonstrations of fiber optics and periscope.