

Qingkai QIAN

Postdoctoral Researcher

The Pennsylvania State University

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Academic and Professional Appointments

Postdoctoral Researcher

Jan. 2019-Now

The Pennsylvania State University

Research Associate

Sep. 2018-Dec. 2018

Hong Kong University of Science and Technology

Education

Ph.D. | Electronic and Computer Engineering | Aug. 2014- Aug. 2018

Hong Kong University of Science and Technology, Hong Kong SAR, China

Advisor: Prof. Kevin J. Chen

Thesis title: Surface Functionalization and Device Applications of MoS₂ and WSe₂ Realized by Remote N₂ Plasma Treatment

M.S. | Physics | Aug. 2012-Jul. 2014

Tsinghua University, Beijing, China

Advisor: Prof. Qunqing Li

Thesis title: Fabrication and Characterization of Thin Film Transistors Based on Solution-Dispersed Carbon Nanotubes

B.S. | Physics | Aug. 2008-Jul. 2012

Tsinghua University, Beijing, China

Academic and Professional Service

Journal Review: *Nano Letters*, *ACS Applied Materials & Interfaces*, *J. Phys.: Condens. Matter*

Research interest

1. Optoelectronics based on low dimensional materials
2. Single photon emitters and quantum photonics
3. Charge density wave and first-principles calculations

Publications (See citations in [Google Scholar](#))

1. Q. Qian, R. Zu, Q. Ji, G. S. Jung, K. Zhang, Y. Zhang, M. J. Buehler, J. Kong, V. Gopalan and S. Huang, "Chirality-Dependent Second Harmonic Generation of MoS₂ Nanoscroll with Enhanced

- Efficiency," *ACS Nano*, *accepted* (<https://pubs.acs.org/doi/10.1021/acsnano.0c05189>)
2. Q. Qian, X. Shen, D. Luo, L. Jia, M. Kozina, R. Li, M. Lin, A. H. Reid, S. Weathersby, J. Yang, Y. Zhou, K. Zhang, X. Wang and S. Huang, "Coherent Lattice Wobbling and Out-of-Phase Intensity Oscillations of Friedel Pairs Observed by Ultrafast Electron Diffraction," *ACS Nano* **14**, 8449–8458, 2020
 3. Q. Qian, L. Peng, N. Perea-Lopez, K. Fujisawa, K. Zhang, X. Zhang, T. H. Choudhury, J. M. Redwing, M. Terrones, X. Ma, and S. Huang, "Defect creation in WSe₂ with a microsecond photoluminescence lifetime by focused ion beam irradiation," *Nanoscale* **12**, 2047-2056, 2020
 4. Q. Qian, J. Lei, J. Wei, Z. Zhang, G. Tang, K. Zhong, Z. Zheng, and K. J. Chen, "2D materials as semiconducting gate for field-effect transistors with inherent over-voltage protection and boosted ON-current," *npj 2D Mater. Appl.* **3**, 24, 2019 (selected as Leading Research in Materials Science of Nature Partner Journals)
 5. Q. Qian, Z. Zhang and K. J. Chen, "Layer-dependent second-order Raman intensity of MoS₂ and WSe₂: Influence of intervalley scattering," *Phys. Rev. B* **97**, 165409, 2018
 6. Q. Qian, Z. Zhang and K. J. Chen, "In Situ Resonant Raman Spectroscopy to Monitor the Surface Functionalization of MoS₂ and WSe₂ for High-k Integration: A First-Principles Study," *Langmuir* **34**, 2882-2889, 2018
 7. Q. Qian, Z. Zhang, M. Hua, J. Wei, J. Lei, and K. J. Chen, "Remote N₂ plasma treatment to deposit ultrathin high-k dielectric as tunneling contact layer for single-layer MoS₂ MOSFET," *Appl. Phys. Express* **10**, 125201, 2017
 8. Q. Qian, Z. Zhang, M. Hua, G. Tang, J. Lei, F. Lan, Y. Xu, R. Yan, and K. J. Chen, "Enhanced dielectric deposition on single layer MoS₂ with low damage using remote N₂ plasma treatment," *Nanotechnology* **28**, 175202, 2017
 9. Q. Qian, B. Li, M. Hua, Z. Zhang, F. Lan, Y. Xu, R. Yan, and K. J. Chen, "Improved Gate Dielectric Deposition and Enhanced Electrical Stability for Single-Layer MoS₂ MOSFET with an AlN Interfacial Layer," *Sci. Rep.* **6**, 27676, 2016
 10. Q. Qian, G. Li, Y. Jin, J. Liu, Y. Zou, K. Jiang, S. Fan, and Q. Li, "Trap-State-Dominated Suppression of Electron Conduction in Carbon Nanotube Thin-Film Transistors," *ACS Nano* **8**, 9597, 2014
 11. Q. Qian, J. Liu, Q. Li, Y. Zou, Y. Jin, G. Li, K. Jiang, and S. Fan, "Modeling and optimization of ambipolar graphene transistors in the diffusive limit," *J. Appl. Phys.* **114**, 164508, 2013
 12. Q. Qian, Q. Li, "Thin Film Transistor", *US Patent US9548391*, filed Aug. 7, 2013, and issued Jan. 17, 2017
 13. Z. Zhang, Q. Qian, B. Li and K. J. Chen, "Interface Engineering of Monolayer MoS₂/GaN Hybrid Heterostructure: Modified Band Alignment for Photocatalytic Water Splitting Application by Nitridation Treatment", *ACS Appl. Mater. Inter.* **10**, 17419, 2018
 14. J. Liu, Q. Qian, Y. Zou, G. Li, Y. Jin, K. Jiang, S. Fan, and Q. Li, "Enhanced performance of graphene transistor with ion-gel top gate," *Carbon* **68**, 480, 2014
 15. J. Liu, Q. Li, Y. Zou, Q. Qian, Y. Jin, G. Li, K. Jiang, and S. Fan, "The Dependence of Graphene Raman D-band on Carrier Density," *Nano Lett.* **13**, 6170, 2013
 16. Y. Zou, Q. Li, J. Liu, Y. Jin, Q. Qian, K. Jiang, and S. Fan, "Fabrication of All-Carbon Nanotube Electronic Devices on Flexible Substrates Through CVD and Transfer Methods," *Adv. Mater.* **25**, 6050, 2013