

Curriculum Vitae

Feng Miao
Professor
School of Physics
Nanjing University
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Professional Preparation

B.A., Physics	(2004)	Nanjing University
Ph.D., Physics	(2009)	University of California, Riverside

Appointments

Director, Institute of Brain-Inspired Intelligence, Nanjing University	Jan. 2021 – present
Professor, School of Physics, Nanjing University	July 2012 – present
Research Associate, Hewlett-Packard Laboratory (Palo Alto)	July 2009 – July 2012

Research Interest

Electronic and opto-electronic properties of emerging quantum materials and their applications to neuromorphic computing, retinomorph computing and quantum simulation; next-generation computing technologies.

Honors and Awards

Xplorer Prize (New Cornerstone Science Foundation, one of the most recognized Prizes for young scientists in China) (2024)
Chinese Physical Society “Huang Kun” Award (the most prestigious award in the field of solid-state physics and semiconductor physics in China) (2021)
IAAM Medal (International Association of Advanced Materials, Sweden) (2021)
China "Leading Scientists, Engineers and Innovators" (2019)
Clarivate Analytics "Highly Cited Researchers" (2018)
China "Young and Middle-aged Leading Scientists, Engineers and Innovators" (awarded by ministry of science and technology, China) (2018)
"Jiangsu Youth Stars of Science and Technology" (Jiangsu province government) (2018)
Nanjing Natural Science Academic Paper Award (2018)
NSFC (National Science Fund of China) Distinguished Young Scholar (2016)
Chief Scientist of National Key Basic Research Program (2015)
Jiangsu Young Investigator Award (2014)
Poe Memorial Scholarship Award (University of California, Riverside) (2009)
Chinese Government Award for Outstanding Student Abroad (2009)
Dean's Dissertation Fellowship Award (University of California, Riverside) (2008)
Dean's Fellowship Award (University of California, Riverside) (2004)

Professional Activities

Editorial Board & Associate Editor: Scientific Reports (Springer Nature); npj 2D Materials and Applications (Nature Partner Journal); Newton (Cell family); Neuromorphic Computing and Engineering (IOP Publishing)

Journal Review: Physical Review Letters; Nature; Science; Nature Nanotechnology; Nature Physics; Nature Materials; Nature Electronics; Nature Photonics; Nature Synthesis; Nature Computational Science; Science Advances; Nature Communications; Advanced Materials; Nano Letters; Applied Physics Letters; Europhysics Letters; Journal of Applied Physics; Nanoscale; Nano Research; Journal of Physics D; Applied Physics A; IEEE Transactions on Electron Devices; Semiconductor Science and Technology; *et al.*

Grant Review: SNSF (Swiss National Science Foundation), NOW (Netherlands Organisation for Scientific Research), EU FLAG-ERA, ISF (the Israel Science Foundation), Austrian Science Fund, Research Grants Council (RGC) of Hong Kong, National Science Foundation of China (NSF of China), MOEC (The Ministry of Education of China), *et al.*

Committee Member: Neuromorphics Technical Committee of IEEE Electron Devices Society; Brain-inspired Intelligence Committee of Chinese Neuroscience Society.

Conference Chair: Organized and co-organized international conference sessions including MRS, OPTICA NOMA (Novel Optical Materials and Applications) and IEEE Workshop on Future Computing, *et al.*

Research Associates Supervised

Shijun Liang, 2017.10-2020.12 (currently Professor at Nanjing University)
Bin Cheng, 2019.4-2021.12 (currently Professor at Nanjing University of Science and Technology)
Xuan Pan, 2020.10-2023.9 (currently Associate Professor at Xi'an Jiaotong University)
Junjie Shan, 2021.1-2023.12 (currently Associate Professor at Nanjing Normal University)

Postdoctoral Scholars Supervised

Hongguang Zhang, 2013.5-2015.4 (currently Associate Professor at Nanjing University of Posts and Telecommunications)
Xiaojuan Lian, 2014.10-2017.4 (currently Associate Professor at Nanjing University of Posts and Telecommunications)
Song Hao, 2015.7-2017.6 (currently Associate Professor at Nanjing University of Science and Technology)
Yuekun Yang, 2020.10-2024.8 (currently Associate Professor at Nanjing University)

Graduate Students Supervised

Erfu Liu, 2012.9-2015.6 (currently Associate Professor at Nanjing University)
Yajun Fu, 2013.9-2017.9 (currently Associate Professor at Southwest University of Science and Technology)
Mingsheng Long, 2014.9-2017.6 (currently Professor at Anhui University)
Yaojia Wang, 2015.9-2019.6 (currently Assistant Professor at Katholieke Universiteit Leuven, Belgium)
Anyuan Gao, 2014.9-2019.12 (currently Associate Professor at Shanghai Jiaotong University)
Chen Pan, 2014.9-2020.6 (currently Associate Professor at Nanjing University of Science and Technology)
Lili Zhang, 2015.9-2020.9 (currently Assistant Professor at Lanzhou University)
Kang Xu, 2014.9-2017.6 (currently Postdoc at New York University)
Miao Wang, 2013.9-2018.9 (currently System Engineer at KLA-Tencor Corporation)
Junwen Zeng, 2013.9-2018.9 (currently Engineer at Huawei Technologies)
Chenyu Wang, 2014.9-2019.12 (currently Engineer at Huawei Technologies)
Yu Wang, 2015.9-2020.9 (currently Engineer at Xiaomi Corporation)

Qiao Li, 2016.9-2022.3 (currently *Postdoc at University of California, Riverside*)
 Xiaowei Liu, 2016.9-2022.6 (currently *Engineer at Huawei Technologies*)
 Zecheng Ma, 2016.9-2024.6 (currently *Postdoc at Huatian Technology*)
 Tianjun Cao, 2017.9-2024.6 (currently *Engineer at Shanghai Bangxin Semiconductor*)
 Cong Wang, 2017.9-2022.9 (currently *Postdoc at Nanjing University*)
 Shengnan Yan, 2017.9-2023.12 (currently *Postdoc at Nanjing University*)
 Shuang Wang, 2018.9-2023.6 (currently *Postdoc at Hong Kong Polytechnic University*)
 Lizheng Wang, 2018.9-2024.12 (currently *Postdoc at Ningbo Institute of Materials Technology and Engineering*)
 Moyu Chen, 2018.9-2024.9 (currently *Postdoc at University of Munich*)

Publications

(Total citations: **31323** by May. 2025; also see <https://publons.com/researcher/1397881/feng-miao/>)

1. Z. Liu, J. Shi, J. Cao, Z. Ma, Z. Yang, Y. Cui, L. Wang, Y. Dai, M. Chen, P. Wang, Y. Xie, F. Chen, Y. Shi, C. Xiao, S. A. Yang, B. Cheng*, S.-J. Liang*, **F. Miao***, "Skin-inspired in-sensor encoding of strain vector using tunable quantum geometry", **Advanced Functional Materials** 35, 2416204 (2025).
2. Q. Wu, X. Pan, W.W. Zhao, Y. Gao, D.W. Zhao, S.C. Yan, T.T. Li, **F. Miao**, Z.Y. Fei, Y. Shi, "Twisted GeS Nanowire with Engineered Stacking Order and Tunable Composition", **Advanced Materials Interfaces** (2025) <https://doi.org/10.1002/admi.202400802>.
3. H.B. Xiao, H. Gao, M. Li, F.Q. Chen, Q. Li, Y.W. Li, C. Li, M.X. Wang, F.Y. Zhu, L.X. Yang, S.Y. Wang, **F. Miao**, Y.L. Chen, C. Chen, B. Cheng, J.P. Liu, Z.K. Liu, "Unveiling a Tunable Moiré Bandgap in Bilayer Graphene/hBN Device by Angle-Resolved Photoemission Spectroscopy", **Advanced Science** (2025) <https://doi.org/10.1002/advs.202412609>.
4. W. Dang, Y. Shen, W. Wei, C. Pan*, F. Chen, G.-J. Ruan, Y. Luo, Y. Guo, Q. Tan, J. Shi, X.-J. Yangdong, S. Chen, C. Wang, Y. Xie, Z.-Z. Yang, P. Wang, S. Wang, L. Zhong, S. Cheng, C. Zhu, B. Cheng, S.-J. Liang*, **F. Miao***, "Mortise-tenon - shaped memristors for scientific computing", **Science Advances** 11, eadu3309 (2025).
5. J. Xie, J.-L. Xiong, B.Cheng*, S.-J. Liang*, **F. Miao***, "In-Memory Probabilistic Computing Using Gate-Tunable Layer Pseudospins in van der Waals Heterostructures", **Chinese Physics Letters** 42, 040202 (2025).
6. Z.-A Li, C. Pan, P. Wang, Y. Yang*, W. Yu, Y. Zhao, G. Ruan, C. Wang, J. Mei, P. Zeng, X. Wang, Z. Ni, B. Cheng, S.-J Liang*, **F. Miao***, "In-Pixel Dual-Band Intercorrelated Compressive Sensing Based on MoS₂/h-BN/PdSe₂ Vertical Heterostructure", **ACS Nano** 19, 6263 (2025).
7. C. Pan, P.C. Su, W.T. Yu, P.F. Wang, Y.K. Yang, C. Wang, S.J. Liang, B. Cheng, **F. Miao**, "Drain self-blocking ambipolar transistors for complementary circuit applications", **Applied Physics Letters** 125, 183504 (2024).
8. X. Pan, J.W. Shi, W.T. Yu, Y.C. Zhao, Y.K. Yang, B. Cheng, S.J. Liang, **F. Miao**, "Rotation-invariant image recognition using interconnected floating-gate phototransistor", **Applied Physics Letters** 125, 133103 (2024).
9. S.P. Gao, C. Pan, P.C. Su, X.J. Yangdong, W.T. Yu, Z.J. Zeng, Y. Shen, J.W. Shi, Y.W. Cui, P.F. Wang, Y.K. Yang, C. Wang, B. Cheng, S.J. Liang, **F. Miao**, "High precision current mirror circuit based on two-dimensional material transistors", **Science China-Information Sciences** 67, 189405 (2024).
10. X. Liu, J. Shan, T. Cao, L. Zhu, J. Ma, G. Wang, Z. Shi, Q. Yang, M. Ma, Z. Liu, S. Yan, L. Wang, Y. Dai, J. Xiong, F. Chen, B. Wang, C. Pan, Z. Wang, B. Cheng, Y. He, X. Luo, J. Lin, S.-J Liang, **F. Miao***, "On-device phase engineering", **Nature Materials** 23, 1363 (2024).

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11. M. Chen, Y. Xie, B. Cheng, Z. Yang, X. Li, F. Chen, Q. Li, J. Xie, K. Watanabe, T. Taniguchi, W. He, M. Wu, S.-J. Liang, **F. Miao***, "Selective and quasi-continuous switching of ferroelectric Chern insulator devices for neuromorphic computing", **Nature Nanotechnology** 19, 962 (2024).

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12. Z.C. Ma, Z.L. Liu, B. Cheng, S.J. Liang, **F. Miao**, "In-situ strain engineering and applications of van der Waals materials", **Acta Physica Sinica** 73, 110701 (2024).
13. Z.C. Ma, S.N. Yan, Z.L. Liu, T. Xu, F.Q. Chen, S.C. Chen, T.J. Cao, L.T. Sun, B. Cheng, S.J. Liang, **F. Miao**, "Anisotropic metal-insulator transition in strained VO₂(B) single crystal", **Chinese Physics B** 33, 67103.
14. T.J. Cao, S. Hao, C.C. Wu, C. Pan, Y.D. Dai, B. Cheng, S.J. Liang, **F. Miao**, "Improving the electrical performances of InSe transistors by interface engineering", **Chinese Physics B** 33, 47302 (2024).
15. Y.K. Yang, S.J. Liang, **F. Miao**, "Pixel-correlated computing for detecting and tracking targets in dim lighting", **Nature Electronics** 7, 191-192 (2024).

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16. M.Y. Chen, Y.Q. Xie, B. Cheng, S.J. Liang, **F. Miao**, "Competition and coupling effect between localized and itinerant electrons in graphene moiré heterostructures", **Scientia Sinica-Physica Mechanica & Astronomica** 54, 127301 (2024).
17. Z. Ma, S. Yan, F. Chen, Y. Dai, Z. Liu, K. Xu, T. Xu, Z. Tong, M. Chen, L. Wang, P. Wang, L. Sun, B. Cheng, S.-J. Liang*, **F. Miao***, "Ultrasensitive Mechanical Sensor Using Tunable Ordered Array of Metallic and Insulating States in Vanadium Dioxide", **Chinese Physics Letters** 41, 077101 (2024).
18. D. Li, Z. Li, C. Pan, Y. Sun, J. Zhou, X.-J. Yangdong, X. Xu, L. Liu, H. Wang, Y. Chen, X. Song, P. Liu, X. Zhou*, S.-J. Liang*, **F. Miao***, T. Zhai*, "Ionic Photovoltaics-in-Memory in van der Waals Material", **Advanced Materials** 36, 2406984 (2024).
19. J. Xiong, J. Xie, B. Cheng*, Y. Dai, X. Cui, L. Wang, Z. Liu, J. Zhou, N. Wang, X. Xu, X. Chen, S. Cheong, S.-J. Liang*, **F. Miao***, "Electrical switching of Ising-superconducting nonreciprocity for quantum neuronal transistor", **Nature Communications** 15, 4953 (2024).
20. W. Wei, C. Wang, C. Pan, X.-J. Yangdong, Z. Yang, Y. Yang, B. Cheng, S.-J. Liang*, **F. Miao***, "Harnessing nonlinear conductive characteristic of TiO₂/HfO₂ memristor crossbar for implementing parallel vector – matrix multiplication", **APL Machine Learning** 2, 026104 (2024).
21. Y. Yang, C. Pan, Y. Li, X.-J. Yangdong, P. Wang, Z. Li, S. Wang, W. Yu, G. Liu, B. Cheng, Z. Di, S.-J. Liang*, **F. Miao***, "In-sensor Dynamic Computing for Intelligent Machine Vision", **Nature Electronics** 7, 225 – 233(2024), Nature Electronics Research Briefing 7, 191 – 192 (2024).
22. Y. Dai, J. Xiong, Y. Ge, B. Cheng*, L. Wang, P. Wang, Z. Liu, S. Yan, C. Zhang, X. Xu, Y. Shi, S. Cheong, C. Xiao*, S. A. Yang, S.-J. Liang*, **F. Miao***, "Interfacial magnetic spin Hall effect in van der Waals Fe₃GeTe₂/MoTe₂ heterostructure", **Nature Communications** 15, 1129 (2024).
23. **F. Miao**, J. Joshua Yang, I. Valov, Y. Chai, "Editorial: Focus issue on 2D materials for neuromorphic computing", **Neuromorphic Computing and Engineering** 3,10201(2023).
24. W. Tong, W. Wei, X. Zhang, S. Ding, Z. Lu, L. Liu, W. Li, C. Pan, L. Kong, Y. Wang, M. Zhu*, S.-J. Liang*, **F. Miao***, and Y. Liu*, "Highly Stable HfO₂ Memristors through van der Waals Electrode Lamination and Delamination", **Nano Letters** 23, 9928-9935 (2023).
25. L. Li, W. Dang, X. Zhu, H. Lan, Y. Ding, Z. Li, L. Wang, Y. Yang, L. Fu*, **F. Miao*** and M. Zeng*, "Ultrathin Van Der Waals Lanthanum Oxychloride Dielectric for Two-Dimensional Field-Effect Transistors", **Advanced Materials** 2309296 (2023).
26. C. Pan, J. Shi, P. Wang, S. Wang, C. Wang, B. Cheng, S.-J. Liang*, **F. Miao***, "Polarity

- tunable complementary logic circuits", **SCIENCE CHINA Information Sciences** 66, 229401 (2023).
27. P. Wang, M. Chen, Y. Xie, C. Pan, K. Watanabe, T. Taniguchi, B. Cheng*, S.-J Liang*, **F. Miao***, "Moiré Synaptic Transistor for Homogeneous-Architecture Reservoir Computing", **Chinese Physics Letters** 40, 117201 (2023) (Express Letter).
 28. X. Pan, J. Shi, P. Wang, S. Wang, C. Pan, W. Yu, B. Cheng, S.-J Liang*, **F. Miao***, "Parallel perception of visual motion using light-tunable memory matrix", **Science Advances** 9, eadi4083 (2023).
 29. C. Wang, G. Ruan, Z. Yang, X.-J. Yangdong, Y. Li*, L. Wu, Y. Ge, Y. Zhao, C. Pan, W. Wei, L. Wang, B. Cheng, Z. Zhang, C. Zhang, S.-J Liang*, **F. Miao***, "Parallel in-memory wireless computing", **Nature Electronics** 6, 381-389 (2023).
 30. C.Y. Gu, X.W. Liu, C. Chen, A.J. Liang, W. Guo, X.R. Yang, J. Zhou, C. Jozwiak, A. Bostwick, Z.K. Liu, S.J. Liang, Y.L. Chen, **F. Miao**, E. Rotenberg, Y.F. Nie, "Low-lying electronic states with giant linear dichroic ratio observed in PdSe₂", **Physical Review B** 106, L121110 (2022).
 31. L.L. Zhang, Z. Wang, J.W. Zhang, B. Chen, Z.M. Liang, X.N. Quan, Y.D. Dai, J.F. Huang, Y.T. Wang, S.J. Liang, M.S. Long, M.S. Si, **F. Miao**, Y. Peng, "Quasi-Continuous Tuning of Carrier Polarity in Monolayered Molybdenum Dichalcogenides through Substitutional Vanadium Doping", **Advanced Functional Materials** 32, 2204760 (2022).
 32. X.W. Liu, J.L. Xiong, L.Z. Wang, S.J. Liang, B. Cheng, **F. Miao**, "Giant coercivity in single crystal Ta₃FeS₆ film", **Acta Physica Sinica** 71, 127503 (2022).
 33. D. Christensen, R. Dittmann, B. Linares-Barranco, A. Sebastian, M. Le Gallo, A. Redaelli, S. Slesazeck, T. Mikolajick, S. Spiga, S. Menzel, I. Valov, G. Milano, C. Ricciardi, S.J. Liang, **F. Miao**, M.R. Lanza, T.J. Quill, S.T. Keene; A. Salleo, J. Grollier, D. Markovic; A. Mizrahi; P. Yao; J.J. Yang; G. Indiveri; J.P. Strachan; S. Datta, E. Vianello, A. Valentian, J. Feldmann, X. Li, W.H.P. Pernice, H. Bhaskaran, S. Furber, E. Neftci, F. Scherr, W. Maass, S. Ramaswamy, J. Tapson, P. Panda, Y. Kim, G. Tanaka, S. Thorpe, C. Bartolozzi, T.A. Cleland, C. Posch, S. Liu, G. Panuccio, M. Mahmud, A.N. Mazumder, M. Hosseini, T. Mohsenin, E. Donati, S. Tolu, R. Galeazzi, M.E. Christensen, S. Holm, D. Ielmini, N. Pryds, "2022 roadmap on neuromorphic computing and engineering", **Neuromorphic Computing and Engineering** 2, 22501 (2022).
 34. P. Suo, S.N. Yan, R.H. Pu, W.J. Zhang, D. Li, J.M. Chen, J.B. Fu, X. Lin, **F. Miao**, S.J. Liang, W. Liu, G. Ma, "Ultrafast photocarrier and coherent phonon dynamics in type-II Dirac semimetal PtTe₂ thin films probed by optical spectroscopy", **Photonics Research** 10(3), 653-661 (2022).
 35. L. Wang, J. Xiong, B. Cheng*, Y. Dai, F. Wang, C. Pan, T. Cao, X. Liu, P. Wang, M. Chen, S. Yan, Z. Liu, J. Xiao, X. Xu, Z. Wang, Y. Shi, S. Cheong, H. Zhang, S.-J Liang*, **F. Miao***, "Cascadable in-memory computing based on symmetric writing and readout", **Science Advances** 8, eabq6833 (2022).
 36. Y. Li, S. Zhang, F. Chen, L. Wei, Z. Zhang, H. Xiao, H. Gao, M. Chen, S.-J Liang, D. Pei, L. Xu, K. Watanabe, T. Taniguchi, L. Yang, **F. Miao**, J. Liu*, B. Cheng*, M. Wang*, Y. Chen*, Z. Liu*, "Observation of Coexisting Dirac Bands and Moire Flat Bands in Magic-Angle Twisted Trilayer Graphene", **Advanced Materials** 42, 2205996 (2022).
 37. Z. Zhang, B. Cheng, J. Lim, A. Gao, L. Lyu, T. Cao, S. Wang, Z.-A Li, Q. Wu, L. K. Ang, Y. S. Ang*, S.-J Liang*, **F. Miao***, "Approaching the intrinsic threshold breakdown voltage and ultrahigh gain in graphite/InSe Schottky photodetector", **Advanced Materials** 47, 2206196 (2022).
 38. Q. Li, B. Cheng*, M. Chen, B. Xie, Y. Xie, P. Wang, F. Chen, Z. Liu, K. Watanabe, T. Taniguchi, S.-J Liang, D. Wang, C. Wang, Q. -H Wang, J. Liu, **F. Miao***, "Tunable quantum criticalities in an isospin extended Hubbard model simulator", **Nature** 609, 479 – 484 (2022).

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39. L. Pi, P. Wang, S. -J Liang, P. Luo, H. Wang, D. Li, Z. Li, P. Chen, X. Zhou*, **F. Miao***, T. Zhai*, "Broadband convolutional processing using band-alignment-tunable heterostructures", **Nature Electronics** 5, 248 – 254 (2022).
40. S. Wang, X. Pan, L. Lyu, C. Wang, P. Wang, C. Pan, Y. Yang, C. Wang, J. Shi, B. Cheng, W. Yu, S.-J Liang*, **F. Miao***, "Nonvolatile van der Waals Heterostructure Phototransistor for Encrypted Optoelectronic Logic Circuit", **ACS Nano** 16, 3, 4528 – 4535 (2022).
41. C. Wang, S. -J. Liang, C. Wang, Z. Yang, Y. Ge, C. Pan, X. Shen, W. Wei, Y. Zhao, Z. Zhang, B. Cheng, C. Zhang, **F. Miao***, "Scalable massively parallel computing using continuous-time data representation in nanoscale crossbar array", **Nature Nanotechnology** (2021) (doi: <https://doi.org/10.1038/s41565-021-00943-y>).
42. P. Suo, H. Zhang, S. Yan, W. Zhang, J. Fu, X. Lin, S. Hao, Z. Jin, Y. Zhang, C. Zhang, **F. Miao***, S. -J. Liang, G. Ma, "Observation of negative terahertz photoconductivity in large area type-II dirac semimetal PtTe₂", **Physical Review Letters** 126, 227402 (2021).
43. X. Liu, Y. Wang, Q. Guo, S. -J Liang, T. Xu, B. Liu, J. Qiao, S. Lai, J. Zeng, S. Hao, C. Gu, T. Cao, C. Wang, Y. Wang, C. Pan, G. Su, Y. Nie, X. Wan, L. Sun, Z. Wang, L. He*, B. Cheng*, **F. Miao***, "Temperature-sensitive spatial distribution of defects in PdSe₂ flakes", **Physical Review Materials** 5, L041001 (2021). (Editor's suggestion)
44. C. Wang, Z. Yang, S. Wang, P. Wang, C. Wang, C. Pan, B. Cheng, S. -J Liang*, **F. Miao***, "A Braitenberg Vehicle Based on Memristive Neuromorphic Circuits", **Advanced Intelligent Systems** 2, 1900103 (2020).
45. Y. Wang, C. Wang, S. -J Liang, Z. Ma, K. Xu, X. Liu, L. Zhang, A. Admasu, S. Cheong, L. Wang, M. Chen, Z. Liu, B. Cheng*, W. Ji*, **F. Miao***, "Strain-sensitive magnetization reversal of a van der Waals magnet", **Advanced Materials** (2021) doi: 10.1002/adam.202004533.
46. S. Wang, C. Wang, P. Wang, C. Wang, Z. Li, C. Pan, Y. Dai, A. Gao, C. Liu, J. Liu, H. Yang, X. Liu, B. Cheng, K. Chen, Z. Wang, K. Watanabe, T. Taniguchi, S. -J Liang*, **F. Miao***, "Networking retinomorphic sensor with memristive crossbar for brain-inspired visual perception", **National Science Review** 8, nwaa172 (2021).

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47. Zhang, G. Wang, Y. Zhang, Z. Cao, Y. Wang, T. Cao, C. Wang, B. Cheng, W. Zhang, X. Wan, J. Lin*, S. -J Liang*, **F. Miao***, "Tuning Electrical Conductance in Bilayer MoS₂ through Defect-Mediated Interlayer Chemical Bonding", **ACS Nano** 14, 10265 (2020).
48. L. Li, L. Shao, X. Liu, A. Gao, H. Wang, B. Zheng, G. Hou, K. Shehzad, L. Yu, **F. Miao***, Y. Shi, Y. Xu, X. Wang, "Room-temperature valleytronic transistor", **Nature Nanotechnology** 15, 743 (2020).
49. C. Pan, C. Wang, S. -J Liang*, Y. Wang, T. Cao, P. Wang, C. Wang, S. Wang, B. Cheng, A. Gao, E. Liu, K. Watanabe, T. Taniguchi, **F. Miao***, "Reconfigurable logic and neuromorphic circuits based on electrically tunable two-dimensional homojunctions", **Nature Electronics** 3, 383 (2020).

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50. C. Wang, C. Pan, S. -J Liang, B. Cheng*, **F. Miao***, "Reconfigurable Vertical Field-Effect Transistor based on Graphene/MoTe₂/Graphite Heterostructure", **Science China Information Sciences** 63, 202402 (2020).
51. C. Wang, S. -J Liang, S. Wang, P. Wang, Z. Li, Z. Wang, A. Gao, C. Pan, C. Liu, J. Liu, H. Yang, X. Liu, W. Song, C. Wang, B. Cheng, X. Wang, K. Chen, Z. Wang, K. Watanabe, T. Taniguchi, J. Yang*, **F. Miao***, "Gate-tunable van der Waals heterostructure for reconfigurable neural network vision sensor", **Science Advances** 6, eaba6173 (2020).
52. A. Gao, Z. Zhang, L. Li, B. Zheng, C. Wang, Y. Wang, T. Cao, Y. Wang, S. -J Liang, **F. Miao***, Y. Shi*, X. Wang*, "Robust Impact-Ionization Field-Effect Transistor Based on Nanoscale

Vertical Graphene/Black Phosphorus/Indium Selenide Heterostructures", **ACS Nano** 14, 434 (2020).

53. S. Hao, S. Yan, Y. Wang, T. Xu, H. Zhang, X. Cong, L. Li, X. Liu, T. Cao, A. Gao, L. Zhang, L. Jia, M. Long, W. Hu, X. Wang, P. Tan, L. Sun, X. Cui, S. -J Liang*, **F. Miao***, "Edge-Epitaxial Growth of InSe Nanowires toward High-Performance Photodetectors", **Small** 16, 1905902 (2020).
54. X.J. Wang, Z. Zhou, C.Y. Ban, Z.P. Zhang, S. Ju, X. Huang, H.W. Mao, Q. Chang, Y.H. Yin, M.Y. Song, S. Cheng, Y.M. Ding, Z.D. Liu, R.L. Ju, L.H. Xie, **F. Miao**, J.Q. Liu, W. Huang, "Multifunctional Polymer Memory via Bi-Interfacial Topography for Pressure Perception Recognition", **Advanced Science** 7, 1902864 (2020).
55. L.X. Kang, C. Ye, X.X. Zhao, X.Y. Zhou, J.X. Hu, Q. Li, D. Liu, C.M. Das, J.F. Yang, D.Y. Hu, J.Q. Chen, X. Cao, Y. Zhang, M.Z. Xu, J. Di, D. Tian, P. Song, G. Kutty, Q.S. Zeng, Q.D. Fu, Y. Deng, J.D. Zhou, A. Ariando, **F. Miao**, G. Hong, Y.Z. Huang, S.J. Pennycook, K.T. Yong, W. Ji, X.R.S. Wang, Z. Liu, "Phase-controllable growth of ultrathin 2D magnetic FeTe crystals", **Nature Communications** 11, 3729 (2020).
56. Y.Y. Zhu, Q.P. Zhang, M. Kam, S. Poddar, L.L. Gu, S.J. Liang, P.F. Qi, **F. Miao**, Z.Y. Fan, "Vapor phase fabrication of three-dimensional arrayed BiI₃ nanosheets for cost-effective solar cells", **InfoMat** 2, 975-983 (2020).
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Review/Perspective Papers

1. Z.C. Ma, Z.L. Liu, B. Cheng, S.J. Liang, **F. Miao**, "In-situ strain engineering and applications of van der Waals materials", **Acta Physica Sinica** 73, 110701 (2024).
2. X. Pan, Y. Li, B. Cheng, S.-J Liang* and **F. Miao***, "2D materials for intelligent devices ", **SCIENCE CHINA Physics, Mechanics & Astronomy** 11, 117504 (2023)
3. M. Chen#, F. Chen#, B. Cheng*, S.-J Liang* and **F. Miao***, "Moiré heterostructures: highly tunable platforms for quantum simulation and future computing", **Journal of Semiconductors** 44, 010301 (2023)
4. S.-J Liang*, Y. Li#, B. Cheng, and **F. Miao***, "Emerging Low-Dimensional Heterostructure Devices for Neuromorphic Computing", **Small Structures** 10, 2200064 (2022)
5. S. -J Liang, **F. Miao***, "Lego-like reconfigurable AI chips", **Nature Electronics** 5, 327–328 (2022).
6. **F. Miao***, S. -J. Liang, B. Cheng*, "Straintronics with van der Waals materials", **npj Quantum Materials** 6, 59 (2021).
7. S. -J Liang, B. Cheng, X. Cui*, **F. Miao***, " Van der Waals Heterostructures for High - Performance Device Applications: Challenges and Opportunities", **Advanced Materials** 32, 1903800 (2020).
8. C. Wang, C. Wang, F. Meng, P. Wang, S. Wang, S. -J Liang*, **F. Miao***, "2D Layered Materials for Memristive and Neuromorphic Applications", **Advanced Electronic Materials** 6, 1901107 (2020).
9. Y. Yu, **F. Miao**, J. He, Z. Ni, "Photodetecting and light-emitting devices based on two-dimensional materials", **Chinese Physics B** 26, 036801 (2017).

Patents

Over 30 issued/pending US/China/International patents, with selected list as following:

1. **Feng Miao**, Nanjing, Shijun Liang, Cong Wang, Zaizheng Yang, "System and Method for Robot Control Based on Memristive Crossbar Array", US 12011833, issued on Jun. 18, 2024.

2. **Feng Miao**, Shijun Liang, Chenyu Wang, "Retinomorphic Sensor Array and Image Convolution Method Therefor", US 12132134, issued on Oct. 29, 2024.
3. **Feng Miao**, Miao Wang, "High Temperature Resistant Memristor Based on Two-Dimensional Covalent Crystal and Preparation Method Thereof", US 10418550, issued on Sept. 17, 2019.
4. **Feng Miao**, Joshua Yang, Wei Wu, Shih-Yuan Wang, R. Stanley Williams, "Graphene memristor having modulated graphene interlayer conduction," US 8294132, issued on Oct. 23, 2012.
5. **Feng Miao**, Joshua Yang, Gilberto Medeiros Ribeiro, R. Stanley Williams, "Changing a memristor state," US 8331131, issued on Dec. 11, 2012.
6. **Feng Miao**, Joshua Yang, John Paul Strachan, Wei Yi, Gilberto Medeiros Ribeiro, R. Stanley Williams, "High-reliability high-speed memristor," US 9165645, issued on Oct. 20, 2015.
7. **Feng Miao**, Joshua Yang, John Paul Strachan, Wei Yi, Gilberto Medeiros Ribeiro, R. Stanley Williams, "Memristor with channel region in thermal equilibrium with containing region," US 9276204, issued on Mar. 1, 2016.
8. Joshua Yang, **Feng Miao**, Wei Wu, Shih-Yuan Wang, R. Stanley Williams, "Defective graphene-based memristor," US 8203171, issued on Jun. 19, 2012.
9. Joshua Yang, **Feng Miao**, Wei Wu, Shih-Yuan Wang, R. Stanley Williams, "Memristive device," US 8546785, issued on Oct. 1, 2013.
10. Wei Yi, **Feng Miao**, Joshua Yang, "Multi-level memory cell with continuously tunable switching," US 8923034, issued on Dec. 30, 2014.
11. Joshua Yang, Minxian Max Zhang, **Feng Miao**, "Memristors having mixed oxide phases," US 9257645, issued on Feb. 9, 2016.
12. **Feng Miao**, Mingsheng Long, "Optoelectronic Device Based on p-g-n Heterojunctions of Two-Dimensional Layered Thin Film Materials", Patent No.: ZL 201511028062.4, Issue Date: September 29, 2017.
13. **Feng Miao**, Mingsheng Long, "Optoelectronic Device Based on p-i-n Heterojunctions of Two-Dimensional Layered Materials", Patent No.: ZL 201511029416.7, Issue Date: November 10, 2017.
14. **Feng Miao**, Lili Zhang, Xinyi Cui, Chenyu Wang, Erfu Liu, Mingsheng Long, "Method for Transferring CVD Two-Dimensional Transition Metal Chalcogenides Assisted by Water-Soluble Salt", Patent No.: ZL 201710350595.7, Issue Date: December 4, 2018.
15. **Feng Miao**, Xinyi Cui, Chenyu Wang, Yi Cao, Ying Li, "Field-Effect Based Biosubstance Sensor and Biosubstance Detection System Based on Layered Materials", Patent No.: ZL 201610018192.8, Issue Date: January 11, 2019.
16. **Feng Miao**, Miao Wang, "High-Temperature Tolerant Memristor Based on Two-Dimensional Atomic Crystal", Patent No.: ZL201810050297.0, Issue Date: June 16, 2020.
17. **Feng Miao**, Xiaomu Wang, Anyuan Gao, "Avalanche Field-Effect Transistor and Measurement Device Based on Two-Dimensional Layered Materials", Patent No.: ZL201910003119.7, Issue Date: February 12, 2021.
18. **Feng Miao**, Shijun Liang, Chen Pan, "Unit Circuit and Multifunctional Logic Circuit Based on Tunable Homojunction Field-Effect Devices", Patent No.: ZL202010596101.5, Issue Date: July 9, 2021.
19. **Feng Miao**, Shijun Liang, Chen Pan, Chenyu Wang, Pengfei Wang, "Artificial Synaptic Circuit and Implementation Method Based on Tunable Homojunction Field-Effect Devices", Patent No.: ZL202010596185.2, Issue Date: July 9, 2021.
20. **Feng Miao**, Shijun Liang, Cong Wang, Zaizheng Yang, "Robot Control System and Method Based on Memristor Crossbar Array", Patent No.: ZL201910993530.3, Issue Date: November 23, 2021. Patentee: Nanjing University, Nanjing University Shenzhen Research Institute.
21. **Feng Miao**, Shijun Liang, Cong Wang, Wei Wei, "System and Method for Edge Computing Using High-Order Differentiation of Analog Sensor Signals", Patent No.: ZL202110607304.4, Issue Date: March 18, 2022.

22. **Feng Miao**, Shijun Liang, Cong Wang, "Apparatus and Method for Frequency Division Multiplexing Parallel Analog In-Memory Computing", Patent No.: ZL202110526207.2, Issue Date: June 21, 2022.
23. **Feng Miao**, Shijun Liang, Cong Wang, Gongjie Ruan, "Method and System for Complex Number Dot Product Operation Based on Non-Volatile Memory Array", Patent No.: ZL202111382949.9, Issue Date: July 18, 2023.
24. **Feng Miao**, Shijun Liang, Cong Wang, Gongjie Ruan, "MIMO and De-MIMO Method and System Based on Analog In-Memory Computing", Patent No.: ZL202211382662.0, Issue Date: July 28, 2023.
25. **Feng Miao**, Shijun Liang, Cong Wang, Gongjie Ruan, "Modulation and Demodulation Method and System Based on Analog In-Memory Computing", Patent No.: ZL202211382599.0, Issue Date: September 22, 2023.
26. **Feng Miao**, Shijun Liang, Cong Wang, Yichen Zhao, "Method for Correcting Dot Product Error in a Variable Resistance Device Array", Patent No.: ZL202111372955.6, Issue Date: November 17, 2023.
27. **Feng Miao**, Shijun Liang, Chenyu Wang, "Retinal-Morphology Optoelectronic Sensor Array and Its Image Convolution Processing Method", Patent No.: ZL202010189068.4, Issue Date: December 26, 2023.
28. **Feng Miao**, Cong Wang, Shijun Liang, Yichen Zhao, "Training Method and Apparatus for Analog Hardware Neural Network", Patent No.: ZL202410650458.5, Issue Date: March 25, 2025.

Invited Talks and Seminars

More than 100 invited talks and seminars, with selected invited talks include: MRS Spring meeting (2025, 2024, 2022, 2021, 2017), APS March meeting (2020), Nature Conference (2024), IEEE International Conference on Solid-State & Integrated Circuit Technology (2020), International Workshop on Nanotechnology (2020), 10th Singapore International Chemistry Conference (2018), Recent Progress in Graphene and Two-dimensional Materials Research Conference (RPGR) (2018), International Symposium on Memory Devices for Abundant Data Computing (2017), *et al.*

List of selected invited talks and seminars:

1. MRS spring meeting, Seattle, 2025
2. IEEE EDTM (Electron Devices Technology and Manufacturing), Hong Kong, 2025
3. Nature Conference on Neuromorphic Computing, Beijing, China, 2024
4. MRS fall meeting, Boston, 2024
5. Hong Kong Forum of Physics, Hong Kong, 2024
6. University of California, Santa Cruz, 2024
7. International Conference on Memristive Materials, Devices & Systems (MEMRISYS 2024), Korea, 2024
8. Recent Progress in Graphene and 2D Materials Research Conference (RPGR), Nanjing, China, 2024
9. IEEE EDTM (Electron Devices Technology and Manufacturing), India, 2024
10. The University of Hong Kong, Hong Kong, 2024
11. International Symposium on Emerging Memory and Computing (ISMC), Hong Kong, 2024
12. International Workshop on Quantum Materials for 2D Photonics & Optoelectronics (QM2PO), Singapore, 2023
13. Conference of Condensed Matter Physics (CCMP), Liyang, China, 2023
14. IEEE-NANO, Korea, 2023 (online)
15. Future Electronics Materials Research in Australia (FEMRA) workshop, Australia, 2023 (online)

16. 2022 MRS Fall Meeting (online)
17. International Conference on Memristive Materials, Devices & Systems (MEMRISYS 2022), Cambridge, USA, 2022 (online)
18. International Conference on Solid-State and Integrated Circuit Technology (ICSICT), Nanjing, China, 2022
19. National University of Singapore, 2022 (online)
20. 2021 MRS Fall Meeting, Boston, 2021 (online)
21. International conference on "Recent Progress in Graphene and 2D materials Research" (RPGR) 2021, Korea (online)
22. 3rd International Symposium on Memory Devices for Abundant Data Computing, 2021 (online)
23. International Conference on Solid-State and Integrated Circuit Technology (ICSICT), 2020 (online)
24. APS March Meeting, Denver, 2020 (online/cancelled)
25. International Workshop on Nanotechnology (Tnano20), Republic of Georgia, 2020 (online)
26. International Conference on Memristive Materials, Devices & Systems (MEMRISYS), Germany, 2019
27. International Conference on 2D Materials and Technology (ICON-2DMAT), Suzhou, China, 2019
28. Conference of Condensed Matter Physics (CCMP), Liyang, China, 2019
29. 2019 International Workshop on Nanomaterials and Nanodevices, Beijing, China, 2019
30. The 1st UK-China Conference "Grand Challenges and Solutions in 2D Materials Science and Technologies", Manchester, UK, 2018
31. The 4th International Conference on Two-Dimensional Materials and Technologies (ICON-2DMAT), Melbourne, Australia, 2018
32. The 10th Singapore International Chemistry Conference (SICC10), Singapore, 2018
33. The International Conference on Memristive Materials, Devices & Systems (MEMRISYS 2018), Beijing, China, 2018
34. The 2nd Sino-German Symposium on Electronic and Memory Materials, Xi'an, China, 2018
35. International Symposium on Emerging Memory and Computing (ISMC), Jiangxi, China, 2018
36. MRS spring meeting, Phoenix, 2017
37. Third International Conference on 2D Materials and Technology (ICON-2DMAT), Singapore, 2017
38. Nanyang Technological University, Singapore, 2017
39. International Symposium on emerging Memory and Computing (ISMC), Hong Kong, China, 2017
40. University of California, Riverside, 2017
41. Asia-Pacific Symposium on Solid Surfaces and Cross-Strait Symposium on Solid Surfaces, Taipei, 2016
42. 2016 Asia Communications and Photonics Conference (ACP), Wuhan, China, 2016
43. 2016 EMN 2D Materials Meeting, Spain, 2016
44. The 9th Singapore International Chemical Conference (SICC-9), Singapore, 2016
45. University of California, Los Angeles, 2015
46. University of California, Riverside, 2015
47. University of Southern California, 2015
48. HP Labs, Palo Alto, California, 2015
49. University of Massachusetts, Amherst, 2015