Zhifang Shi

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Employment

Shenzhen University of Advanced Technology Jun. 2024 – now

Assistant Professor, **Principal investigator (PI)**

Hybrid Functional Materials and Devices Lab

Faculty of Materials Science and Energy Engineering

University of North Carolina at Chapel Hill May. 2021 – May. 2024

Postdoctoral Research Fellow

Supervisor: **Prof. Jinsong Huang**

Education

ShanghaiTech University Sep. 2014 – Jul. 2020

Ph.D. in Materials Science and Engineering

Subject: Rational Design, Synthesis, and Characterization of Novel Cubic Perovskites.

Supervisor: **Prof. Qixi Mi**

Dalian University of Technology Sep. 2010 – Jun. 2014

B.S. in Applied Chemistry

Publications

[1] Hangyu Gu, **Zhifang Shi**, Guang Yang, Huanxin Guo, Haoliang Wang, Mengru Wang, He Liu, Xinjian Ying, Chengbin Fei, Jinsong Huang*, -, **2025**, under review.

[2] **Zhifang Shi**, Yeming Xian, Xiaoming Wang, Haoyang Jiao, Hua Zhou, Yugang Zhang,

Zhenyi Ni, Yanfa Yan and Jinsong Huang*, Tunable Coherent Mixed-Dimensional Perovskite Heterojunctions and Quantum Wells Grown from Solution, ***Nat. Photon.***, **2025**, accepted.

[3] Mingze Li, Shaojie Wang, **Zhifang Shi**, Zhijun Li, Allen Wood, Jinsong Huang*, Defect Repairing in Lead Bromide Perovskite Single Crystals with Biasing and Bromine for X-ray Photon-counting Detectors, ***Nat. Mater.***, **2025**, accepted.

[4] **Zhifang Shi,** He Liu, Haoyang Jiao, Mingze Li, Zhenyi Ni, Liang Zhao and Jinsong Huang*, Self-Regulated Facet Stability During Solution Growth of Perovskite Crystals, ***Nat. Synth.***, **2025**, online published. https://doi.org/10.1038/s44160-025-00786-8

[5] Guang Yang, Hangyu Gu, Jun Yin, Chengbin Fei, **Zhifang Shi**, Xiaoqiang Shi, Xingjian Ying, Jinsong Huang*, Air-processed Wide-bandgap Perovskite Solar Cells and Modules with Reductive Cation, ***Nat. Sustain.***,**2025**, 8, 456-463.

[6] Ying Zhou, Hengkai Zhang, Yeming Xian, **Zhifang Shi**, Jean Aoba, Chengbin Fei, Guang Yang, Nengxu Li, Farida Selim, Yanfa Yan, Jinsong Huang*, Enhancing Charge-emitting Shallow Traps in Metal Halide Perovskites by >100 Times by Surface Strain, ***Joule***, **2025**, 9, 101772.

[7] Zhenyi Ni,† Liang Zhao,† **Zhifang Shi**,† Yifan Dong, Obadiah G. Reid, Matthew C. Beard, and Jinsong Huang*, Reducing defects in wide-bandgap perovskite single crystals and its impact to charge collection for high resolution Gamma-ray spectroscopy, ***Adv. Mater.***, **2024**, 36, 2406193. (**†Contribute equally**)

[8] Chengbin Fei, Anastasia Kuvayskaya, Xiaoqiang Shi, Mengru Wang, **Zhifang Shi**, …, Alan Sellinger, Jinsong Huang*, Strong-bonding hole-transport layers reduce ultraviolet degradation of perovskite solar cells, ***Science***, **2024**, 384, 1126-1134.

[9] Nengxu Li, **Zhifang Shi**, Chengbin Fei, Haoyang Jiao, Mingze Li, Hangyu Gu, Yifan

Dong, Matthew Beard, Jinsong Huang*, Barrier Reinforcement for Enhanced Perovskite Solar Cell Stability under Reverse Bias, ***Nat. Energy***, **2024**, 9, 1264-1274.

[10] Wyatt Panaccione, **Zhifang Shi**, Praneeth Kandalakunta, Jinsong Huang, and Lei R. Cao*, Experimental Testing of an Organic Metal Halide Perovskite for Fast Neutron Detection, ***Nucl. Instrum. and Methods in Phys. Res. A***, **2024**, 1064, 169340.

[11] Wenzhan Xu, Bo Chen, Zhao Zhang, Ye Liu, **Zhifang Shi**, Hangyu Gu, Chengbin Fei, Nengxu Li, Md Aslam Uddin, Hengkai Zhang, and Jinsong Huang*, Multifunctional Entinostat Enhances the Mechanical Robustness and Efficiency for Flexible Perovskite Solar Cells and Minimodules, ***Nat. Photon.***, **2024**, 18, 379-387.

[12] Liang Zhao, **Zhifang Shi**, Ying Zhou, Xiaoming Wang, Yeming Xian, Yifan Dong, Obadiah Reid, Zhenyi Ni, Matthew Beard, and Jinsong Huang*, Surface Defect Passivation Enabled Near Unity Charge Collection Efficiency in Bromide based Perovskite Gamma-Ray Spectrum Devices, ***Nat. Photon.***, **2024**, 18, 250-257.

[13] Jinsong Huang, Mengru Wang, **Zhifang Shi**, Ammonium Cations in Perovskite Solar Cells and Uses Thereof, **PCT Patent**, **2023**, PCT/US2024/016021.

[14] Mengru Wang, † **Zhifang Shi**, † Chengbin Fei, Zhewen JD Deng, Guang Yang, Sean P. Dunfield, David P. Fenning, and Jinsong Huang*, Ammonium Cations with High pKa in Perovskite Solar Cells for Improved High Temperature Photostability, ***Nat. Energy***, **2023**, 8, 1229-1239. (**†Contribute equally**)

[15] Guang Yang, Zhenshan Yu, Mengru Wang, **Zhifang Shi**, Zhenyi Ni, Haoyang Jiao, Chengbin Fei, Allen Wood, Abdulwahab Alasfour, Bo Chen, Zachary Holman, Jinsong Huang*, Shunt Mitigation toward Efficient Large-area Perovskite-silicon Tandem Solar Cells, ***Cell Rep. Phys. Sci.***, **2023**, 4, 101628.

[16] Chengbin Fei, Nengxu Li, Mengru Wang, …, Wenzhan Xu, **Zhifang Shi**, Yanfa Yan, and Jinsong Huang*, Lead Chelating Hole Transport Layers for Efficient and Stable Perovskite Minimodules, ***Science***, **2023**, 380, 6647, 823-829.

[17] Liang Zhao, Ying Zhou, **Zhifang Shi**, Zhenyi Ni, Mengru Wang, Ye Liu, and Jinsong Huang*, High-yield growth of $FACsPbBr_3$ single crystals with low defect density from mixed solvents for gamma-ray spectroscopy, ***Nat. Photon.***, **2023**, 17, 315-323.

[18] **Zhifang Shi**, Zhenyi Ni, Jinsong Huang*, Direct Observation of Fast Carriers Transport along Out-of-plane Direction in a Dion-Jacobson Layered Perovskite. ***ACS Energy Lett.,*** **2022**, 7, 984-987.

[19] Haoyang Jiao, Zhenyi Ni, **Zhifang Shi**, Chengbin Fei, Ye Liu, Xuezeng Dai, Jinsong Huang*, Perovskite grain wrapping by converting interfaces and grain boundaries into robust and water-insoluble low-dimensional perovskites, ***Sci. Adv.***, **2022**, 8, eabq4524.

[20] Md Aslam Uddin, Prem Jyoti Singh Rana, Zhenyi Ni, Xuezeng Dai, Zhenhua Yu, **Zhifang Shi**, Haoyang Jiao, Jinsong Huang*, Blading of Conformal Electron-Transport Layers in p–i–n Perovskite Solar Cells, ***Adv. Mater.***, **2022**, 34, 2202954.

[21] **Zhifang Shi**, Zheng Fang, Jingshu Wu, Yi Chen and Qixi Mi*, Order-disorder transition of a rigid cage cation embedded in a cubic perovskite. ***Nat. Commun.***, **2021**, 12, 3548.

[22] Ziyan Wu[#], Qiqi Zhang[#], Binghan Li, **Zhifang Shi**, Kaimin Xu, Zhijun Ning and Qixi Mi*, Stabilizing the $CsSnCl_3$ Perovskite Lattice by B-Site Substitution for Enhanced Light Emission. ***Chem. Mater.***, **2019**, 31, 4999-5004.

[23] Qixi Mi, **Zhifang Shi**, Yi Zhang, **Chinese patent**, **2018**, ZL201510670503.4.

[24] Qixi Mi, **Zhifang Shi**, Yi Zhang, **Chinese patent**, **2018**, ZL201610121585.1.

[25] **Zhifang Shi**, Yi Zhang, Chao Cui, Binghan Li, Wenjia Zhou, Zhijun Ning* and Qixi Mi*, Symmetrization of the Crystal Lattice of $MAPbI_3$ Boosts the Performance and Stability of Metal–Perovskite Photodiodes. ***Adv. Mater.***, **2017**, 29, 1701656.

[26] Yuqin Liao, Hefei Liu, Wenjia Zhou, Dongwen Yang, Yuequn Shang, **Zhifang Shi**,…, Qixi Mi, Edward H. Sargent and Zhijun Ning*, Highly Oriented Low-Dimensional Tin Halide Perovskites with Enhanced Stability and Photovoltaic Performance. ***J. Am.***

Chem. Soc., **2017**, 139, 6693-6699.

[27] Xue Wang, Juan Su, Hui Chen, Guo-Dong Li, **Zhifang Shi**, Haifeng Zou* and Xiaoxin Zou*, Ultrathin In_2O_3 Nanosheets with Uniform Mesopores for Highly Sensitive Nitric Oxide Detection. ***ACS Appl. Mater. Interfaces***, **2017**, 9,16335-16342.

Teaching

Modern Methods for Materials Analysis	Fall 2025 – 2026
Physical Chemistry	Fall 2025 – 2026
General Chemistry	Spring 2024 – 2025
Materials and Clean Energy Conversion	Fall 2024 – 2025

Conferences

1. Materials Research Society Fall Meeting, 2016, Boston, USA.
2. Materials Research Society Fall Meeting, 2017, Boston, USA.
3. Materials Challenges in Alternative & Renewable Energy, 2017, Jeju, Korea.
4. Center for Hybrid Organic Inorganic Semiconductors for Energy (CHOISE) Kick-off meeting, 2022, Denver, USA.
5. 2023 EFRC-Hub-CMS-CCS Principal Investigators' Meeting, 2023, Virtual, USA.
6. 2023 CHOISE workshop, 2023, Chapel Hill, NC, USA.
7. Nature Conference: Perovskite and Organic Photovoltaics, 2024, Nanjing, China.
8. 2024 International Conference on the Cooperation and Integration of Industry, Education, Research and Application, 2024, Changsha, China. (Invited)
9. Sustainable Carbon Cycle towards Carbon Neutrality, Youth Scientist Salon, 2024, Shenzhen, China. (Invited)
10. The Advanced Materials for Sustainability Workshop, 2024, Sharjah, United Arab Emirates. (Invited)
11. 3rd International Conference on Energy Chemistry, 2025, Shenzhen, China. (Organizing Committee)

Science Foundation

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- Start-up Funding from Shenzhen University of Advanced Technology.
- -, co-PI.

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- Center for Hybrid Organic Inorganic Semiconductors for Energy (CHOISE), an Energy Frontier Research Center funded by the Office of Basic Energy Sciences, Office of Science within the US Department of Energy.
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- Shanghai International Cooperation Project. (16520720700)

Awards

- National scholarship for doctoral students, Ministry of Education, 2018.
- Outstanding students, ShanghaiTech University, 2018.
- Outstanding students, Baosteel Education Foundation, 2017.
- Outstanding students, ShanghaiTech University, 2016.

Service to Material Society

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Reviewer for ***Nat. Commun.***, ***J. Energy Chem.***, ***Materials*** etc.