

DAN, JIADONG

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Date of Birth: 11 May 1993
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Research Interests
Machine Learning
Electron Microscopy
Computational Imaging
AI for Characterization

EDUCATION

National University of Singapore <i>Ph.D. in Integrative Sciences and Engineering (Advisor: Prof. Stephen J. Pennycook)</i> <i>Areas of concentration: electron microscopy, machine learning</i>	Singapore 2015 – 2020
Shandong University <i>B.Eng. in Materials Sciences & Engineering</i> <i>Graduated in the top 5% of the class</i>	Shandong, China 2011 – 2015
National Cheng Kung University <i>Exchange Student in Department of Materials Sciences & Engineering</i> <i>Overall Grade: 92.9/100</i>	Tainan, China 2013

RESEARCH EXPERIENCE

Eric and Wendy Schmidt AI in Science Fellow <i>Center for Bioimaging Sciences, National University of Singapore</i> <ul style="list-style-type: none">Designing software for quantitative electron microscopy data analysis.Developing AI copilot systems for next-generation electron microscope.	2023 – Present Singapore
Research Fellow <i>Department of Biological Sciences, National University of Singapore</i> <ul style="list-style-type: none">Pioneered structural motifs and their hierarchies in disordered materials.Developed algorithms to represent and classify structural motifsDeveloped machine learning frameworks to learn motif compositional rules.	2020 – 2023 Singapore

FELLOWSHIPS & AWARDS

(2025) NUS Long Service Award <i>National University of Singapore</i>	2025 Singapore
(2024) Project Proposal Selected for Oxford RSE Workshop (VIDAR) <i>Oxford Research Software Engineering Workshop, University of Oxford</i>	2024 UK
(2024) Kavli IPMU Travel Award (AI-driven discovery in physics and astrophysics) <i>The CD3 x Simons Foundation workshop, Kavli IPMU</i>	2024 Japan
(2023) IFSM Young Scientist (sole recipient from Singapore) <i>International Federation of Societies for Microscopy (IFSM)</i>	2023 USA
(2023) The Eric and Wendy Schmidt AI in Science Fellowship <i>Schmidt Sciences</i> <i>Amount: S\$202,000 for independent research and professional development</i>	2023 USA
(2022) Postdoctoral Scholar Award (sole recipient from Singapore) <i>Microscopy Society of America</i>	2022 USA
(2015) NUS-NGS Scholarship (one of 44 international recipients) <i>National University of Singapore</i> <i>Amount: S\$168,000 awarded as a Ph.D. research scholarship</i>	2015 Singapore
(2012) First-Class Academic Excellence Scholarship (top 2%) <i>Shandong University</i>	2012 China

GRANTS & FUNDING

AISI-NUS Joint Research Initiative Fund (A-8003325-00-00)

Amount: S\$200,000, Co-PI

Led the drafting of the project proposal and developed a detailed budget breakdown

AISI-NUS

2025 – 2026

ACADEMIC SERVICE

Mentorship

Master Student(s): *Cheng Zhang (NUS, 2021 – 2023)*

Peer Review

Contributed reviews to *npj Computational Materials*, *Microscopy & Microanalysis*, *Scientific Reports*, *Molecules*, *Electronics*, *Entropy*, *Nanomaterials*, and *Algorithms*

Professional Leadership

Post-doc subcommittee officer at Microscopy Society of America (2023 – present), and co-organized the *Postdoc and Early Career Professional Development Event* at M&M 2024

Public Engagement and Science Communication

Press interviews for *NUS Faculty of Science Research News*

CONFERENCE & SEMINAR PRESENTATIONS

Poster presentation at <i>IAMNano 2017</i> , Singapore	Nov. 2017
Poster presentation at <i>Microscopy & Microanalysis 2022</i> , Portland, USA	Aug. 2022
Invited talk at Institute of Engineering Innovation, The University of Tokyo, Japan (hosted by Prof. Ryo Ishikawa)	Apr. 2023
Invited talk at School of Materials Science and Engineering, Peking University, China (hosted by Prof. Xiaoxu Zhao)	May 2023
Invited talk at School of Physics, University of Chinese Academy of Sciences, China (hosted by Prof. Wu Zhou)	May 2023
Poster presentation at <i>Microscopy & Microanalysis 2023</i> , Minneapolis, USA	Jul. 2023
Oral presentation at 20 th International Microscopy Congress, Busan, Korea	Sep. 2023
Oral presentation at Institute of Physics Singapore Meeting, Singapore	Sep. 2023
Invited talk at 2023 Chinese Electron Microscopy Society (CEMS) Meeting, China	Oct. 2023
Oral presentation at AI for Science Summit, University of Cambridge, UK	Dec. 2023
Fireslide oral at the CD3 × Simons Foundation workshop, Kavli IPMU, Japan	Jan. 2024
Invited talk at Anhui University, China (hosted by Prof. Dongsheng Song)	Apr. 2024
Poster presentation at <i>Microscopy & Microanalysis 2024</i> , Cleveland, USA	Aug. 2024
Poster presentation at the Faculty of Science 95 th Anniversary Symposium, NUS, Singapore	Sep. 2024
Oral presentation at Materials Research Society (MRS) Fall Meeting, Boston, USA	Dec. 2024
Poster presentation at Meet the New Faculty Candidate Session at MRS Fall Meeting, Boston, USA	Dec. 2024
Invited to attend the Global Young Scientists Summit (GYSS) Meeting, Singapore	Jan. 2025
Oral presentation at the 13 th Asia Pacific Microscopy Congress (APMC2025), Brisbane, Australia	Feb. 2025
Invited research seminar at the University of Wyoming, WY, USA	May 2025

TEACHING EXPERIENCE

Experiments in Chemistry III (CM2192)

2015 – 2016

Graduate Teaching Assistant

NUS

- Grading lab reports, supervising lab sessions, and leading discussions on experimental techniques.

Engineering Principles & Practices II (EG1112)

2016 – 2017

Graduate Teaching Assistant

NUS

- Grading exams and assignments, and facilitating group discussions on engineering concepts.

Engineering Principles & Practices I (EG1111)

2017 – 2018

Graduate Teaching Assistant

NUS

- Grading exams and assignments, and facilitating group discussions on engineering concepts.

SOFTWARE DEVELOPMENT

motif-learn

<https://github.com/jiadongdan/motif-learn>

Primary Developer

defect-learn

<https://github.com/jiadongdan/defect-learn>

Primary Developer

stemplot

<https://github.com/jiadongdan/stemplot>

Primary Developer

VIDAR

<https://github.com/jiadongdan/VIDAR>

Primary Developer

PUBLICATIONS (H-INDEX: 19 WITH 1,928 CITATIONS)

32. [Bridging context and images: multimodal learning for defect identification in two-dimensional materials](#)
Jiadong Dan*, Cheng Zhang, N. Duane Loh*
manuscript in preparation, 2025
31. [Modifying the Dzyaloshinskii-Moriya interaction via disruption of ordered intercalation in a van der Waals magnet](#)
Yangrui Liu, Jianxiong Zhang, Ying Liu, **Jiadong Dan**, Luyang Wang, Wei Liu, Lei Zhang, Fengshan Zheng, Haifeng Du, Binghui Ge, Jin-Zhu Zhao, Dongsheng Song
Nano Letters, 2025 (**Impact factor: 10.8**)
30. [Atomic-Scale Order and Disorder Induced Diverse Topological Spin Textures in Self-Intercalated Van der Waals Magnets \$\text{Cr}_{1+\delta}\text{Te}_2\$](#)
Ying Liu, Yangrui Liu, **Jiadong Dan**, Wei Liu, Luyang Wang, Kejun Hu, Weiwei Wang, Lei Zhang, Binghui Ge, Haifeng Du, Dongsheng Song
Advanced Functional Materials, 2024 (**Impact factor: 18.5**)
29. [Physics through the microscope](#)
Stephen J. Pennycook, Ryo Ishikawa, Haijun Wu, Xiaoxu Zhao, Changjian Li, N. Duane Loh, **Jiadong Dan**, Wu Zhou
Chinese Physics B, 2024
28. [Can conventional classifiers outperform neural networks in identifying structural defects from atomic resolution micrographs?](#)
Jiadong Dan*, Cheng Zhang, N. Duane Loh
Microscopy and Microanalysis, 2024 (**Impact factor: 2.9, top in Microscopy category**)
27. [Symmetry quantification and segmentation in STEM imaging through Zernike moments](#)
Jiadong Dan*, Cheng Zhang, Xiaoxu Zhao, N. Duane Loh*
Chinese Physics B, 2024 (*editor's suggestion*)
26. [Atomically engineering metal vacancies in monolayer transition metal dichalcogenides](#)
Xiaocang Han, Mengmeng Niu, Yan Luo, Runlai Li, **Jiadong Dan**, Yanhui Hong, Xu Wu, Alex V. Trukhanov, Wei Ji, Yeliang Wang, Jiahuan Zhou, Jingsi Qiao, Jin Zhang, Xiaoxu Zhao
Nature Synthesis, 2024 (*featured with a News and Views by Marijn A. van Huis*)
25. [A multiscale generative model to understand disorder in domain boundaries](#)
Jiadong Dan*, Moaz Waqar, Ivan Erofeev, Kui Yao, John Wang, Stephen J. Pennycook, and N. Duane Loh*
Science Advances, 2023 (*featured by NUS Faculty of Science Research News*)(**Impact factor: 11.7**)
24. [Exploring the emergence of complex grain boundary structures via hybrid probabilistic generative model](#)
Jiadong Dan*, Moaz Waqar, Stephen J. Pennycook, and N. Duane Loh
Microscopy and Microanalysis, 2023 (**Impact factor: 2.9, top in Microscopy category**)
23. [Exploring motifs and their hierarchies in crystals via unsupervised learning](#)
Jiadong Dan, Xiaoxu Zhao, Qian He, N. Duane Loh and Stephen J. Pennycook
Microscopy and Microanalysis, 2022 (**Impact factor: 2.9, top in Microscopy category**)
22. [Navigating the nanoworld: automatic feature recognition](#)
Stephen J. Pennycook, **Jiadong Dan**, Xiaoxu Zhao, Shoucong Ning, Wu Zhou, Qian He, N Duane Loh
Microscopy and Microanalysis, 2022 (**Impact factor: 2.9, top in Microscopy category**)
21. [Learning motifs and their hierarchies in atomic resolution microscopy](#)
Jiadong Dan, Xiaoxu Zhao, Shoucong Ning, Jiong Lu, Kian Ping Loh, Qian He, N. Duane Loh*, and Stephen J. Pennycook*
Science Advances, 2022 (*featured by NUS Faculty of Science Research News*)(**Impact factor: 11.7**)
20. [Strong moiré excitons in high-angle twisted transition metal dichalcogenide homobilayers with robust commensuration](#)
Xiaoxu Zhao, Jingsi Qiao, Xin Zhou, Hao Chen, Jun You Tan, Hongyi Yu, Si Min Chan, Jing Li, Henshui Zhang, Jiadong Zhou, **Jiadong Dan**, Zhen Liu, Wu Zhou, Zheng Liu, Bo Peng, Longjiang Deng, Stephen J. Pennycook, Su Ying Quek, Kian Ping Loh
Nano Letters, 2022 (**Impact factor: 10.8**)
19. [Improving photoelectrochemical activity of \$\text{ZnO}/\text{TiO}_2\$ core-shell nanostructure through Ag nanoparticle integration](#)
Wang, Zeli, Zhen Chen, **Jiadong Dan**, Weiqiang Chen, Chenghang Zhou, Zexiang Shen, Tze Chien Sum, and Xue-Sen Wang
Catalysts, 2021
18. [Unveiling atomic-scale moiré features and atomic reconstructions in high-angle commensurately twisted transition metal dichalcogenide homobilayers](#)
Xiaoxu Zhao, Jingsi Qiao, Si Min Chan, Jing Li, **Jiadong Dan**, Shoucong Ning, Wu Zhou, Su Ying Quek, Stephen J. Pennycook, Kian Ping Loh
Nano Letters, 2021 (**Impact factor: 10.8**)

17. [Engineering covalently bonded 2D layered materials by self-intercalation](#)
Xiaoxu Zhao, Peng Song, Chengcai Wang, Anders C Riis-Jensen, Wei Fu, Ya Deng, Dongyang Wan, Lixing Kang, Shoucong Ning, **Jiadong Dan**, T Venkatesan, Zheng Liu, Wu Zhou, Kristian S Thygesen, Xin Luo, Stephen J. Pennycook, Kian Ping Loh
Nature, 2020 (featured by NUS Faculty of Science Research News)(**Impact factor: 50.5**)
16. [Chemically exfoliated VSe₂ monolayers with room-temperature ferromagnetism](#)
Wei Yu, Jing Li, Tun Seng Herng, Zishen Wang, Xiaoxu Zhao, Xiao Chi, Wei Fu, Ibrahim Abdelwahab, Jun Zhou, **Jiadong Dan**, Zhongxin Chen, Zhi Chen, Zejun Li, Jiong Lu, Stephen J. Pennycook, Yuan Ping Feng, Jun Ding, Kian Ping Loh
Advanced Materials, 2019, (**Impact factor: 27.4**)
15. [Growth of Nb-doped monolayer WS₂ by liquid-phase precursor mixing](#)
Ziyu Qin, Leyi Loh, Junyong Wang, Xiaomin Xu, Qi Zhang, Benedikt Haas, Carlos Alvarez, Hanako Okuno, Justin Zhou Yong, Thorsten Schultz, Norbert Koch, **Jiadong Dan**, Stephen J. Pennycook, Dawen Zeng, Michel Bosman, Goki Eda
ACS Nano, 2019 (**Impact factor: 15.8**)
14. [A machine perspective of atomic defects in scanning transmission electron microscopy](#)
Jiadong Dan, Xiaoxu Zhao, and Stephen J. Pennycook*
InfoMat, 2019 (**Impact factor: 22.7**)
13. [Defect heterogeneity in monolayer WS₂ unveiled by work function variance](#)
Xinyun Wang, **Jiadong Dan**, Zhenliang Hu, Jin Feng Leong, Qi Zhang, Ziyu Qin, Shisheng Li, Junpeng Lu, Stephen J. Pennycook, Wanxin Sun, Chorong Haur Sow
Chemistry of Materials, 2019
12. [Engineering and modifying two-dimensional materials via electron beams](#)
Xiaoxu Zhao, **Jiadong Dan**, Wu Zhou, Kian Ping Loh, Stephen J. Pennycook
Microscopy and Microanalysis, 2019 (**Impact factor: 2.9, top in Microscopy category**)
11. [High-energy gain upconversion in monolayer tungsten disulfide photodetectors](#)
Qixing Wang, Qi Zhang, Xiaoxu Zhao, Yu Jie Zheng, Junyong Wang, Xin Luo, **Jiadong Dan**, Rui Zhu, Qijie Liang, Lei Zhang, PK Johnny Wong, Xiaoyue He, Yu Li Huang, Xinyun Wang, Stephen J. Pennycook, Goki Eda, Andrew TS Wee
Nano Letters, 2019 (**Impact factor: 10.8**)
10. [Phase-controlled synthesis of monolayer ternary telluride with a random local displacement of tellurium atoms](#)
Bijun Tang, Jiadong Zhou, Pingping Sun, Xiaowei Wang, Lichun Bai, **Jiadong Dan**, Jiefu Yang, Kun Zhou, Xiaoxu Zhao, Stephen J. Pennycook, Zheng Liu
Advanced Materials, 2019 (**Impact factor: 27.4**)
9. [Edge segregated polymorphism in 2D molybdenum carbide](#)
Xiaoxu Zhao, Weiwei Sun, Dechao Geng, Wei Fu, **Jiadong Dan**, Yu Xie, Paul RC Kent, Wu Zhou, Stephen J. Pennycook, Kian Ping Loh
Advanced Materials, 2019 (**Impact factor: 27.4**)
8. [Healing of planar defects in 2D materials via grain boundary sliding](#)
Xiaoxu Zhao, Yujin Ji, Jianyi Chen, Wei Fu, **Jiadong Dan**, Yuan Yue Liu, Stephen J. Pennycook, Wu Zhou, Kian Ping Loh
Advanced Materials, 2019 (**Impact factor: 27.4**)
7. [Effects of precursor pre-treatment on the vapor deposition of WS₂ monolayers](#)
Mei Er Pam, Yumeng Shi, Junping Hu, Xiaoxu Zhao, **Jiadong Dan**, Xue Gong, Shaozhan Huang, Dechao Geng, Stephen J. Pennycook, Lay Kee Ang, Hui Ying Yang
Nanoscale Advances, 2019
6. [Molecular-beam epitaxy of two-dimensional In₂Se₃ and its giant electroresistance switching in ferroresistive memory junction](#)
Sock Mui Poh, Sherman Jun Rong Tan, Han Wang, Peng Song, Irfan H Abidi, Xiaoxu Zhao, **Jiadong Dan**, Jingsheng Chen, Zhengtang Luo, Stephen J. Pennycook, Antonio H Castro Neto, Kian Ping Loh
Nano Letters, 2018 (**Impact factor: 10.8**)
5. [Molecular beam epitaxy of highly crystalline MoSe₂ on hexagonal boron nitride](#)
Sock Mui Poh, Xiaoxu Zhao, Sherman Jun Rong Tan, Deyi Fu, Wenwen Fei, Leiqiang Chu, **Jiadong Dan**, Wu Zhou, Stephen J. Pennycook, Antonio H Castro Neto, Kian Ping Loh
ACS Nano, 2018 (**Impact factor: 15.8**)
4. [Atom-by-atom fabrication of monolayer molybdenum membranes](#)
Xiaoxu Zhao#, **Jiadong Dan**#, Jianyi Chen, Zijong Ding, Wu Zhou, Kian Ping Loh, Stephen J. Pennycook
Advanced Materials, 2018 (**Impact factor: 27.4**)
3. [Strain modulation by van der Waals coupling in bilayer transition metal dichalcogenide](#)
Xiaoxu Zhao, Zijong Ding, Jianyi Chen, **Jiadong Dan**, Sock Mui Poh, Wei Fu, Stephen J. Pennycook, Wu Zhou, Kian Ping Loh
ACS Nano, 2018 (**Impact factor: 15.8**)
2. [Mo-terminated edge reconstructions in nanoporous molybdenum disulfide film](#)
Xiaoxu Zhao, Deyi Fu, Zijong Ding, Yu-Yang Zhang, Dongyang Wan, Sherman JR Tan, Zhongxin Chen, Kai Leng, **Jiadong Dan**, Wei Fu, Dechao Geng, Peng Song, Yonghua Du, T Venkatesan, Sokrates T Pantelides, Stephen J. Pennycook, Wu Zhou, Kian Ping Loh
Nano Letters, 2018 (**Impact factor: 10.8**)
1. [Ultrathin nickel boron oxide nanosheets assembled vertically on graphene: a new hybrid 2D material for enhanced photo/electro-catalysis](#)
Min-Quan Yang, **Jiadong Dan**, Stephen J. Pennycook, Xin Lu, Hai Zhu, Qing-Hua Xu, Hong Jin Fan, Ghim Wei Ho
Materials Horizons, 2017