

CURRICULUM VITAE

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Ph.D. candidate

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EDUCATION

Doctor of Philosophy | University at Buffalo, The State University of New York

Feb 2024 - Jan 2027

- Major: Materials informatic and data science
- Research Area: 2D materials, electronic devices, clean energy applications, and machine learning
- GPA: **3.93** / 4.0

Master of science | University at Buffalo, The State University of New York

Sep 2022 - Jan 2024

- Major: Materials informatic and data science
- Related coursework: Multivariate Statistics & Materials Informatics / Quantitative Methods in Materials Characterizations / Experimental Design for Materials Development
- GPA: **3.92** / 4.0

Bachelor of Science & Master of science | National Chung Cheng University, Taiwan

Sep 2014 - Aug 2019

- Major: Earth and Environmental Sciences
- Master's degree | GPA: 4.14 / 4.3
- Bachelor's degree | GPA: 3.45 / 4.3
- Related coursework: Data structure, Algorithm, Object Oriented Programming

SKILLS & ABILITIES

Experimental skills

- Low-dimensional material synthesis using chemical vapor deposition (CVD) technique. Materials include transition metal dichalcogenides (TMDs, such as MoS_2), transition metal carbides, nitrides, and carbonitrides (MXenes).
- Electronic device fabrication skills include e-beam lithography, e-beam evaporation, sputtering deposition, atomic layer deposition (ALD), etcher, and spin coating. Electrical measurement techniques for electronic device (such as field effect transistors) characterizations.
- Proficiency in a set of microscopic and spectroscopic material characterization techniques, including optical microscopy, atomic force microscopy (AFM), scanning electron microscopy (SEM), transmission electron microscopy (TEM), Raman, photoluminescence spectroscopy (PL), Fourier-transform infrared spectroscopy (FTIR), energy dispersive spectroscopy (EDS), X-ray diffraction analysis (XRD), X-ray photoelectron spectroscopy (XPS).

Data science abilities

- Data science techniques to assist the material characterization and data analysis, including design of experiment, machine learning (ML), principal component analysis-based feature selection and reduction.
- Experience with Neural Networks, Genetic Algorithms, XGBoost, Random Forest, and Bayesian Regressions.
- Software development skills such as Python, Flask, JavaScript, React.js, MySQL, Docker, Git, Claude Code, CI/CD processes and AWS services

PROFESSION EXPERIENCES

Research Assistant | University at Buffalo, The State University of New York

Jan 2023 - Present

Project I: Selective synthesis of two-dimensional (2D) materials using chemical vapor deposition (CVD)

- Lead member in collaboration with **Applied Materials Inc.** for 2D material synthesis
- Conducted 100+ times of CVD synthesis of 2D materials.
- Explored CVD parameter space for site-specific nucleation and growth.
- Performed material characterization through various microscopic/spectroscopic techniques, including AFM, SEM, EDS, Raman, PL, and XPS.

Project II: Collaboration with **Air Force Office of Scientific Research (AFOSR)** for 2D material synthesis

- Performed comprehensive material characterization using various microscopic/spectroscopic techniques.
- Executed 30+ advanced analytics and data visualization for an annual project review by OriginLab.
- Coordinated a team of 5+ researchers in interdisciplinary collaborations across 3 laboratories.

Project III: Data-driven smart synthesis of two-dimensional materials

- Conducted literature review and collected CVD growth parameters and optical image data for 2D material synthesis.
- Optimized synthesis success rate from 61% to 90% by machine learning (ML) techniques such as Random Forest regression.

Project IV: Collaboration with **Suny Albany and University of Nebraska** for 2D material synthesis

- Developed and optimized 15+ CVD synthesis trials using both liquid and solid Mo precursors to grow MoS₂ on advanced substrates, such as Cr₂O₃ magnetoelectric films and SiO₂/Si stacks, achieving improved crystallinity.
- Evaluated 10+ samples to establish clear process–structure–property relationships, revealing substrate-dependent growth behaviors and enabling integration with both microscale electrical testing and optical spectroscopy (Raman and PL).
- Led a 3-institution collaboration involving synthesis, device fabrication, and materials characterization, demonstrating a distinct ability to coordinate complex research efforts across academia and disciplines.

Project V: Collaboration with **University of Burgundy, France** for AI-assisted 2D material discovery

- Developed an AI/CNN workflow to predict twist angles in bilayer MoS₂ with >90% accuracy.
- Integrated automated optical microscopy and electrochemical testing to rapidly screen HER-active 2D materials.
- Created open-source ML tools for 2D material characterization and HER prediction, accelerating collaborative device discovery across institutions.

Software Engineer | Vizuro LLC, Taipei, Taiwan (Causal AI leader by Gartner 2024) Sep 2021- Aug 2022

Project: Causal inference AutoML web applications (<https://vizuro.com/kairos>)

- Managed architecture, design, and development of a top 3 AI/ML solutions for precision marketing.
- Designed and developed 50+ front-end and back-end features using Vue.js and Flask.
- Implemented 10+ web application deployment with Docker and Gitlab CI/CD in AWS EC2 instance.

Research Assistant | Academia Sinica, Taipei, Taiwan (1st National Laboratories) Jul 2020 - Aug 2021

Project: Taiwan Archived Platform for Seismology (<https://taps.earth.sinica.edu.tw/en-US/>)

- Designed and developed 3+ web applications for Taiwan Archived Platform for Seismology.
- Visualized seismic waveform and quality assurance analysis by 10+ figures.
- Created 2+ python packages to request data through command line interface.
- Integrated 20+ existing data systems into 1 upgraded web application for higher performance.
- Developed MEMS based seismometers for 2+ building monitoring utilizing Raspberry Pi.

HONORS & AWARDS

- Awarded the prestigious **UB Engineering Alumni Association Endowed Scholarship**, 2025
- **1 patent** of materials synthesis is under review of SUNY RF and Applied Materials Inc., 2024
- **First place** in the Ph.D. comprehensive exam at MDI department in 2023
- Selected as a **panelist** of SUNY Graduate Research Conference 2023, Apr 2023
- First place in MDI poster competition in 2023
- Third place in the Graduate Student 3 Minutes Thesis (3MT) competition of the MDI department in 2023
- Nominated in the 2023 Graduate Student Poster Competition of the School of Engineering and Applied Sciences
- Nominated in the 2023 Celebration of Student Academic Excellence Poster Presentations at SUNY Buffalo
- Member of graduate student association (GSA) at UB, Conference Funding, Oct 2023
- New York State Center of Excellence in Materials Informatics, Career Experience Program fellowship, Mar 2023
- SUNY Buffalo, Research Foundation Tuition Scholarship, Jan 2023
- Geological Society located in Taipei, VEI CHOW JUAN Thesis Award, Nov 2020
- National Chung Cheng University, Dean's List Award, Jun 2018

PROFESSION SERVICES

- **Peer reviewer** of 3 journals such as JES, ACS Appl. Mater. Interfaces, and PSS (b)
- **Member of board of directors GSA** at UB, Sep 2024 – Sep 2025
- **Hosted 3 international researchers from the SKKU University, Korean**, Jul 2025
- **Organized lab tours for MDI departmental visits for the French researchers from the University of Burgundy, France**, 2024
- Committee of Taiwanese GSA, 2024
- Panelist of SUNY Graduate Research Conference 2023, Apr 2023
- Organization committee for MDI STUFF (a regular event for graduate student research talks), 2023
- Student volunteer for Erich Bloch Symposium, 2023
- Hosted Taiwanese international graduate students in Fall of 2023

PUBLICATIONS

Underline as the applicant, † as these authors contribute equally, * as the corresponding author.

1. C. Chen†, Y. Fu†, X. Gao, A. Butler, K. Reyes, H. Li, M. Pentaris, A. Yadav, K. T. Wong, H. Yue, and F. Yao*, "Two-dimensional van der Waals materials and their mixed low-dimensional hybrids for electrochemical energy applications", **MRS Bulletin** (2023). (DOI: <https://doi.org/10.1557/s43577-023-00597-2>)
2. S. Shahi, A. Ahmed, R. Yang, A. Cabanillas, A. Chakravarty, M. Liu, H. N. Jaiswal, Y. Fu, Y. Guo, S. Jadeja, H. Murugesan, A. Butler, C. Chen, J. Muhigirwa, M. Enaitalla, J. Liu, F. Yao*, and H. Li*, "Plasma-induced energy band evolution for two-dimensional heterogeneous anti-ambipolar transistors", **Journal of Vacuum Science & Technology B** (2023) (selected as an **Editor's Pick**). (DOI: <https://doi.org/10.1116/6.0002888>)
3. A. Cabanillas, H. N. Jaiswal, A. Chakravarty, A. Ahmed, Y. Fu, C. Chen, F. Yao, H. Li*, "Inherent Photogating in MoTe₂ Transistors with Van der Waals Contacts", **IEEE 2024 Device Research Conference (DRC)**. (DOI: <https://doi.org/10.1109/DRC61706.2024.10605297>)
4. M. S. Parasnis, Y. Fu, E. Deng, A. Butler, C. Chen, R. Dias, H. Lin, F. Yao*, and P. C. Nalam*, "High-Performance Ti₃C₂T_x-MXene/Mycelium Hybrid Membrane for Efficient Lead Remediation: Design and Mechanistic Insights", **ACS Applied Materials & Interfaces** (2025). (DOI: <https://doi.org/10.1021/acsami.4c19943>)
5. S. K. Arachchige†, C. Chen†, A. Dutta†, S. Im, A. Butler, A. Kuzmin, A. Neelur, P. Khadagale, A. Cabanillas, D. Adinehloo, A. Rzhetskii, M. Swihart, V. Perebeinos, H. Li, F. Yao*, P. N. Prasad*, "Rare-Earth-Modified Luminescent Two-dimensional Nanosheets Derived from Oxidized Mo₂C MXene", under review.
6. C. Chen†, A. Cabanillas†, A. Ahmed, A. Butler, Y. Fu, H. Hui, H. Zeng, A. Yadav, G. Lee, K. T. Wong*, F. Yao*, and H. Li*, "Wafer-Scale 2D MoS₂ Transistors Using Transfer-Free Location-on-Demand Selective Synthesis", manuscript in preparation.
7. K. Bayouth, C. Chen, F. Yao, S. Bricq*, "Hybrid machine learning for 2D materials design and discovery in computer vision: A comprehensive review", manuscript in preparation.
8. Z. Li, Y. Fu, S. Wei, J. Lee, C. Chen, F. Yao, and H. Sun*, "Machine Learning in 2D Materials: A Comprehensive Review of Synthesis, Characterization, and Bandgap Engineering", manuscript in preparation.

CONFERENCES

Underline as the applicant, * as the corresponding author.

1. C. Chen, A. Cabanillas, H. Li*, F. Yao*, "[Wafer-Scale 2D MoS₂ Transistors Using Transfer-Free Location-on-Demand Selective Synthesis](#)", in the **84th Physical Electronics Conference - PEC 2025**, Brookhaven National Laboratory, New York, Aug 2025
2. C. Chen, A. Cabanillas, H. Li*, F. Yao*, "[Location-Controlled Chemical Vapor Deposition of MoS₂ for High-Performance Field-Effect Transistor Arrays](#)", in the **34th Microelectronics Design and Test Symposium (IEEE MDTs 2025)**, Albany, New York, May 2025 (oral presentation)
3. C. Chen, A. Cabanillas, A. Ahmed, A. Butler, Y. Fu, A. Chakravarty, H. Hui, H. Zeng, A. Yadav, K. T. Wong, H. Li*, F. Yao*, "[Location-Selective CVD Synthesis of Circular MoS₂ Flakes with Ultrahigh Field-Effect Mobility](#)", in the **AVS 70th International Symposium & Exhibition**, Tampa, Florida, November 2024 (oral presentation)

4. C. Chen, Y. Fu, A. Butler, A. Cabanillas A. Ahmed, A. Chakravarty, S. S. Jadeja, H. Hui, L. Samson, H. Zeng, A. Yadav, K. T. Wong, H. Li*, F. Yao*, "Site-Specific Synthesis of Molybdenum Dichalcogenide Using Chemical Vapor Deposition Technique", in [the Erich Bloch Symposium, University at Buffalo, June 2024](#)
5. C. Chen, Y. Fu, A. Butler, A. Cabanillas A. Ahmed, A. Chakravarty, S. S. Jadeja, H. Hui, L. Samson, H. Zeng, A. Yadav, K. T. Wong, H. Li*, F. Yao*, "[Site-Specific Synthesis of Molybdenum Dichalcogenide Using Chemical Vapor Deposition Technique](#)", in **the AVS 69th International Symposium & Exhibition**, Portland, Oregon, November 2023
6. C. Chen, "Data-driven smart synthesis of two-dimensional materials", in [the Erich Bloch Symposium, University at Buffalo, June 2023 \(oral presentation\)](#)
7. C. Chen, A. Tiroucoumarane, D. V. S. P. Kosana, R. Finster, Y. Fu, A. Butler, A. Chakravarty, H. Li, S. Broderick, K. Rajan, and F. Yao*, "[Data-driven smart synthesis of two-dimensional materials](#)", in **the 127th Topical Symposium of the New York State Section of the American Physical Society (NYSSAPS)**, Buffalo, NY, USA, April 29, 2023.
8. C. Chen, [panelist of AI Impact on the Common Good](#), **SUNY Graduate Research Conference 2023**, Apr 2023 (virtual conference)