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Erik S. Cheng

Research interests: nonequilibrium chemistry, interfacial chemistry, atomic layer etching, scientific machine learning, computational chemistry methods

Education

9/2018– 5/2023
Ph.D. in Materials Science and Engineering, *The University of Texas at Austin*.
- **Dissertation:** Data-driven Prediction of Nonequilibrium Chemistry in Plasma Enhanced Atomic Layer Etching of Silicon Nitride
- **Advisor:** Prof. Gyeong S. Hwang
- **Committee:** Prof. Graeme Henkelman, Prof. Laxminarayan L. Raja, Prof. John G. Ekerdt, Prof. Gyeong S. Hwang (chair)

9/2019– 8/2022
M.S. in Statistics, *The University of Texas at Austin*.

9/2014– 5/2018
B.S. in Chemistry, *University of California, Berkeley*.

Research Experience

9/2018– 5/2023
Graduate Research Assistant, *University of Texas at Austin*, Austin, TX, advised by Prof. Gyeong S. Hwang.
- Developed mechanistic models of plasma enhanced atomic layer etching mechanisms of silicon nitride with fluorocarbon precursors using high-throughput DFTB simulations.
- Created tools for high throughput, parallel computing using HPC resources, statistical analysis, and machine learning for extended time and length scale simulations, applied to data driven investigation of non-equilibrium surface chemistry/plasma processes.
- Created tools for automating and parallelizing SCC-DFTB molecular dynamics simulations, using HPC resources, allowing for $> 3\times$ increases in system size and $> 10\times$ increases in accessible time scales relative to previous DFT approach.
- Implemented and applied custom analysis tools (including graph-based atomic network analysis, classical machine learning, and statistical hypothesis testing) to 100s of GBs of simulation data to identify critical chemical events.
- Developing 2 parameter sets for DFTB: an extension of the pbc-0-3 set to include Ar and a new parameter set for Sn-O interactions.
- Explored the use of a framework for prediction of long-term structures under varied process conditions via a generative deep learning approach.
- Created presentations and data visualizations for both academic and industry collaborators, presented results in weekly meetings.
- Assisted in review of articles, including for *Langmuir* and *Applied Surface Science*.

6/2020 – 8/2020
Research Intern, *Tokyo Electron America, Concept and Feasibility Lab*, Austin, TX, with Dr. Peter Ventzek.
- Studied plasma based atomic layer etching of silicon nitride with fluorocarbon precursors.
- Applied machine learning techniques to characterize and analyze key features in simulation data.
- Developed models of polymeric photoresist materials.

6/2017– **Nanomaterials Intern**, *Nano Precision Medical*, Emeryville, CA, with Drs. Tomoyuki
8/2017 Yoshie, Lyle Gordon, and Hoda Amani Hamedani.
- Improved permeance model of porous films for use in analysis of permporometry data by accounting for pore constriction from adsorb layer formation. Incorporated model into Python script for automated parametric fitting.
- Introduced improvements to, and validated, theoretical model of current generation in titanium anodization.
- Designed and conducted experiments to determine effect of two step anodization on resulting titania characteristics. Characterized films with Wyko profilometry and various imaging tools, including skimage and ImageJ.

6/2016– **R&D Student Intern**, *Sandia National Labs*, Albuquerque, NM, with Dr. Carlos Perez
8/2016 and Christian Arrington.
- Studied effects of anodization conditions on results of aluminum anodization. Maintained anodizing solutions and equipment and quantified experimental results using weight, digital optical microscopy, and profilometry.
- Studied effects of parameters in electroplating and patterning pipeline on quality of patterned electroplated gold.
- Created electrodeposited patterns of gold on nickel substrates, studying the effect of varying factors in template creation, strikes, and electrodeposition bath.

5/2015– **Undergraduate Research Assistant**, *University of California, Berkeley*, Berkeley, CA,
5/2017 advised by Prof. Rich Saykally.
- Studied the evaporation behavior of aqueous solutions of acids and bases using Raman thermometry techniques.
- Maintained and operated experimental apparatus, including laser/optics, liquid pumps, and vacuum chamber.
- Determined quality of data by observation of Raman spectrum features and analysis of data through processing in MATLAB and Igor, assessing results using theoretical cooling models.

6/2013– **Electronics Assistant**, *University of Northern Iowa*, Cedar Falls, IA, advised by Prof. Tim
8/2013 Kidd.
- Studied materials composition of MoS_2 nanoparticles using SEM and EDX techniques.
- Constructed and debugged electronics kits and go-karts for university science summer camp.
- Prepared presentation materials of research results.

Teaching and Mentoring Experience

I have completed 3 semesters' worth of teaching training: CS 370 (UC Berkeley, Spring 2017), CS 375 (UC Berkeley, Fall 2017), and the Teaching Preparation Series Basic Certification (UT Austin, Fall 2022).

8/2022– **Teaching Assistant, ChE 348, Numerical Methods in Chemical Engineering and**
12/2022 **Problem Solving**, *University of Texas at Austin*, Austin, TX.
- Prepared and presented live coding (MATLAB) demonstrations for implementing various key numerical methods for a section of about 30 students.
- Topics included linear algebra, root finding, numerical integration and differentiation, numerical solutions of differential equations.

8/2020– **Graduate Mentor**, *University of Texas at Austin*, Austin, TX.
5/2021
- Mentor for an undergraduate student through the Texas Research Experience (TREX) program.
- Responsible for introducing student to literature review and basic research skills in computational chemistry.

8/2017 – **Undergraduate Student Instructor, CS/STAT/INFO C8, Foundations of Data**
5/2018 **Science**, *University of California at Berkeley*, Berkeley, CA, with Prof. Ani Adhikari.
- Delivered weekly lectures on Python programming and inferential statistics to sections of about 30 students.
- Supervised programming and statistics lab exercises, addressed student questions and managed technical issues.
- Created instructional documents, practice and exam problems, and assisted in general course responsibilities.
- Evaluations available upon request.

1/2017– **Course Tutor, CS/STAT/INFO C8, Foundations of Data Science**, *University of*
5/2017 *California at Berkeley*, Berkeley, CA, with Profs. David Wagner and John Denero.
- Led weekly tutoring sections of 5 students, reviewing and reinforcing concepts of Python programming and inferential statistics.
- Held office hours, graded homework, and assisted in preparation of course materials and software.
- Evaluations available upon request.

1/2017– **One-on-One Supplementary Tutor(CS/STAT/INFO C8)**, *University of California*
5/2017 *at Berkeley*, Berkeley, CA, provided as part of CS 370.
Provided extra tutoring as part of service for students who request extra assistance.

1/2015 – **Instructor and Course Facilitator, MATH 98/198**, *University of California at Berkeley*,
5/2018 Berkeley, CA.
- Instructed small groups of students in both basic and advanced methods for solving the Rubik's cube.
- Organized course logistics.

Professional Service

9/2022 – **Graduate and Industry Networking Conference (GAIN) 2023 Communications**
2/2023 **Committee Member**, *University of Texas at Austin*, Austin, Texas, (link).
- Worked on outreach efforts, including soliciting corporate sponsors, website management (Wordpress), and creation of promotional materials.
- Ensured prompt communication with interested corporate partners in a professional manner.
- Assisted in other necessary duties, including recruitment of poster judges, spell and format checking of printed materials, etc.

9/2021 – **Graduate and Industry Networking Conference (GAIN) 2022 Organization Com-**
2/2022 **mittee Member**, *University of Texas at Austin*, Austin, Texas, (link).
- Led efforts to clean contact information spreadsheets, enabling the use of automation for reaching out to potential corporate partners.
- Ensured prompt communication with interested corporate partners in a professional manner.
- Assisted in other necessary duties, including recruitment of poster judges, spell and format checking of printed materials, etc.

4/2018 **Panelist**, *Data 8 UGSI Panel on Applications of Data Science*, Berkeley, CA.
- Invited to speak to a class of 800+ students on personal experiences in applications of data science outside of typical CS or statistics contexts (discussed computational chemistry/cheminformatics).

9/2017 – **Module Developer**, *CUNEIF 102A, UC Berkeley*, Berkeley, CA.
5/2018
- Developed Jupyter-based course module for teaching computational linguistics.
- Implemented demonstrations of key concepts in computational linguistics/NLP using Python and scipy stack.
- Coordinated with Prof. Niek Veldhuis to incorporate key insights elucidated from Ancient Sumerian corpus.

2/2017– **Data Science Consultant**, *Thousand Currents (formerly IDEX)*, Berkeley, CA.
6/2017
- Team member in the Data Science for Social Good group through Berkeley Institute of Data Science to work with Thousand Currents.
- Cleaned Salesforce data and providing business insights through analysis of donor data.
- Created an R Shiny app for clients to more intuitively access and read data acquired from Salesforce Nonprofit Cloud.

Projects

8/2021 – **High-Speed Robust Film Thickness Metrology**, *Statistical Consulting Project*, super-
12-2021 vised by Prof. Bindu Viswanathan, consulting for Dr. Shrawan Singhal.
- Developed statistical models (OLS and Gaussian Process Regression) for data-driven prediction of film thickness given film images.
- Produced reports on model performance and limitations over full possible data range.

10/2020 – **Trajectory prediction with ODE2VAE for atomistic bombardment simulations**,
12-2020 *CS 395T Final Project*, supervised by Prof. Chandrajit Bajaj.
  ○ Implemented a low-cost, machine learned molecular simulator by modifying the Pytorch-based
    ODE2VAE deep neural network.

11/2019 – **An Investigation of the Multiple Traveling Salesman Problem**, *SDS 392 Final*
12-2019 *Project*, supervised by Dr. Victor Eijkhout.
  ○ Implemented (in C++) and investigated various modifications of heuristic based solutions to the
    multiple traveling salesman (mTSP) problem applied to a theme of delivery services.

1/2017 – **Understanding Bias in Sampling Users with Twitter's Streaming API**, *Supervised*
5-2017 *Case Study*, supervised by Prof. Deborah Nolan.
  ○ Independent study (in group of 2) supervised by Prof. Deborah Nolan in assessing sampling biases
    in Twitter's publicly available Streaming API, applying permutation testing over multiple large
    corpora (thousands of Tweets). Performed using R.
  ○ Presented at UC Berkeley College of Chemistry Undergraduate Research Fair.

Journal Articles

My name in each author list is **bolded**.
* denotes shared first authorship

1. **Cheng**, **E. S.** & Hwang, G. S. Low-Energy Argon Ion Bombardment-Induced Decomposition of
   Physisorbed Hydrofluorocarbons on Silicon Nitride Surfaces: A Computational Mechanistic Study.
   (Submitted).

2. Yang, T.-H., **Cheng**, **E. S.**, Johnson, S., Iwao, T., Zhao, J., Ekerdt, J. G., Ventzek, P. L. G. &
   Hwang, G. S. Ammonium Chloride ($-NH_3^+Cl-$) Salt Formation from Dichlorosilane Decomposition
   and Its Potential Impact on Silicon Nitride Atomic Layer Deposition. *Applied Surface Science.* (In
   press) (2023).

3. **Cheng**, **E. S.**, Ventzek, P. L. & Hwang, G. S. Theoretical Analysis of Thermal Spikes during Ion
   Bombardment of Amorphous Silicon Nitride. *Journal of Vacuum Science and Technology A.* (In press)
   (2023).

4. **Cheng**, **E. S.** & Hwang, G. S. Dissociative chemisorption of methyl fluoride and its implications
   for atomic layer etching of silicon nitride. *Applied Surface Science* **543,** 148557. ISSN: 0169-4332.
   https://doi.org/10.1016/j.apsusc.2020.148557 (2021).

5. Rizzuto, A. M., **Cheng**, **E. S.**, Lam, R. K. & Saykally, R. J. Surprising Effects of Hydrochloric Acid on
   the Water Evaporation Coefficient Observed by Raman Thermometry. *Journal of Physical Chemistry
   C* **121,** 4420–4425. ISSN: 19327455. https://doi.org/10.1021/acs.jpcc.6b12851 (2017).

Articles in Preparation

1. **Cheng**, **E. S.** & Hwang, G. S. Tight-binding Molecular Dynamics Investigations of Ar bombardment
   of SiN. (In preparation).

2. **Cheng**, **E. S.** & Hwang, G. S. Mechanisms of SiN Modification during PEALE from Reactions of
   Fragmented HFCs. (In preparation).

3. **Cheng**, **E. S.** & Hwang, G. S. Origins of HFC-based Etch Enhancement of SiN Etch during PEALE.
   (In preparation).

Talks

I was the presenter except where otherwise indicated.

1. **Cheng**, **E. S.**, Hwang, G. S., Ventzek, P. L., Chen, Z. & Sridhar, S. *Theoretical understanding of
   non-equilibrium and equilibrium reactions during low energy ion bombardment of molecular adsorbates*
   Accepted to ACS Spring 2023; withdrawn due to lack of travel funds. Mar. 2023.

2. **Cheng**, **E. S.**, Hwang, G. S., Ventzek, P. L., Chen, Z. & Sridhar, S. *On the Chemical and Physical Mechanisms of Etch Product Volatilization in Plasma Enhanced Atomic Layer Etch of Silicon Nitride with Hydrofluorocarbons.* **Dorothy M. and Earl S. Hoffman Awardee** and **John Coburn and Harold Winters Finalist** talk at AVS 68. Nov. 2022.

3. Lam, C., **Cheng**, **E. S.**, Hwang, G. S., Ekerdt, J. G., Chen, Z., Blakeney, J., Carruth, M., Ventzek, P. L. & Sridhar, S. *Plasma-Assisted Atomic Layer Etching of Silicon Nitride.* Talk given by JGE at Telluride Semiconductor Surface Chemistry Workshop. July 2022.

4. Hwang, G. S., Ventzek, P. L., Yang, T.-H., **Cheng**, **E. S.** & Wang, T.-Y. *Understanding the Surface Chemistry of Silicon Nitride Atomic Layer Deposition and Etching from First Principles.* Talk given by GSH at 2022 IEEE 22nd International Conference on Nanotechnology (NANO). July 2022.

5. **Cheng**, **E. S.**, Hwang, G. S., Ventzek, P. L., Chen, Z., Sridhar, S. & Ranjan, A. *First-principles Insight into Non-equilibrium Chemistry in PEALE of Silicon Nitride with Hydrofluorocarbons.* Talk given at AVS 22nd International Conference on Atomic Layer Deposition (ALD 2022). **ALE Best Student Paper Award Finalist**; recording can be found here. June 2022.

6. **Cheng**, **E. S.**, Hwang, G. S., Ventzek, P. L. & Ranjan, A. *The Role of CH_3F Exposure in ALE of Silicon Nitride: First-Principles Based Evaluation.* Talk accepted to AVS 67 Virtual Symposium. Withdrawn due to virtual format. Oct. 2021.

7. **Cheng**, **E. S.** & Hwang, G. S. *Fundamental Understanding of Silicon Nitride ALE from Atomistic Simulations.* Talk given at TTCA and L&L Technical Seminar, Tokyo Electron America. **Invited talk**. Sept. 2021.

8. **Cheng**, **E. S.**, Hwang, G. S., Ventzek, P. L. & Chen, Z. *Structural and Compositional Evolution of SiN Surfaces Under Low Energy Ar^+ Bombardment.* Talk given at AVS 21st International Conference on Atomic Layer Deposition (ALD 2021) (Virtual). **Special selection for Live Contributed Talk**; recording can be found here. June 2021.

9. Hwang, G. S., **Cheng**, **E. S.**, Ventzek, P. L. & Ranjan, A. *First-principles Understanding of Atomic Layer Etching of Silicon Nitride using Hydrofluorocarbons.* Talk given by GSH at AVS 19th International Conference on Atomic Layer Deposition (ALD 2019). July 2019.

Posters

I was the presenter except where otherwise indicated.

1. **Cheng**, **E. S.**, Hwang, G. S., Ventzek, P. L., Chen, Z. & Sridhar, S. *Understanding non-equilibrium chemistry during ion bombardment using high-throughput density functional tight binding* Accepted to ACS Spring 2023, withdrawn due to lack of travel funds. Mar. 2023.

2. **Cheng**, **E. S.**, Hwang, G. S., Ventzek, P. L., Chen, Z. & Sridhar, S. *Identification of Critical Factors in Plasma Enhanced Atomic Layer Etching of Silicon Nitride through First-Principles-Based Simulations.* **Winner of the Plasma Science & Technology Division Student Poster Prize**. Nov. 2022.

3. Yang, T.-H., **Cheng**, **E. S.**, Hwang, G. S., Johnson, S., Ekerdt, J. G., Ventzek, P. L., Iwao, T., Zhao, J. & Ishibashi, K. *Hydrochloride Production from Dichlorosilane Decomposition and Its Impact on Atomic Layer Deposition of Silicon Nitride.* Presented by YTS at AVS 68. Nov. 2022.

4. **Cheng**, **E. S.**, Hwang, G. S., Ventzek, P. L., Chen, Z., Sridhar, S. & Ranjan, A. *Prediction of Chemical Evolution and Its Impact on PEALE of Silicon Nitride with Hydrofluorocarbons.* Presented at AVS 22nd International Conference on Atomic Layer Deposition (ALD 2022). **Second place winner for ALE Student Poster Award**; recording can be found here. July 2022.

5. Yang, T.-H., **Cheng**, **E. S.**, Hwang, G. S., Johnson, S., Ekerdt, J. G., Ventzek, P. L., Iwao, T., Zhao, J. & Ishibashi, K. *Hydrochloride Production from Dichlorosilane Decomposition and Its Impact on Atomic*

Layer Deposition of Silicon Nitride. Accepted to AVS 22nd International Conference on Atomic Layer Deposition (ALD 2022). Withdrawn due to travel costs. June 2022.

6. **Cheng**, **E. S.** & Hwang, G. S. *Fundamental Understanding of Silicon Nitride PEALE from Atomistic Simulations.* Presented at Graduate and Industry Networking Conference 2022, UT Austin. **Burnt Orange Award** (selected by judges as one of two best presentations). Feb. 2022.

7. **Cheng**, **E. S.**, Hwang, G. S., Ventzek, P. L. & Chen, Z. *First-Principles Based Investigation of Low Energy Ion Bombardment on CH₃F-Covered Silicon Nitride Surfaces.* Accepted to AVS 67 Virtual Symposium. Withdrawn due to virtual format. Oct. 2021.

8. **Cheng**, **E. S.**, Hwang, G. S., Ventzek, P. L. & Chen, Z. *On the Reactivity of SiN Surfaces Damaged by Ion Bombardment Towards CH₃F and CF₄ Precursors.* Presented at AVS 21st International Conference on Atomic Layer Deposition (ALD 2021)(Virtual). Accepted as "On-Demand" poster; poster can be seen here. June 2021.

9. **Cheng**, **E. S.** & Hwang, G. S. *Adsorbate-induced Enhancement of Atomic Layer Etching of Silicon Nitride with Methyl Fluoride.* Graduate and Industry Networking Conference at The University of Texas at Austin. Feb. 2019.

10. **Cheng**, **E. S.** & Hwang, G. S. *Adsorbate-induced Enhancement of Atomic Layer Etching of Silicon Nitride with Methyl Fluoride.* Presented at Texas Materials Institute Materials Science and Engineering Program 2019 Research Poster Contest. **Awarded 2nd place**. Feb. 2019.

11. **Cheng**, **E. S.**, Chen, M. & Nolan, D. *Understanding Bias in Sampling Users with Twitter's Streaming API.* Presented at UC Berkeley College of Chemistry Undergraduate Research Fair. May 2017.

12. **Cheng**, **E. S.** & Perez, C. *Anodization as a Low Cost, Scalable, and Tunable Nanoscale Manufacturing Technique.* Presented at Rio Grande Symposium for Advanced Materials. Oct. 2016.

13. **Cheng**, **E. S.** & Perez, C. *Anodization as a Low Cost, Scalable, and Tunable Nanoscale Manufacturing Technique.* Presented at Sandia intern symposium; poster can be found here. July 2016.

14. **Cheng**, **E. S.** & Kidd, T. *Chemical Analysis of MoS₂ Nanoparticles Formed by Ultrasonic Exfoliation.* Presented at University of Northern Iowa Undergraduate Research Symposium. Aug. 2013.

Awards and Honors

11/2022 **Plasma Science and Technology Division Student Poster Prize**, *Plasma Science and Technology Division (PSTD), American Vacuum Society (AVS).*
Chosen based on content and presentation of research work among student poster presenters at AVS 68 in PSTD.

8/2022 **Dorothy M. and Earl S. Hoffman Award**, *American Vacuum Society (AVS).*
Following the Awards Committee Meeting in the Spring/Summer, the top eight (8) student nominees are notified and invited to present talks on their research to the Awards Committee in a virtual interview in late summer. After the interview, one of the top three (3) students of the eight (8) finalists will receive the Hoffman Award. The finalists not selected will receive either the Varian Award, Whetten Award, or Dorothy M or Earl S. Hoffman Scholarships. Criteria for selection of the awardee are excellence in research and academic record.

7/2022 **Coburn & Winters Student Award Finalist / Student Merit Award Winner**, *Plasma Science and Technology Division (PSTD), American Vacuum Society (AVS).*
Student Merit Awards recognize meritorious achievements by students in an area fostered and encouraged by the Plasma Science and Technology Division, while also encouraging student participation in the Division. The John Coburn and Harold Winters Award is given in recognition of outstanding research achievements and an oral presentation given by a Student Merit Award winner at the AVS International Symposium. Based on application and nomination.

7/2022	**Professional Development Award**, *University of Texas at Austin.*
	Funding awarded to provide support for students to attend major professional meetings at which they present an original paper based on their research at UT. Awarded for attendance of AVS 22nd International Conference on Atomic Layer Deposition (ALD 2022).
7/2022	**Graduate Engineering Travel Grant**, *Graduate Engineering Council (GEC), University of Texas at Austin.*
	GEC awards several monetary grants to graduate engineers in the Cockrell School to facilitate travel and attendance to conferences in their fields of study. Based on merit of student application package and advisor support. Awarded for attendance of AVS 22nd International Conference on Atomic Layer Deposition (ALD 2022).
6/2022	**ALE 2022 Student Poster Award, 2nd place**, *AVS 22nd International Conference on Atomic Layer Deposition (ALD 2022).*
	Chosen from all submitted student posters in field of ALE. Selected for the poster entitled "Prediction of Chemical Evolution and Its Impact on PEALE of Silicon Nitride with Hydrofluorocarbons".
6/2022	**ALE Best Student Paper Award Finalist**, *AVS 22nd International Conference on Atomic Layer Deposition (ALD 2022).*
	ALE student awards have been established to recognize outstanding research performed by a graduate student in areas of interest to Atomic Layer Etching. Selected for the talk entitled "First-principles Insight into Non-equilibrium Chemistry in PEALE of Silicon Nitride with Hydrofluorocarbons".
2/2022	**Burnt Orange Research Award**, *Graduate and Industry Networking Conference (GAIN) 2022.*
	Selected as one of the two best poster presentations at GAIN 2022. Selected for the talk entitled "Fundamental Understanding of Silicon Nitride PEALE from Atomistic Simulations".
7/2021	**Professional Development Award**, *University of Texas at Austin.*
	Funding awarded to provide support for students to attend major professional meetings at which they present an original paper based on their research at UT. Awarded for attendance of AVS 21st International Conference on Atomic Layer Deposition (ALD 2021).
5/2020 – 5/2024	**Engineering Doctoral Fellowship**, *Cockrell School of Engineering, University of Texas at Austin.*
	4-year fellowship (annually renewed) for outstanding graduate students, based on advisor nomination.
11/2019	**Third Place Winner**, *HackTX 2019.*
	Developed a random walk model and website to predict wildfire spread, trained on Tweet data filtered by relevancy to wildfire events. Part of team of 5.
9/2019 – 5/2020	**Engineering Foundation Endowed Graduate University Fellowship**, *Cockrell School of Engineering, University of Texas at Austin.*
	Awarded to outstanding continuing graduate students in the Cockrell School of Engineering based off of advisor nomination.
4/2019	**Phi Kappa Phi inductee**, *University of Texas at Austin.*
	Invited for being in top 10% of undergraduate seniors and graduate students.
2/2019	**Second Place, Texas Materials Institute Materials Science and Engineering Program 2019 Research Poster Contest**, *University of Texas at Austin.*
	Chosen from posters presented at Texas Materials Institute Materials Science and Engineering Program 2019 Research Poster Contest. Awarded for the poster "Adsorbate-induced Enhancement of Atomic Layer Etching of Silicon Nitride with Methyl Fluoride"
9/2018- 5/2019	**Temple Foundation Graduate Fellowship**, *Cockrell School of Engineering, University of Texas at Austin.*
	Awarded for outstanding academic performance among incoming first year graduate students.
12/2017	**Dean's List**, *College of Chemistry, University of California at Berkeley.*
	Term GPA in top 10 percent of undergraduate students in the UC Berkeley College of Chemistry.
5/2014	**AP Scholar with Distinction**, *The College Board.*
1/2014	**National Merit Finalist**, *National Merit Scholarship Corporation.*

Coursework

Graduate-level classes shown in **bold**.

Materials Science, Chemistry

UT Austin **Simulation of Materials, Molecular Modeling Methods and Applications, Statistical Mechanics, Nanomaterials Chemistry and Engineering, Solid State Properties of Materials, Phase Transformations**

UC Berkeley **Quantum Mechanics**, Statistical Mechanics, Advanced Inorganic Chemistry I/II, Advanced Organic Chemistry I/II, Computational Chemistry, Physical Chemistry Lab

Statistics, Data Science, CS, Math

UT Austin **Foundations of Predictive Machine Learning, Mathematical Statistics I/II, Bayesian Statistical Methods, Design and Analysis of Experiments, Regression Analysis, Introduction to Scientific Programming**

UC Berkeley Principles and Techniques of Data Science, Mathematical Statistics, Probability for Data Science, Linear Models, Advanced Linear Algebra, Concepts in Computing with Data, Data Structures, Structure and Interpretation of Computer Programs

Skills

- **Languages (proficient):** Python
- **Languages (familiar):** Bash, R
- **Languages (basic):** C++, FORTRAN, MATLAB, Java, SQL, awk
- **Platforms:** Windows, Linux, HPC
- **Key Python packages:** `scipy` stack (`numpy`, `scipy`, `pandas`, `matplotlib`), `sklearn`, `PyTorch`, `Atomic Simulation Package` (ASE)
- **Computational chemistry packages (Proficient):** `VASP`, `DFTB+`
- **Computational chemistry packages (Familiar):** `Gaussian`
- **Computational chemistry packages (Basic):** `GAMESS`, `LAMMPS`
- **Statistics:** Hypothesis Testing, Parameter Estimation, Nonparametric Methods, Experiment Design, Linear Models
- **Miscellaneous tools:** Microsoft Office, git, LaTeX, Chemdraw, GIMP, VMD

Memberships

Member American Vacuum Society

Member American Chemical Society

Languages

English Native

Mandarin Native speaking proficiency, basic skill in reading/writing

German Elementary (A1-A2)

Volunteering

4/2023 **Engineering Design Challenge Judge**, *TAME (Texas Alliance for Minorities in Engineering) 2023 Capital Area and San Antonio Divisional STEM Competition*, Austin, Texas.

4/2022 **Engineering Design Challenge Judge**, *TAME (Texas Alliance for Minorities in Engineering) 2022 Capital Area and San Antonio Divisional STEM Competition*, Austin, Texas.

3/2022 **Presentation Judge**, *Capital of Texas Undergraduate Research Conference*, Austin, Texas.

2/2020 **Electronics Tutorial Booth Volunteer**, *Girl Day at UT Austin*, Austin, Texas.

8/2019– 5/2023	**Member**, *Tzu Chi Collegiate Association*, UT Austin Chapter. Activities include multiple It's My Park Day events, food bank work, regular trail/park cleanups, retirement home visits, and more.

Interests

Speedcubing	Achievements include peak national rank of #71 in 5x5x5 cube; multiple competitions organized. (Profile)
Tetris	Top 2% of Tetris players (sprint/40L). (Profile)
Rock climbing	(Profile)
Chess	(Profiles: chess.com, lichess)

References

Available upon request.

Miscellaneous

Work status	U.S. Citizen
Erdös Number	8