XIN XU

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PROFESSIONAL PREPARATION

Assistant Professor, The Polytechnic School, **Arizona State University**, U.S. 01/2024-present
Postdoc, Materials Science and Engineering, **Stanford University**, U.S. 2019-2023
- Advisor: Dr. William Chueh, Kimmelman Professor of Materials Science and Engineering

Ph.D., Applied Physics, **Northwestern University**, U.S. 2014-2019
- Advisor: Dr. Sossina Haile, Walter P. Murphy Professor of Materials Science and Engineering
- Thesis: Charge Transport across Single Grain Boundaries in Oxide Electrolytes

B.S., Physics, **Nanjing University**, China 2010-2014

RESEARCH, TEACHING AND MENTORSHIP

My research focuses on charge transport in ceramic and metallic materials for solid-state batteries, fuel cells, and next-generation energy technologies, using multimodal characterization to uncover how charge, structure, and extreme fields interact at material interfaces. I have developed and taught core courses including *Materials and Manufacturing Processes*, *Engineering Electrical Fundamentals*, and *Solid-State Ionics and Electrochemistry*. I am currently mentoring three Ph.D. students and seven undergraduate researchers, six of whom have earned competitive research fellowships and received recognition from Arizona State University and national scientific societies.

FUNDED GRANTS

1. U.S. National Science Foundation (**NSF**) (CBET-2608123), *Lead PI*, *$629,419 total ($324,999 ASU share)*, 2026-2029.
2. U.S. Department of Energy (**DOE**) Early CAREER Research Program (DE-SC0026366), *single PI*, *$875,000*, 2025-2030.
3. Research Corporation for Science Advancement (**RCSA**) Scialog Collaborative Innovation Award (SA-NES-2023-110c), PI, *$55,000*, 2024-2025.

SELECT HONORS & AWARDS

1. NSF Professional Development Workshop in Ceramics Travel Award 08/2026
2. International Society of Solid State Ionics Young Scientist Award Finalist 04/2026
3. U.S. Department of Energy Early CAREER Award 09/2025
4. Phase I Finalist in the Bezos Earth Fund Greenhouse Gas Removal Ideation Prize 06/2024
5. RCSA Scialog Collaborative Award 02/2024
6. Top Reviewer, Materials Today Energy 02/2024
7. RCSA Scialog Fellow of Negative Emissions Science 10/2023
8. MRS Early Career Distinguished Presenter 09/2023

PUBLICATIONS

1. Teng Cui, Sunny Wang, Samuel S Lee, Eddie Barks, John Cattermull, Celeste Melamed, Zhelong Jiang, Madison Morrison, Leah Narun, Yan-Kai Tzeng, Naoki Fujii, Seung Hyan Kim, **Xin Xu**, Geoff McConohy,

Paul M Wallace, Andrew C Lee, Xiao Cui, Joon-Hyung Lee, William C Chueh, X Wendy Gu, "Dendrite initiation and deflection in biaxially stressed solid electrolytes", **Nature** (2026), DOI: https://doi.org/10.1038/s41586-026-10734-x

2. Shu-Ting Ko, Ziting Ma, Cruz Gonsalves, Joseph Degroot, Chuck Chunhu Tan, Timothy Lin, Cauê Nogueira, Xin Xu, Chunting Chris Mi, Lingping Kong, "Current-Driven Li2O Formation in Catalyst-Free Solid-State Li-O2 Batteries Enabling Simultaneous High Energy and High Power", **Advanced Energy Materials** (2026), e71210, DOI: 10.1002/aenm.71210
3. Weilai Yu, Hao Lyu, Donglin Li, Kuan-Yu Lin, Jacob Florian, Yukio Cho, **Xin Xu**, Yuelang Chen, Hongchang Hao, Chengyi Xu, Dennis Nordlund, Jagjit Nanda, Jian Qin, Yi Cui, Zhenan Bao, "Spatiochemical segregation in porous lithium–metal interphases", **Journal of the American Chemical Society** (2026), 148, 23, 24084–24095, DOI: 10.1021/jacs.6c04430
4. Ruixin Wu, Ruihao Deng, Cauê Nogueira, Ru Xiao, Keng Xu, **Xin Xu**, Fudong Han, "Lithium–Carbon Composite Anodes for Solid-State Lithium Metal Batteries", **ACS Energy Letters** (2026) 11, 3, 2868-2875, DOI: 10.1021/acsenergylett.5c04190
5. **Xin Xu**, Teng Cui, Geoff McConohy, Harsh D. Jagad, Samuel S. Lee, Sunny Wang, Celeste Melamed, Yufei Yang, Edward Barks, Emma Kaeli, Leah Narun, Yi Cui, Zewen Zhang, Hye Ryoung Lee, Rong Xu, Melody M. Wang, Levi Hoogendoorn, Ajai Romana, Alexis Geslin, Robert Sinclair, Yi Cui, Yue Qi, X. Wendy Gu, William C. Chueh, "Heterogeneous Doping via Nanoscale Coating Impacts Mechanics of Li Intrusion in Brittle Solid Electrolytes", **Nature Materials** (2026), DOI: 10.1038/s41563-025-02465-7
6. Junghwa Lee, Zhelong Jiang, Nicolas B Liang, Jin Hwan Kwak, Howie Nguyen, Grace M Busse, Yiseul Yoo, Hari Ramachandran, Kipil Lim, Peter M Csernica, Tianyi Li, **Xin Xu**, Kyung Yoon Chung, Kathrin Michel, Joop E Frerichs, William E Gent, Raphaële J Clément, Jungjin Park, William C Chueh, "Eliminating lattice collapse in dopant-free LiNi0.9Mn0.1O2 cathodes via electrochemically induced partial cation disorder" **Nature Energy** (2025), DOI: 10.1038/s41560-025-01910-w
7. Wenbo Wang, Siying Liu, Luyang Liu, Xukun Ma, Cauê Nogueira, **Xin Xu**, Orit Shefi, Jessica Lancaster, Xiangfan Chen, "Dynamic Fluid‐Assisted Continuous Multimaterial 3D Printing for Seamless Gradient Structures", **Advanced Materials Technologies** (2025), 2500621, DOI: 10.1002/admt.202500621
8. Henry L Thaman, Michael Li, Justin Andrew Rose, Swati Narasimhan, **Xin Xu**, Che-Ning Yeh, Norman Jin, Andrew Akbashev, Isabel Davidoff, Martin Z Bazant, William C Chueh, "Two-Stage Growth of Solid Electrolyte Interphase on Copper: Imaging and Quantification by Operando Atomic Force Microscopy", **ACS Nano** (2025), 19, 12, 11949-11960, DOI: 10.1021/acsnano.4c16418
9. Jianbo Wang, Sofia K Catalina, **Xin Xu**, Zhelong Jiang, Qin Tracy Zhou, William C Chueh, J Tyler Mefford, "Cu substrate as a bi-directional kinetic promoter for high-efficiency four-electron Sn aqueous batteries", **EES Batteries** (2025), 1, 1557-1568, DOI: 10.1039/D5EB00176E
10. Jianbo Wang, Sofia K Catalina, Zhelong Jiang, **Xin Xu**, Qin Tracy Zhou, William C Chueh, J Tyler Mefford, "A Reversible Four-electron Sn Metal Aqueous Battery", **Joule** (2024), 8, 12, 3386-3396, DOI: 10.1016/j.joule.2024.09.002
11. Yufei Yang, Srija Biswas, Rong Xu, Xin Xiao, **Xin Xu**, Pu Zhang, Huaxin Gong, Xueli Zheng, Yucan Peng, Junyan Li, Huayue Ai, Yecun Wu, Yusheng Ye, Xin Gao, Chad Serrao, Wenbo Zhang, Philaphon Sayavong, Zhuojun Huang, Zhouyi Chen, Yi Cui, Rafael A Vilá, David T Boyle, Yi Cui, "Capacity recovery by transient voltage pulse in silicon-anode batteries", **Science** (2024), 386, 6719, 322-327, DOI: 10.1126/science.adn1749
12. Sunny Wang, Edward Barks, Po-Ting Lin, **Xin Xu**, Celeste Melamed, Geoff McConohy, Slavomír Nemš ák, William Chueh* "Effect of H+ Exchange and Surface Impurities on Bulk and Interfacial Electrochemistry of

Garnet Solid Electrolytes", **Chemistry of Materials** (2024), 36, 14, 6849–6864 (2024). DOI: 10.1021/acs.chemmater.4c00738

13. Yinxing Ma†, Jiayu Wan†, **Xin Xu**†, Austin Sendek, Sarah Holmes, Brandi Ransom, Zhelong Jiang, Pu Zhang, Xin Xiao, Wenbo Zhang, Rong Xu, Fang Liu, Yusheng Ye, Emma Kaeli, Evan Reed, William Chueh, Yi Cui. "Experimental Discovery of a Fast and Stable Lithium Thioborate Solid Electrolyte, Li6+2x[B10S18]Sx (x≈1)". **ACS Energy Letters** (2023), 8, 2762-2771, DOI: 10.1021/acsenergylett.3c00560
14. Geoff McConohy†*, **Xin Xu**†*, Cui Teng†, Edward Barks, Sunny Wang, Emma Kaeli, Celeste Melamed, X. Wendy Gu, William Chueh*, "Mechanical regulation of lithium intrusion probability in garnet solid electrolytes". **Nature Energy** (2023), 1-10, Cover Article, DOI:10.1038/s41560-022-01186-4
15. Geoff McConohy, **Xin Xu**, "Applied stress can control lithium intrusions in solid electrolytes", **Nature Energy** (2023), 8(3), 228-229, DOI:10.1038/s41560-023-01210-1
16. Peter M. Csernica, Samanbir S. Kalirai, William E. Gent, Kipil Lim, Young-Sang Yu, Yunzhi Liu, Sung-Jin Ahn, Emma Kaeli, **Xin Xu**, Kevin H. Stone, Ann F. Marshall, Robert Sinclair, David A. Shapiro*, Michael F. Toney* & William C. Chueh*. "Persistent and partially mobile oxygen vacancies in Li-rich layered oxides", **Nature Energy** (2021), 6, 642-652, DOI: 10.1038/s41560-021-00832-7
17. **Xin Xu***, Connor Carr, Xinqi Chen, Benjamin D. Myers, Ruiyun Huang, Weizi Yuan, Sihyuk Choi, Dezhi Yi, Charudatta Phatak, Sossina Haile*. "Local Multimodal Electro-chemical-structural Characterization of Ionic Grain Boundaries", **Advanced Energy Materials** (2021), 2003309, DOI: 10.1002/aenm.202003309
18. **Xin Xu**, Yuzi Liu, Jie Wang, Dieter Isheim, Vinayak P. Dravid, Charudatta Phatak, and Sossina M. Haile*. "Variability and Origins of Grain Boundary Electric Potential Detected by Electron Holography and Atom-probe Tomography", **Nature Materials** (2020), 19, 887893, DOI: 10.1038/s41563-020-0656-1
19. **Xin Xu**†*, Frank Barrows†*, Vinayak P. Dravid, Sossina Haile, Charudatta Phatak*, "Quantifying Leakage Fields at Ionic Grain Boundaries using Off-axis Electron Holography", **Journal of Applied Physics** (2020), 128(21), 214301, DOI: 10.1063/5.0031233
20. Frank Barrows, **Xin Xu**, Sossina Haile, Charudatta Phatak, and Amanda Petford-Long*. "Electron Holography Investigation of Resistive Switching CeO_2 / STO Nanocolumns", **Microscopy and Microanalysis** (2020), 26, 1950-1951, DOI: 10.1017/S1431927620019911
21. Dezhi Yi, **Xin Xu**, Xuan Meng, Naiwang Liu, and Li Shi*. "Synthesis of Core–shell ZSM-5 Zeolite with Passivated External Surface Acidity by B-oriented Thin Silicalite-1 Shell Using a Self-assembly Process", **Journal of Porous Materials** (2019), 26, 1767-1779, DOI: 10.1007/s10934-019-00776-0
22. Dezhi Yi, Xuan Meng, **Xin Xu**, Naiwang Liu, and Li Shi. "Catalytic Performance of Modified ZSM-5 Designed with Selectively Passivated External Surface Acidity by Phosphorus", **Industrial & Engineering Chemistry Research** (2019), 58, 10154-10163, DOI: 10.1021/acs.iecr.9b00629
23. **Xin Xu**, Sossina Haile, and Charudatta Phatak. "In-situ Electron Holography Study of Grain Boundaries in Cerium Oxide", **Microscopy and Microanalysis** (2018), 24, 1466–1467, DOI: 10.1017/S143192761800781X
24. Ho-Il Ji, **Xin Xu**, and Sossina M. Haile. "Chemical Surface Exchange of Oxygen on $CeO_{2-\delta}$ in an O_2/H_2O Atmosphere", **Physical Chemistry Chemical Physics** (2017). 19, 29287–29293, DOI: 10.1039/c7cp05969h

INVITED CONFERENCE PRESENTATIONS

1. Invited PI Poster Presentation, **2026 DOE Materials Chemistry Principal Investigators' Meeting**, Bethesda, MD

2. Invited Speaker in Symposium of Energy Materials for Sustainable Development, **Materials Science & Technology (MS&T 2026)**, Pittsburgh, PA
3. Invited Discussion Leader in Electrochemical Computing, **GRC Ceramics 2026**, South Hadley, MA
4. Invited Speaker in Symposium 12: Electronic and Ionic Materials in Energy Storage and Conversion Systems, **ACerS Spring Meeting 2026**, Bellevue, WA
5. Invited Speaker in ACerS Robert B. Sosman Award Symposium, **Materials Science & Technology (MS&T 2025)**, Columbus, OH
6. Invited Speaker in Symposium 2: Next generation electrodes and electrolytes and Symposium 11: Emergent phenomena in complex oxide thin films, **Electronic Materials and Applications (EMA) 2025**, Denver, CO
7. Invited Speaker in Symposium CH-4: Advanced Characterization Techniques and Methodologies for Battery Materials, **MRS Fall 2024**, Boston, MA
8. Invited Panelist, **1st RCSA Fellows Conference 2024**, Tucson, AZ
9. Invited Speaker in Energy and Fuels Division, **ACS Spring 2024**, New Orleans, LA

INVITED LECTURES

1. Arizona State University, Materials Science and Engineering Seminar, 09/2026
2. University of Massachusetts Amherst, Department of Chemistry, 08/2024
3. Tulane University, Department of Physics & Engineering Physics, 03/2024
4. Clemson University, Department of Materials Science & Engineering, 05/2023
5. Arizona State University, The Polytechnic School, 03/2023
6. University of Oregon, Center for Advanced Materials Characterization, 03/2023
7. University of California, Davis, Department of Materials Science & Engineering, 02/2023

PROFESSIONAL SERVICE AND LEADERSHIP

1. Organizer: **2026 O-HyLi (Oxygen, Hydrogen, Lithium) Workshop**, November 28-29, Boston, MA
2. Symposium Organizer: "Energy Materials for Sustainable Development", **MS&T26: Materials Science & Technology**, October 4-7, Pittsburgh, PA
3. Session Organizer and Chair, Symposium 13: Defects and Transport in Ceramics, **ACerS Spring 2026**, Bellevue, WA
4. Topic Editor of Advances in Solid State Batteries, **Frontiers in Energy Research**, 2024-2026
5. Youth Editorial Board Member, **Fundamental Research**, 2024-2026
6. Session Organizer and Chair, EN03: New Chemistries, Multi-scale Modelling and Advanced Manufacturing for Solid-State Batteries, **MRS Fall 2025**, Boston, MA
7. Session Chair, ACerS Robert B. Sosman Award Symposium, **Materials Science & Technology (MS&T 25)**, Columbus, OH
8. Session Organizer and Chair, Low dimensional Battery Chemistries: Nanostructures, Coatings, and Thin Films, **ACS Fall 2025**, Washington DC
9. Session Co-organizer and Chair, Symposium 13: Defects and Transport in Ceramics, **ACerS Electronic Materials and Applications (EMA) 2025**, Denver, CO
10. Workshop Lead and Funding Member, **Pre-collegiate Opportunities Within Energy Research (POWER) 2021-2023**, Stanford, CA

11. Invited Judge, **37th Hilliard Symposium 2020**, Northwestern University, Evanston, IL
12. Independent Reviewer: *DOE Early CAREER Program, DOE Graduate Student Research Program SCGSR, Nature Chemical Engineering, Joule, Journal of Materials Chemistry A, ACS Nano, Materials Today Energy, Solid State Ionics, Applied Physics Letters, Journal of Applied Physics, Material Advances, ACS Applied Energy Materials, Energy Storage Materials*

TEACHING AND MENTORSHIP

1. EGR 218 Materials and Manufacturing Processes, Arizona State University, Fall 2024, Fall 2026
2. EGR 216 Engineering Electrical Fundamentals, Arizona State University, Fall 2025, Fall 2026
3. EGR 598 Solid-state Ionics, Arizona State University, Spring 2027
4. Graduate students: **Cauê Nogueira** (PhD, Student Council 2025-2026, Microscopy Society of America; ASU Fulton Fellow 2024), **Qiwen Chen** (PhD, 2026), **Isabella Wu** (PhD, 2026)
5. Undergraduates: **Giancarlo Bugarini** (2026 Summer), **Muhammad Ahmad** (2026 Summer), **Matthew Sample** (ASU FURI Fellowship 2025), **Ty Zurcher** (2025 Fall), **Lia Ryan** (ASU FURI Fellowship 2025), **Keegan Erdmann** (ASU FURI Fellowship 2024), **Brendan Sourwine** (ASU FURI Fellowship 2024)
6. Highschool Intern: **Ethan Cho** (Junior, BASIS Scottsdale, AZ), **Sarah Adamsha** (Junior, Mountain Ridge High School, AZ), **Yishan Gao** (Junior, Seton Catholic Preparatory, AZ)