

Ziyi Zhang

510-990-7006; zzhang645@wisc.edu

LinkedIn: www.linkedin.com/in/ziyi-zhang-uwmadison

1625 Edgeworth Bend Apt 415, Austin, TX 78754

Summary

Experienced researcher in nanomaterials synthesis, characterizations, and property studies. Looking for research or engineering positions in related fields.

Education

Ph.D., Materials Science and Engineering, August 2023

University of Wisconsin-Madison

Dissertation Title: "Growth Kinetics and Properties Control of Two-dimensional Nanostructures at the Liquid Interfaces"

B.S., Materials Science and Engineering, December 2015

University of California-Berkeley

Experience

Research Assistant, September 2016 - Present

Xudong Wang Research Group, Materials Science and Engineering Dept., UW-Madison

- Developed ionic layer epitaxy technique for growing 2D nonlayered nanocrystals at the air-solution interface.
- Synthesized and characterized properties of 2D nanomaterials grown by ionic layer epitaxy technique, including metal oxides, sulfides, noble metals, and MOFs.
- Developed time-resolved grazing incidence X-ray scattering techniques for in situ monitoring of crystal nucleation and growth kinetics at the liquid interface.
- Designed and modified 5nm wafer-scale gold nanosheet for enhanced photodynamic cancer cell-killing therapy.
- Discovered and modified the ferromagnetic-antiferromagnetic transition properties of ultrathin transition metal oxides/hydroxides.
- Developed 2D metal oxide catalysts for enhanced water splitting, alcohol oxidation and battery applications.
- Supervised three undergraduate research assistants, and served as a laboratory manager and safety coordinator.

Research Assistant, May 2015 - August 2016

Materials Science Division, Lawrence Berkeley National Lab, Berkeley, CA

- Designed and synthesized imidazole-based zwitterions and ionic liquids to study the self-assembling behaviors at the oil-water interface.
- Synthesized and characterized Fe₃O₄ nanoparticles for use in magnetic field structured liquid.
- Designed and constructed reversible structured liquid by interfacial Janus nanoparticles in an oil/water system.

Undergraduate Research Assistant, June 2014 - May 2015

Asta Research Group, Materials Science and Engineering Dept., UC-Berkeley

- Designed high-performance lead-free perovskite photovoltaic materials via a high-throughput computational method.

Teaching Experience

Teaching Assistant, Fall 2022

MS&E 350 - Introduction to Materials Science, UW-Madison

Teaching Assistant, Spring 2022

Math 221 - Calculus and Analytic Geometry I, UW-Madison

Teaching Assistant, Spring 2018

MS&E 451 - Introduction to Ceramic Materials, UW-Madison

Skills

Laboratory and Instruments

- Structure Characterizations: SEM, TEM, LEED, XRD, XRR, AFM, etc.
- Elemental/Chemical Characterizations: EELS, XPS, FT-IR, Raman, NMR, etc.
- Electrical/Magnetic Characterizations: PPMS /SQUID, etc.
- Deposition Techniques: CVD, PLD, ALD, plasma sputtering.
- Integrated circuit fabrications in the clean room.
- Electrochemical characterizations in the three-electrode system (LSV, CV, EIS, etc.).
- Others: TGA, DSC, DLS, UV-vis, etc.
- Over 7-year working experience with synchrotron X-ray facilities (LBNL, ANL, SLAC).

Computer

- Programming: Matlab, Python, C++.
- Software: Origin, ImageJ, DigitalMicrograph, ChemDraw, etc.

Language

- English
- Mandarin Chinese (native speaker)

Awards, Publications and Presentations

Awards

Outstanding Reviewer Award 2022, Journal of Nanobiotechnology.

Publications

(**Google Scholar:** https://scholar.google.com/citations?user=js_dbSAAAAAJ&hl=en&oi=ao)

1. **Z. Zhang**, C. Carlos, Y. Dong, X. Wang. A facile cycling synthesis approach of 2D nanosheets preparation for sustainable high-performance catalysis. (in preparation)

2. **Z. Zhang**, M. P. Polak, C. Carlos, Y. Dong, D. Morgan, X. Wang. Strong Room-Temperature Ferromagnetism in Ultrathin NiOOH Nanosheets through Surfactant Manipulation. (under review)
3. **Z. Zhang**, Y. Dong, C. Carlos, X. Wang. Surface Ligand Modification on Ultrathin Ni(OH)₂ Nanosheets Enabling Enhanced Alkaline Ethanol Oxidation Kinetics. ACS Nano. (2023). <https://doi.org/10.1021/acsnano.3c05014>
4. Y. Dong, M. Abbasi, J. Meng, L. German, C. Carlos, J. Li, **Z. Zhang**, D. Morgan, J. Hwang, X. Wang. Substantial lifetime enhancement for si-based photoanodes enabled by amorphous tio₂ coating with improved stoichiometry. Nature Communications. 14(1), 1865 (2023). <https://doi.org/10.1038/s41467-023-37154-z>
5. C. Carlos, J. Li, **Z. Zhang**, K. J. Berg, Y. Wang, X. Wang. Strain-correlated piezoelectricity in quasi-two-dimensional zinc oxide nanosheets. Nano Letters. (2023). <https://doi.org/10.1021/acs.nanolett.3c01728>
6. **Z. Zhang**, C. Carlos, Y. Wang, Y. Dong, X. Yin, L. German, K. J. Berg, W. Bu, X. Wang. Nucleation kinetics and structure evolution of quasi-two-dimensional ZnO at the air-water interface: An in situ time-resolved grazing incidence x-ray scattering study. Nano Lett. 22(7), 3040-3046 (2022). <https://doi.org/10.1021/acs.nanolett.2c00300>
7. J. Sui, J. Li, L. Gu, C. A. Schmidt, **Z. Zhang**, Y. Shao, E. Gazit, P. U. P. A. Gilbert, X. Wang. Orientation-controlled crystallization of γ -glycine films with enhanced piezoelectricity. Journal of Materials Chemistry B. 10(36), 6958-6964 (2022). <https://doi.org/10.1039/D2TB00997H>
8. Y. Zhao, Y. Wang, Y. Dong, C. Carlos, J. Li, **Z. Zhang**, T. Li, Y. Shao, S. Yan, L. Gu, J. Wang, X. Wang. Quasi-two-dimensional earth-abundant bimetallic electrocatalysts for oxygen evolution reactions. ACS Energy Letters. 6(9), 3367-3375 (2021). <https://doi.org/10.1021/acsenerylett.1c01302>
9. Z. Ying, Y. Long, F. Yang, Y. Dong, J. Li, **Z. Zhang**, X. Wang. Self-powered liquid chemical sensors based on solid-liquid contact electrification. Analyst. 146(5), 1656-1662 (2021). <https://doi.org/10.1039/D0AN02126A>
10. F. Yang, J. Li, Y. Long, **Z. Zhang**, L. Wang, J. Sui, Y. Dong, Y. Wang, R. Taylor, D. Ni, W. Cai, P. Wang, T. Hacker, X. Wang. Wafer-scale heterostructured piezoelectric bio-organic thin films. Science. 373(6552), 337-342 (2021). <https://doi.org/10.1126/science.abf2155>
11. Y. Dong, J. Li, F. Yang, Y. Wang, **Z. Zhang**, J. Wang, Y. Long, X. Wang. Bioresorbable primary battery anodes built on core-double-shell zinc microparticle networks. ACS Appl Mater Interfaces. 13(12), 14275-14282 (2021). <https://doi.org/10.1021/acsmi.1c00602>
12. **Z. Zhang**, D. Ni, F. Wang, X. Yin, S. Goel, L. N. German, Y. Wang, J. Li, W. Cai, X. Wang. In vitro study of enhanced photodynamic cancer cell killing effect by nanometer-thick gold nanosheets. Nano Res. 13(12), 3217-3223 (2020). <https://doi.org/10.1007/s12274-020-2990-7>
13. G. Yan, Y. Wang, **Z. Zhang**, Y. Dong, J. Wang, C. Carlos, P. Zhang, Z. Cao, Y. Mao, X. Wang. Nanoparticle-decorated ultrathin La₂O₃ nanosheets as an efficient electrocatalysis for oxygen evolution reactions. Nano-Micro Letters. 12(1), 49 (2020). <https://doi.org/10.1007/s40820-020-0387-5>
14. Y. Wang, **Z. Zhang**, Y. Mao, X. Wang. Two-dimensional nonlayered materials for electrocatalysis. Energy & Environmental Science. 13(11), 3993-4016 (2020). <https://doi.org/10.1039/D0EE01714K>

15. J. Wang, C. Carlos, **Z. Zhang**, J. Li, Y. Long, F. Yang, Y. Dong, X. Qiu, Y. Qian, X. Wang. Piezoelectric nanocellulose thin film with large-scale vertical crystal alignment. *ACS Applied Materials & Interfaces*. 12(23), 26399-26404 (2020). <https://doi.org/10.1021/acsami.0c05680>
16. Z. T. Rosenkrans, T. Sun, D. Jiang, W. Chen, T. E. Barnhart, **Z. Zhang**, C. A. Ferreira, X. Wang, J. W. Engle, P. Huang, W. Cai. Selenium-doped carbon quantum dots act as broad-spectrum antioxidants for acute kidney injury management. *Advanced Science*. 7(12), 2000420 (2020). <https://doi.org/https://doi.org/10.1002/advs.202000420>
17. Y. Long, H. Wei, J. Li, M. Li, Y. Wang, **Z. Zhang**, T. Cao, C. Carlos, L. G. German, D. Jiang, T. Sun, J. W. Engle, X. Lan, Y. Jiang, W. Cai, X. Wang. Prevention of hepatic ischemia-reperfusion injury by carbohydrate-derived nanoantioxidants. *Nano Letters*. 20(9), 6510-6519 (2020). <https://doi.org/10.1021/acs.nanolett.0c02248>
18. J. Li, Y. Long, F. Yang, H. Wei, **Z. Zhang**, Y. Wang, J. Wang, C. Li, C. Carlos, Y. Dong, Y. Wu, W. Cai, X. Wang. Multifunctional artificial artery from direct 3D printing with built-in ferroelectricity and tissue-matching modulus for real-time sensing and occlusion monitoring. *Advanced Functional Materials*. 30(39), 2002868 (2020). <https://doi.org/https://doi.org/10.1002/adfm.202002868>
19. G. Yan, Y. Wang, **Z. Zhang**, J. Li, C. Carlos, L. N. German, C. Zhang, J. Wang, P. M. Voyles, X. Wang. Enhanced ferromagnetism from organic-cerium oxide hybrid ultrathin nanosheets. *ACS Applied Materials & Interfaces*. 11(47), 44601-44608 (2019). <https://doi.org/10.1021/acsami.9b15841>
20. Y. Wang, Y. Shi, **Z. Zhang**, C. Carlos, C. Zhang, K. Bhawnani, J. Li, J. Wang, P. M. Voyles, I. Szlufarska, X. Wang. Bioinspired synthesis of quasi-two-dimensional monocrystalline oxides. *Chemistry of Materials*. 31(21), 9040-9048 (2019). <https://doi.org/10.1021/acs.chemmater.9b03307>
21. K. Zhao, C. Wang, Y. Yu, M. Yan, Q. Wei, P. He, Y. Dong, **Z. Zhang**, X. Wang, L. Mai. Ultrathin surface coating enables stabilized zinc metal anode. *Advanced Materials Interfaces*. 5(16), 1800848 (2018). <https://doi.org/https://doi.org/10.1002/admi.201800848>
22. **Z. Zhang**, Y. Jiang, C. Huang, Y. Chai, E. Goldfine, F. Liu, W. Feng, J. Forth, T. E. Williams, P. D. Ashby, T. P. Russell, B. A. Helms. Guiding kinetic trajectories between jammed and unjammed states in 2D colloidal nanocrystal-polymer assemblies with zwitterionic ligands. *Sci Adv*. 4(8), eaap8045 (2018). <https://doi.org/10.1126/sciadv.aap8045>
23. X. Yin, Q. Chen, P. Tian, P. Zhang, **Z. Zhang**, P. M. Voyles, X. Wang. Ionic layer epitaxy of nanometer-thick palladium nanosheets with enhanced electrocatalytic properties. *Chemistry of Materials*. 30(10), 3308-3314 (2018). <https://doi.org/10.1021/acs.chemmater.8b00575>
24. Q. Pang, C. Sun, Y. Yu, K. Zhao, **Z. Zhang**, P. M. Voyles, G. Chen, Y. Wei, X. Wang. H₂V₃O₈ nanowire/graphene electrodes for aqueous rechargeable zinc ion batteries with high rate capability and large capacity. *Advanced Energy Materials*. 8(19), 1800144 (2018). <https://doi.org/https://doi.org/10.1002/aenm.201800144>
25. J. Li, L. Kang, Y. Long, H. Wei, Y. Yu, Y. Wang, C. A. Ferreira, G. Yao, **Z. Zhang**, C. Carlos, L. German, X. Lan, W. Cai, X. Wang. Implanted battery-free direct-current micro-power supply from in vivo breath energy harvesting. *ACS Applied Materials & Interfaces*. 10(49), 42030-42038 (2018). <https://doi.org/10.1021/acsami.8b15619>
26. Q. Hu, L. Zhao, J. Wu, K. Gao, D. Luo, Y. Jiang, **Z. Zhang**, C. Zhu, E. Schaible, A. Hexemer, C. Wang, Y. Liu, W. Zhang, M. Grätzel, F. Liu, T. P. Russell, R. Zhu, Q. Gong. In situ dynamic observations of perovskite crystallisation and microstructure evolution intermediated

- from [PbI₆]⁴⁻ cage nanoparticles. *Nature Communications*. 8(1), 15688 (2017). <https://doi.org/10.1038/ncomms15688>
27. T. Krishnamoorthy, H. Ding, C. Yan, W. L. Leong, T. Baikie, **Z. Zhang**, M. Sherburne, S. Li, M. Asta, N. Mathews, S. G. Mhaisalkar. Lead-free germanium iodide perovskite materials for photovoltaic applications. *Journal of Materials Chemistry A*. 3(47), 23829-23832 (2015). <https://doi.org/10.1039/C5TA05741H>

Presentations & Posters

Ziyi Zhang, Yunhe Zhao, Guangyuan Yan, Xin Yin, Xudong Wang, “Developments of Highly Efficient Electrocatalytic 2D Nonlayered Materials via Ionic Layer Epitaxy Strategy”. Oral presentation, MRS Fall 2022, Boston, MA 2022.

Ziyi Zhang, Xudong Wang, “In Situ Monitoring of 2D Nanocrystal Nucleation and Growth Kinetics by Using Time-Resolved Liquid Interface Grazing Incidence X-ray Scattering Techniques”. Oral presentation, MRS Fall 2022, Boston, MA 2022.

Ziyi Zhang, Xudong Wang, “In Situ Monitoring of 2D Nanocrystal Nucleation and Growth Kinetics by Using Time-Resolved Liquid Interface Grazing Incidence X-ray Scattering Techniques”. Poster presentation, AVS Prairie Chapter Symposium, Notre Dame, IN 2022.

Ziyi Zhang, Xin Yin, Fei Wang, Yizhan Wang, Peng Tian, Xudong Wang, “Few-layer Inorganic Nanosheets Grown at Water-air Interface -- Ionic Layer Epitaxy (ILE).” Poster presentation, Solid State Studies in Ceramics, Gordon Research Conference, South Hadley, MA 2018.