ZIRUI WANG

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EDUCATION

University of Illinois, Urbana-Champaign 05/2022
Bachelor of Science in Materials Science and Engineering with High Honor

University of Illinois, Urbana-Champaign In Progress
Doctor of Philosophy in Materials Science and Engineering
Research advisor: Dr. Joaquín Rodríguez-López

RESEARCH EXPERIENCE

Doctoral Research: Automated Electrochemical Characterization for Energy Storage Materials
Advisor: Dr. Joaquín Rodríguez-López 08/2022 - Present
· Designed and microfabricated devices for fully automated analysis of reactivity and stability of electrodeposited thin films and their applications in redox-flow batteries, a promising technology for grid-level energy storage
· Applied Python programming interface to program commercial electrochemical and digital instruments for conducting the fully automated experiments
· Used finite-element analysis to predict and support the experimental results
· Key skills: Electrochemical methods, Micro-fabrication, Laboratory automation, Finite-element simulation

Undergraduate Research: Precise Surface Profiling via Deep Learning
Advisor: Dr. Yingjie Zhang 05/2021 - 01/2024
· Constructed encoder-decoder type of convolutional neural network for tip-deconvolutional resolution enhancement for scanning probe microscopy (SPM)
· Generated artificial atomic force microscopy (AFM) data for neural network training
· Tested the performance of the neural network with real AFM data on gold nanoparticles
· Key skills: Atomic force microscopy theory, Computer Vision with Python, MATLAB

TEACHING EXPERIENCE

Teaching Assistant: MSE 307 (Materials Laboratory I) *Upcoming, 08 - 12/2024*
· Lead two 3-hour weekly lab sections on optical microscopy and thermoelectric effect
· Grade 20 lab reports biweekly and 20 final presentations on Differential Scanning Calorimetry
· Answer students' questions on lecture material and lab reports

Teaching Assistant: MSE 304 (Electronic Properties of Materials) 12/2021 - 05/2022
· Graded 40 weekly written homework
· Answered students' questions on an online platform
· Made exam and homework questions on an online learning platform

Grader: ECE 329 (Fields and Waves), 210 (Analog Signal Processing) 01 - 12/2021
· Graded 80 weekly written homework

PUBLICATIONS

[1] Bonagiri, L. K. S.; **Wang, Z.**; Zhou, S.; Zhang, Y. Precise Surface Profiling at the Nanoscale Enabled by Deep Learning. *Nano Lett.* **2024**, 24 (8), 2589–2595. https://doi.org/10.1021/acs.nanolett.3c04712.

[2] Gaddam, R.; **Wang, Z.**; Li, Y.; Harris, L. C.; Pence, M. A.; Guerrero, E. R.; Kenis, P. J. A.; Gewirth, A. A.; Rodríguez-López, J. Identifying Reactive Trends in Glycerol Electro-Oxidation Using an Automated Screening Approach: 28 Ways to Electrodeposit an Au Electrocatalyst. *ACS Catalysis* **2024**, 15 (2), 639–652. https://doi.org/10.1021/acscatal.4c04190.

OUTREACH EXPERIENCE

Beckman Institute Open House at UIUC 04/2023, 04/2024, 04/2025
· Introduced the applications of electrochemistry and ongoing research to over 600 students ranging from elementary to high school
· Performed demonstrations on fundamental to advanced electrochemical experiments, including fruit batteries, water electrolysis for hydrogen production, and electrochemical catalysis using an automated electrochemistry platform

ACS Student Chapter University High School Science Demo 03/2025
· Introduced the field of Electrochemistry and Energy Storage for students from the University of Illinois High School
· Performed demonstrations on zinc-copper batteries and the reversible charging and discharging processes on Prussian Blue Analogues

Electrochemistry Bootcamp at UIUC 05/2024
· Participated in lectures on fundamental to advanced topics on electrochemistry
· Discussed and demonstrated electrochemical thin-film deposition and finite-element simulation to 30 students with different research backgrounds

PRESENTATIONS

Oral presentation, 247th ECS Meeting, Montréal, Canada 05/2025 (Upcoming)
· *ART: Automated redox titration with interdigitated electrode arrays for energy storage materials* ***(Symposium: I08: Flow Batteries: Beyond Vanadium)***

Poster presentation, Turkey Run Analytical Chemistry Conference 09/2024
· *Automated, High-throughput Studies on Electrochemical Energy Storage Materials*

Poster presentation, AVS Prairie Chapter Symposium 09/2024
· *An Automated Platform for High-throughput Surface Interrogation Studies on Electrochemical Energy Storage Materials*

Invited lecture, ME 487 at UIUC: MEMS-NEMS Theory & Fabrication 04/2024
· *Automated, High-Throughput Electrochemical Surface Analysis of Energy Storage Materials Enabled By Microfabricated Devices*

Poster presentation, Turkey Run Analytical Chemistry Conference 09/2023
· *High-throughput Surface Interrogation with Interdigitated Electrode Arrays*

AWARDS

Beckman Institute Graduate Fellow 08/2025 - 05/2026
· Graduate fellowship awarded by the Beckman Institute for Advanced Science and Technology

at UIUC for pursuing interdisciplinary research

List of Teachers Ranked as Excellent by Their Students 2024

· Ranked excellent by students in MSE 307 (Materials Laboratory I), Fall 2024

Best Poster Award 2024

· Best poster presentation award for the 2024 American Vacuum Society (AVS) Prairie Chapter Symposium in the Materials Research Laboratory at the UIUC

Outstanding Teaching Assistant 2024

· List of Teachers ranked as Outstanding and Excellent for MSE 307: Materials Laboratory I (Fall 2024)

UIUC Robert Bohl Scholarship 2021

· Materials science and engineering departmental scholarship for undergraduate students

UIUC Henry E. Grein Jr. Scholarship 2020

· Materials science and engineering departmental scholarship for undergraduate students