

Lijun Zhou

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Education

Ph.D. student in Mechanical Engineering, University of Washington, Seattle, WA Sept. 2022 - present
Advisor: Prof. Mohammad H. Malakooti

B.S. in New Energy Science and Technology, Xi'an Jiaotong University, China Sept. 2018 - Jun. 2022
Major GPA: 3.8/4.3 Rank: 4/34
Minor in Business Administration

Publications

1. **Lijun Zhou**, Yunsik Ohm, Renmian Chin, Krithika Manohar, Mohammad H., Malakooti, 2025 “Inverse Design of Hybrid Filler Composites with Liquid Metal and Solid Inclusions via Machine Learning” (*in preparation*)
2. Renmian Chin, **Lijun Zhou**, Mohammad H. Malakooti, 2025, “Solution-Processable Elongated Liquid Metal Particles for Composites with Enhanced Thermal Management” (*ACS Applied Materials & Interfaces, submitted*)
3. **Lijun Zhou**, Sebastian Bustos-Nuño, Krithika Manohar, and Mohammad H Malakooti, 2025, “Effective Thermal Conductivity and Elastic Modulus of Elastomer Composites with Liquid Metal and Solid Inclusions” (*Composites Science and Technology, under review*)
4. **Lijun Zhou**, Sidharth S Menon, Xinqi Li, Miqin Zhang, and Mohammad H Malakooti, 2024, “Machine Learning Enables Reliable Colorimetric Detection of pH and Glucose in Wearable Sweat Sensors” (*Advanced Material Technologies, 2401121.*)
5. Xinqi Li, Guanyou Lin, **Lijun Zhou**, Octavia Prosser, Mohammad H Malakooti, and Miqin Zhang, 2024, “Green Synthesis of Iron-doped Graphene Quantum Dots: An Efficient Nanozyme for Glucose Sensing” (*2024 Nanoscale Horizons HOT article, Nanoscale Horizons, 9(6), 976-989.*)
6. **Lijun Zhou**, Peng Wei, Huajing Fang, Wenting Wu, Liangliang Wu, and Hong Wang, 2020, “Self-doped Tungsten Oxide Films Induced by in Situ Carbothermal Reduction for High Performance Electrochromic Devices” (*Back cover, Journal of Materials Chemistry C, 8(40), 13999-14006.*)
7. Huajing fang, Kai Jing, Zetian Zhao, Peng Wei and **Lijun Zhou**, 2020, “A Flexible and Stretchable Multi-mode Ultraviolet Response Composite Material and Its Preparation and Application” (*Chinese Patent*)
8. Huajing Fang, **Lijun Zhou**, Peng Wei, Wenting Wu, and Hong Wang, 2019, “A Preparation Method for Tungsten Oxide Electrochromic Film Suitable for Large Area Production of Low Cost and Environmentally Friendly” (*Chinese Patent*)

Conference Presentations

- 1, **Zhou, L.**, and Malakooti, M.H., 2025, “Artificial Intelligence for Inverse Design of Multifunctional Elastomer Composites With Solid and Liquid Particles” ASME SMASIS, September 8-10, St. Louis, Missouri. (*Oral presentation*)
- 2, **Zhou, L.**, Bustos, S.N., Manohar, K., and Malakooti, M.H., 2025, “Mechanical and Thermal Properties of Liquid Metal Elastomer Composites With Hybrid Fillers: Modeling and Experiment” ASME SMASIS, September 8-10, St. Louis, Missouri. (*Oral presentation*)
- 3, **Zhou, L.**, Bustos, S.N., and Malakooti, M.H., 2025, “Stiffness and Thermal Conductivity of Liquid Metal Elastomer Composites with Secondary Solid Particles—Modeling and Experiment” MRS Spring Meeting & Exhibit, April 7-11, Seattle, Washington. (*Oral presentation*)
- 4, **Zhou, L.** and Malakooti, M.H., 2024, “Accurate Sweat Sensing with Multifunctional Wearable Patch and Machine Learning” ASME SMASIS, September 9-11, Atlanta, Georgia. (*Oral presentation*)
- 5, **Zhou, L.**, Manohar, K., and Malakooti, M.H., 2024, “Data-Driven Design of Functional Elastomer Composites with Dissimilar Inclusions” ASME SMASIS, September 9-11, Atlanta, Georgia. (*Oral presentation*)
- 6, **Zhou, L.**, Zhang, M., and Malakooti, M.H., 2024, “Precision in Colorimetric Sweat Sensing Through Machine Learning” MRS Spring Meeting & Exhibit, April 22-26, Seattle, Washington. (*Oral presentation*)

Awards

Outstanding Graduates of Xi'an Jiaotong University	2022
Academic Research Award of Xi'an Jiaotong University (top ten students annually)	2020

National Second-prize, China Robot Competition
National Scholarship (ranked 31 of 1376)
Provincial first prize in National Mathematics Competition

2020
2019,2020
2019

Research Experience

Graduate Research Associate, [iMatter Lab](#), University of Washington

Sept. 2022 - present

Dedicated to the data-driven design of soft multifunctional composites for soft robotics, flexible electronics and wearable devices

(a) *Data-Driven Design of Hybrid Filler Composites*

Developed a physics-informed, AI-driven inverse framework utilizing machine learning models and optimization algorithms to learn, interpret and optimize the design of liquid metal elastomer composites and hybrid filler composites with both liquid and solid inclusions. Conducted finite element analysis and extensive experiments to validate the accuracy of developed model and inverse design framework.

Developed a multi-step Mori-Tanaka (MMT) micromechanics model for accurate prediction of thermal conductivity and elastic modulus in liquid metal elastomer composites and hybrid filler composites with high filler content. Validated the MMT model against experimental data and finite element analysis, demonstrating improved predictive accuracy for composites with both liquid and solid inclusions. Designed and conducted experiments using liquid metal droplets and ZnO particles as liquid and solid fillers in various elastomer matrices (Sylgard 184, Ecoflex 00-30) to investigate the effects of filler phase ratio, particle size, and matrix type on composite performance. Discovered a 'Mechanical Cloaking' phenomenon where Young's modulus remains constant despite increased thermal conductivity and analyzed failure strain trade-offs between flexibility and stiffness in multifunctional composites.

(b) *Machine Learning Enabled Colorimetric Sweat Sensors with Enhanced Classification Accuracy*

Developed and optimized a novel synthesis process for a colorimetric pH sweat sensor, achieving an enhanced color gradient across the full pH range. Conducted experimental research to develop two types of glucose sensors for non-invasive glucose detection in human sweat. Applied machine learning techniques to improve classification accuracy and reduce the need for manual intervention. Innovatively developed an image segmentation method to enhance feature extraction, thereby improving machine learning model performance. Designed and tested a dual-function sensor capable of simultaneously detecting pH and glucose concentrations. Conducted fundamental research on nanozyme materials for glucose sensing applications.

Research Assistant, Xi'an Jiaotong University

2019 - 2022

Electrochromic thin film design, synthesis and optimization; Electrochromic device fabrication and performance test; Spin-coating, electrospinning, FTIR, SEM, XPS; STM32 microcontroller programming and 3D printing.

Teaching Experience

Graduate Teaching Assistant, University of Washington

2023

Developed and delivered presentations twice a week to 2 sections of post-baccalaureate students; supervised over 80 students doing experiments and writing up professional laboratory reports.

Academic & Community Service

Manuscript Peer Review

Nano Letters; Journal of Electronic Materials.

Smart Materials, Adaptive Structures and Intelligent Systems (ASME 2025)

Smart Materials, Adaptive Structures and Intelligent Systems (ASME 2024)

Smart Materials, Adaptive Structures and Intelligent Systems (ASME 2023)

Educational Outreach

Science Representative, Nano Engineering Material Structure (NEMS)

Sept. 2023

Demonstrated laser foaming process to high school students to build their interest in material science.

Professional Associations

Member of the Materials Research Society (MRS)

2024 - present

Member of the American Society of Mechanical Engineers (ASME)

2024 - present

Undergraduate Mentoring

Eliot Joshi, Department of Mechanical Engineering

December 2024 – present

Sebastian Bustos-Nuño, Department of Mechanical Engineering

July 2024 – present

Highlights: Co-authored a journal article submitted to *Composites Science & Technology* – a prestigious journal known for publishing impactful research in composite materials.