

# Lijun Zhou

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## Education

**Ph.D. 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

GPA: 3.8/4.3 (89.2/100)

Rank: 4/34 (Top 2% in entire entering class)

Minor in Business Administration

## Technical Skills

**Programming & ML:** Python (NumPy, SciPy, Pandas, scikit-learn, PyTorch), MATLAB, Fortran, data analysis, optimization algorithms

**Modeling & Simulation:** Continuum micromechanics modeling, finite element analysis (FEA), Abaqus, ANSYS

**Experimental Techniques:** Liquid metal elastomer composites synthesis, thin-film processing (solution deposition, spin-coating, electrospinning), electrochromic device assembly & testing, SEM, EDS, XPS, FTIR, DSC

**Hardware Sensors & Prototyping:** Wearable sensor fabrication & integration, electrochromic device assembly & testing, image processing & segmentation, STM32 microcontroller programming, 3D printing

## Publications

1. **Lijun Zhou**, Eliot Joshi, Krithika Manohar, Mohammad H., Malakooti, 2026 “Inclusion Morphology and Data-Informed Correction of Anisotropic Properties in Liquid–Solid Hybrid Filler Elastomer Composites” (*in preparation*)
2. **Lijun Zhou**, Yunsik Ohm, Renmian Chin, Olivia Kerr, Krithika Manohar, Mohammad H., Malakooti, 2025 “Inverse Design of Synthesizable Hybrid Filler Composites with Liquid Metal and Solid Inclusions via Machine Learning” (*in preparation*)
3. Renmian Chin, **Lijun Zhou**, Mohammad H. Malakooti, 2025, “Solution-Processable Elongated Liquid Metal Particles for Composites with Enhanced Thermal Management” (*ACS Applied Materials & Interfaces, Accepted*)
4. **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, 111258.*)
5. **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, 10(3), 2401121.*)
6. 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.*)
7. **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.*)
8. 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, Granted*)
9. 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, Granted*)

## Conference Presentations

- 1, **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*)
- 2, **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*)

- 3, **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*)
- 4, **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*)

## Research Experience

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**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. Utilized the inverse design framework to create multifunctional composites for high-performance flexible electronics.

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

*Solution-Processed Self-Doped  $WO_{3-x}$  Thin-Film Electrochromic Materials and Device Engineering*

Conducted research on solution-processed self-doped  $WO_{3-x}$  electrochromic thin films fabricated through peroxide-based tungsten precursors and in-situ carbothermal reduction, enabling controlled oxygen-vacancy formation and nanoscale porosity. Developed thin-film fabrication protocols and optimized precursor chemistry to achieve uniform, high-quality coatings. Performed multi-scale characterization including SEM, FTIR, XPS, and optical transmittance to analyze defect structures, phase evolution, and film morphology. Assembled and evaluated electrochromic devices, achieving ~70% optical modulation, fast switching, and excellent cycling stability, establishing structure–property relationships that reveal the critical role of oxygen vacancies in enhancing ion transport and electrochromic performance.

## Awards

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National Scholarship (ranked <b>31 of 1376</b> )	2019,2020
Academic Research Award of Xi'an Jiaotong University ( <b>top ten</b> students annually)	2020
Outstanding Graduates of Xi'an Jiaotong University	2022
National Second Prize, China Robot Competition	2020
Provincial First Prize, National Mathematics Competition	2019
Graduate Student Conference Presentation Award, University of Washington	2024

## Teaching Experience

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**Graduate Teaching Assistant, University of Washington, ME 564** 2025

Supported a graduate-level course attended by 130+ students, leading weekly office hours and assisting with instruction on ODEs, numerical methods, Python programming, and applied mathematical modeling. Clarified theoretical concepts, reviewed student code, and contributed to problem-solving sessions.

Graduate Teaching Assistant, University of Washington, ME 3542023

Developed and delivered weekly instructional presentations to two sections of upper-division undergraduate students. Supervised 80+ students conducting laboratory experiments, guided data analysis and report writing, and provided individualized feedback on technical documentation and experimental methodology.

Academic & Community Service

Manuscript Peer Review

Nano Letters; Journal of Materials Chemistry C; 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)

Honor & Recognition

Faculty-Nominated CandidateApr. 2025  
Student Scientific Achievement Award in Nano-engineered Systems (UW NanoES)

Conference Service

Session Chair, ASME SMASIS 2024 – Machine Learning for MaterialsSept. 2024  
Co-chaired a technical session, coordinated speakers, and facilitated presentations and discussion.

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

Alyssa Miller, Department of Mechanical EngineeringSept. 2025 – present  
Eliot Joshi, Department of Mechanical EngineeringDec. 2024 – present  
Sebastian Bustos-Nuño, Department of Mechanical EngineeringJul. 2024 – present  
Highlights: Co-authored a journal article submitted to *Composites Science & Technology* – a prestigious journal known for publishing impactful research in composite materials.