

Zhen (Jen) Liu

PhD Candidate, Rice University, Houston, TX 77005

Email: z.liu@rice.edu

Website: <https://zhenliu.rice.edu>

EDUCATION

Ph.D.	Mechanical Engineering Rice University (Current GPA: 3.9/4.0) Advised by Prof. Daniel J. Preston	Expected in 07/24
M.E.	Power Engineering and Engineering Thermophysics Xi'an Jiaotong University (GPA: 90.31/100) Thesis: Thermodynamic and Economic Analysis of Supercritical CO ₂ Cycle System for Shipboard Application, advised by Prof. Chuhua Zhang	06/19
B.E.	Energy and Power Engineering Xi'an Jiaotong University (GPA: 91.16/100)	06/16

PROFESSIONAL EXPERIENCE

Research Assistant , <i>Preston Innovation Laboratory, Rice Mech. Eng.</i> Surface and interfacial phenomena, fluid dynamics, heat transfer.	08/19 – present
Research Assistant , <i>HPCAD Research Group, Xi'an Jiaotong University</i> Thermal system design, heat exchanger analysis, CFD solver development.	08/16 – 06/19
Engineering Intern , <i>Midea Group, China</i> Design of compressors applied in air conditioners.	07/17 – 08/17

PUBLICATIONS IN PREPARATION AND UNDER REVIEW

- Z. Liu**, A. Rajappan, B. Jumet, D.J. Preston, "Spatiotemporal Variation of Surface Wettability for Tailored Fluid Manipulation" (*in preparation*).
- Z. Liu**,* R.M. Rasheed,* R. Cisneros, A. Rajappan, T.F. Yap, B. Jumet, D.J. Preston, "Scalable Hot-Water-Repellent Superhydrophobicity" (*in preparation*). *equal contribution
- A. Rajappan, **Z. Liu**, T.F. Yap, R.M. Rasheed, D.J. Preston, "Foam-enabled Fluidics for Embedded Sensing and Control in Soft Robots" (*under review*).

PUBLICATIONS IN PEER-REVIEWED JOURNALS

Google scholar: <https://scholar.google.com/citations?user=ywvLzq0AAAAJ&hl=en>

- T.J. Shimokusu, A. Nathani, **Z. Liu**, T.F. Yap, D.J. Preston, G. Wehmeyer, "Teflon AF-coated Aluminum Surfaces for Jumping Droplet Thermal Rectification" *Advanced Materials Interfaces*, (*in press*), 2024.
- R.M. Rasheed, J.M. Lentz, I.M. Zobayed, **Z. Liu**, A. Rajappan, D. Gonzalez, D.J. Preston, "Adhesion Force Analysis for Prevention of Particle Resuspension in Multiplexed Inertial Coalescence Filters" *Aerosol Science & Technology*, 58(3), 2024.

13. T.F. Yap, **Z. Liu**, A. Rajappan, T.J. Shimokusu, D.J. Preston, "Harnessing Nature's Design with Necrobotics," *Device*, 1(4), 2023.
12. M.D. Bell, K. Ye, T.F. Yap, A. Rajappan, **Z. Liu**, Y.J. Tao, D.J. Preston, "Rapid In Situ Thermal Decontamination of Wearable Composite Textile Materials," *ACS Applied Materials and Interfaces*, 15(37), 2023.
11. B. Jumet, Z.A. Zook, A. Yousaf, A. Rajappan, D. Xu, T.F. Yap, N. Fino, **Z. Liu**, M.K. O'Malley, D.J. Preston, "Fluidically Programmed Wearable Haptic Textiles," *Device*, 1(3), 2023.
10. **Z. Liu**, T.F. Yap, A. Rajappan, R.A. Shveda, R.M. Rasheed, D.J. Preston, "Mitigating Contamination with Nanostructure-Enabled Ultraclean Storage," *Nano Letters*, 23(14), 2023.
9. A. Rajappan, B. Jumet, R.A. Shveda, C.J. Decker, **Z. Liu**, T.F. Yap, V. Sanchez, D.J. Preston, "Logic-Enabled Textiles," *Proceedings of the National Academy of Sciences (PNAS)*, 119(35), 2022.
8. R.A. Shveda, A. Rajappan, T.F. Yap, **Z. Liu**, M.D. Bell, B. Jumet, V. Sanchez, D.J. Preston, "A Wearable Textile-Based Pneumatic Energy Harvesting System for Assistive Robotics," *Science Advances*, 8(34), 2022.
7. T.F. Yap, **Z. Liu**, A. Rajappan, T.J. Shimokusu, D.J. Preston, "Necrobotics: Biotic Materials as Ready-to-Use Actuators," *Advanced Science*, 2201174, 2022.
6. **Z. Liu**, Y. Song, A. Rajappan, E.N. Wang, D.J. Preston "Temporal Evolution of Surface Contamination under Ultra-high Vacuum," *Langmuir*, 38 (3), 2022.
5. T.F. Yap, J.C. Hsu, **Z. Liu**, K. Rayavara, V. Tat, C.T.K. Tseng, D.J. Preston, "Efficacy and Self-Similarity of SARS-CoV-2 Thermal Decontamination," *Journal of Hazardous Materials*, 429 (127709), 2022.
4. Y. Song, H. Cha, **Z. Liu**, J.H. Seong, L. Zhang, D.J. Preston, E.N. Wang, "Alteration of Pool Boiling Heat transfer on Metallic Surfaces by in situ Oxidation," *International Journal of Heat and Mass Transfer*, 185(122320), 2022.
3. Y. Song, L. Zhang, **Z. Liu**, D.J. Preston, E.N. Wang, "Effects of Airborne Hydrocarbon Adsorption on Pool Boiling Heat Transfer," *Applied Physics Letters*, 116 (25), 2020.
2. T.F. Yap, **Z. Liu**, R. Shveda, D.J. Preston, "A Predictive Model of the Temperature-Dependent Inactivation of Coronaviruses," *Applied Physics Letters*, 117(6), 2020.
1. **Z. Liu**, D.J. Preston, "Enhanced Condensation for Improved Energy Efficiency," *Joule* 3 (5), 2019.

SELECT CONFERENCE PRESENTATIONS

5. **Z. Liu**, T.F. Yap, A. Rajappan, R.A. Shveda, R.M. Rasheed, D.J. Preston "Reducing and Reversing Airborne Contamination with Nanotexture-Enabled Ultra-Clean Storage," Micro Flow and Interfacial Phenomena (μ FIP) Conference, Jun 18 – 21, 2023.
4. **Z. Liu**, T.F. Yap, A. Rajappan, R.A. Shveda, R.M. Rasheed, D.J. Preston "Nanostructure-Enabled Clean Storage for Consistent Phase-Change Heat Transfer Experiments," 11th International Conference on Boiling & Condensation Heat Transfer. May 15 – 17, 2023.
3. **Z. Liu**, Y. Song, A. Rajappan, E.W. Wang, D.J. Preston, "Surface Contamination Under Ultra-High Vacuum," Micro Flow and Interfacial Phenomena (μ FIP) Conference, Jun 20 – 23, 2022.

2. **Z. Liu**, Y. Song, A. Rajappan, E.W. Wang, D.J. Preston, "The Effects of Ultra-High Vacuum on Surface Contamination," APS March Meeting, Mar 14 – 18, 2022.
1. **Z. Liu**, Yaping Ju, Chuhua Zhang. "Thermodynamic Design of a Supercritical CO2 Brayton Cycle for 40MW Shipboard Application," Proceedings of Third Chinese International Turbomachinery Conference. Apr 12 – 15, 2018.

TEACHING AND MENTORING EXPERIENCE

Teaching experience

Teaching Assistant, Rice University

- *MECH 472 - Thermal Systems Design*: grader for student course projects.
- *MECH 231 – Sophomore (Thermal) Lab*: supervised students on thermal system experiments.
- *MECH 371 - Fluid Mechanics*: grader for weekly assignments and final exams.
- *MECH 587 - Capillarity and Wetting*: participated in course projects; guest lecturer on droplets and bubbles - terminology, the Young equation, complete wetting, the spreading coefficient.

Teaching Assistant, Xi'an Jiaotong University (XJTU)

- *Fluid Machinery Internal Flow Theory and Computation*: Held the problem session; graded weekly assignments and final exams.

Mentorship

- **Connor Spears, Rice University** (02/2022 – 04/2022, undergraduate student)
Research topic: Electrowetting on Dielectric for Programmable Droplet Motion.
- **Kory Sila, Rice University** (08/2023 – present, undergraduate student)
Research topic: Wettability Patterned Surfaces.

AWARDS AND HONORS

The Ig Nobel Prize in Mechanical Engineering	2023
Micro Flow and Interfacial Phenomena Conference 2023 Travel Award	2023
Micro Flow and Interfacial Phenomena Conference 2022 Travel Award	2022
XJTU Graduate 1 st Prize Scholarship	2017
Graduate Freshman Special Scholarship (top 1% across the university)	2016
"Pengkang" Scholarship & Excellent Student	2015
Undergraduate Research Funding (provincial level)	2014
Shengu Industry 1 st Prize Scholarship	2014

LEADERSHIP AND SERVICE EXPERIENCE

- Chair of Nano Subgroup in Preston Innovation Lab** 05/20 - present
Organize subgroup meetings for research-related discussions.
- Member of MECH DEI Committee at Rice University** 09/21 - present
Promote involvement in the department, advocate for changes, and help improve everyone's experience in Rice Mechanical Engineering.

Volunteer in prospective student visiting week	02/23
Participation on welcome event and poster session.	
Volunteer for drone show for President DesRoches' inauguration	10/22
Battery charging and assembling of drones.	
Volunteer for Gulf Coast Undergraduate Research Symposium (GCURS)	10/22
Serving as grader for undergraduate research talks.	
Volunteer for EPG Spring Technical Meeting	05/22
Guided lab tours for Energy Polymer Group from industries.	
Volunteer for Gulf Coast Undergraduate Research Symposium (GCURS)	10/21
Provided Tech TA support for the symposium.	
Guided lab tours.	
Volunteering docent in Xi'an Banpo Museum	10/14 – 05/17
Explained ancient people's lifestyles, customs, and the relic of ancient architecture in Prehistorical Site Hall.	

PROFESSIONAL ACTIVITIES

Office Assistant, *Department of International Cooperation & Exchanges, XJTU*

Coordinated student exchange programs and receptions for international visitors.

Service as Peer Review Referee

Science Advances

Joule

ACS Applied Materials & Interfaces

Applied Physics Letters

Applied Surface Science

SELECT MEDIA COVERAGE

- "Keeping VOCs away from delicate technology," E. Phiddian, *Cosmos Magazine*, Jul 19, 2023. [Link](#). **Excerpt:** 'texturing allows the internal container wall to act as a "sacrificial" material,' says lead author Zhen Liu ... 'VOCs are pulled onto the surface of the container wall, which allows other objects stored inside to remain clean.'
- "Capturing VOCs in a container," Kayt Sukel, *ASME.org*, Sep 13, 2023. [Link](#).
- "Rice engineers' storage technology keeps nanosurfaces clean," Jade Boyd, *Rice News*, Jul 17, 2023. [Link](#).

(C.V. last updated Feb. 25, 2023)