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EDUCATION

Ph.D., Department of Mechanical Engineering, M.I.T, *Jun. 2013 – Jun. 2017*
Advisor: Prof. Evelyn Wang
Thesis: Micro and Nanostructures for Two-phase Fluid and Thermal Transport

M.S., Department of Mechanical Engineering, M.I.T, *Jul. 2011 – Jun.2013*
Advisor: Prof. Evelyn Wang
Thesis: Magnetic Tunable Microstructured Surfaces for Thermal Management and Microfluidic Applications

B.E., Building Technology, Tsinghua University, Beijing, China, *Aug. 2007 – Jul. 2011*
Advisor: Prof. Bin Zhao
Thesis: A Particle Resuspension Model in Ventilation Ducts

PROFESSIONAL APPOINTMENT

Jul. 2019 – present
Assistant professor, Department of Mechanical Engineering, University of California, Santa Barbara
Research group: Thermofluid Energy Research Laboratory (Link)

Sept. 2017 – Jun. 2019
Postdoctoral scholar, Department of Materials Science and Engineering, Stanford University
Advisor: Prof. Yi Cui
Research projects

- Impact of heterogeneous temperature distribution on Li-based battery electrochemistry
- Thermal battery based on electrocatalysis
- Textile materials for personal thermal management

RESEARCH INTEREST

Heat and mass transfer, Phase change, Energy conversion and storage, Thermal management of electronic, energy, and personal systems, Materials fabrication, synthesis and characterization

SELECTED HONORS AND AWARDS

NSF CAREER award	Dec 2020
Selected to attend Rising Stars in Mechanical Engineering Workshop (link)	Oct 2018
Meredith Kamm Memorial Award, MIT	May 2017
Outstanding Poster Award in the Thermal Management Track, ITHERM	Jun. 2016
MIT Graduate Woman of Excellence	Apr. 2015

MIT Emerson scholarship	2014 – 2016
Second prize, The MIT Mechanical Engineering de Florez Award Competition	Apr. 2014
Winner in the MIT Micro-Nano Poster Session	Feb. 2014
Winner in the Shell-MAHLE MIT contest	Feb. 2013
First prize, Tsinghua Student Research Training Project	Dec. 2010
Academic Excellence Scholarship, Tsinghua University	2009 – 2010
First prize, Chinese National College Students Physics Olympiad	Dec. 2008

JOURNAL PUBLICATIONS

In progress:

1. H. Wang, S.C. Kim, T. Rojas, Y. Zhu, Y. Li, L. Ma, K. Xu, A. Ngo, Y. Cui, "Correlating Li-ion Solvation Structures and Electrode Potential Temperature Coefficients", in review.
2. Y. Peng*, W. Li*, B. Liu, J. Tang, G. Zhou, **Y. Zhu**, T. Wu, W. Huang, C. Zhang, S. Fan, Y. Cui, "Integrated Cooling (i-Cool) Textile of Heat Conduction and Sweat Transportation for Personal Perspiration Management", preprint

Published and accepted:

1. J. Xu, X. Xiao, Z. Zhang, Y. Wu, D.T. Boyle, H.K. Lee, W. Huang, Y. Li, H. Wang, J. Li, **Y. Zhu**, B. Chen, W. Mitch, Y. Cui, "Designing a Three-phase Electrochemical Pathway to Promote Pt-catalyzed Formaldehyde Oxidation", ***Nano Letters***, 20(12), p. 8719-8724, 2020. doi.org/10.1021/acs.nanolett.0c03560
2. H. Wang*, **Y. Zhu***, S.C. Kim, A. Pei, Y. Li, D. Boyle, H. Wang, Z. Zhang, Y. Ye, W. Huang, Y. Liu, J. Xu, J. Li, F. Liu, Yi Cui, "Underpotential Lithium Plating on Graphite Anodes Caused by Temperature Heterogeneity", ***PNAS***, 117(47), p. 29453-29461, 2020 (* equal contribution) doi.org/10.1073/pnas.2009221117
3. L. Zhao, Y. Qi, P. Luzzatto-Fegiz, Y. Cui, **Y. Zhu**, "COVID-19: Effects of environmental conditions on the propagation of respiratory droplets", ***Nano Letters***, 20(10), p. 7744-7750, 2020. doi: 10.1021/acs.nanolett.0c03331
4. M. Wei, Y. Song, Y. Zhu, D.J. Preston, C.S. Tan, E.N. Wang, "Heat transfer suppression by suspended droplets on microstructured surfaces", Applied Physics Letters, 116, p. 233703, 2020. doi: 10.1063/5.0010510
5. G. Zhou, A. Yang, Y. Wang, G. Gao, A. Pei, X. Yu, **Y. Zhu**, L. Zong, B. Liu, J. Xu, N. Liu, J. Zhang, Y. Li, L.W. Wang, H. Hwang, M. Brongersma, S. Chu, Y. Cui, "Electrotunable liquid sulphur microdroplets", ***Nature Communications***, 11, p. 606, 2020. doi: 10.1038/s41467-020-14438-2
6. Y. Liu, **Y. Zhu**, Y. Cui, "Challenges and opportunities for fast charging lithium–ion batteries", ***Nature Energy***, 4, p. 540-550, 2019. doi: 10.1038/s41560-019-0405-3
7. **Y. Zhu***, J. Xie*, A. Pei, B. Liu, Y. Wu, D. Lin, J. Li, H. Wang, H. Chen, J. Xu, A. Yang, C.-L. Wu, H. Wang, W. Chen, Y. Cui, "Fast lithium growth and short circuit induced by localized-temperature hotspots in lithium batteries", ***Nature Communications***, 10(1), p. 2067, 2019. (* equal contribution) Highlighted in SLAC news. doi: 10.1038/s41467-019-09924-1

8. H. Wang, Y. Li, Y. Li, Y. Liu, D. Lin, C. Zhu, G. Chen, A. Yang, K. Yan, H. Chen, **Y. Zhu**, J. Li, J. Xie, J. Xu, Z. Zhang, R. Vilá, A. Pei, K. Wang, Y. Cui, "Wrinkled Graphene Cages as Hosts for High-Capacity Li Metal Anodes Shown by Cryogenic Electron Microscopy", ***Nano Letters***, 19(2), p. 1326-1335, 2019. doi: 10.1021/acs.nanolett.8b04906
9. H. Wang, D. Lin, J. Xie, Y. Liu, H. Chen, Y. Li, J. Xu, G. Zhou, Z. Zhang, A. Pei, **Y. Zhu**, K. Liu, K. Wang, Y. Cui, "An Interconnected Channel‐Like Framework as Host for Lithium Metal Composite Anodes", ***Advanced Energy Materials***, 9(7), p. 1802720, 2019. doi: 10.1002/aenm.201802720
10. J. Li, **Y. Zhu**, W. Chen, Z. Lu, J. Xu, A. Pei, Y. Peng, Z. Zhang, S. Chu, Y. Cui, "Breathing Mimicking Electrocatalysis for Oxygen Evolution and Reduction", ***Joule***, 2018. doi: 10.1016/j.joule.2018.11.015
11. L. Zhang*, **Y. Zhu***, Z. Lu, L. Zhao, K.R. Bagnall, S.R. Rao, E.N. Wang, "Characterization of thin film evaporation in micropillar wicks using micro-Raman spectroscopy", ***Applied Physics Letters***, 113, p. 163701, 2018. doi: 10.1063/1.5048837 (* equal contribution)
12. J. Li, G. Chen, **Y. Zhu**, Z. Liang, A. Pei, C-L. Wu, H. Wang, H.R. Lee, K. Liu, S. Chu, Y. Cui, "Efficient electrocatalytic CO_2 reduction on three-phase interface", ***Nature Catalysis***, 1, p. 592-600, 2018. doi: 10.1038/s41929-018-0108-3
13. R. Zhang*, B. Liu*, A. Yang*, **Y. Zhu***, C. Liu, G. Zhou, J. Sun, P-C. Hsu, W. Zhao, D. Lin, Y. Liu, A Pei, J. Xie, W. Chen, J. Xu, Y. Jin, T. Wu, Y. Cui, "In-situ investigation on the nanoscale capture and evolution of aerosols on nanofibers", ***Nano Letters***, 18(2), p. 1130-1138, 2018. doi: 10.1021/acs.nanolett.7b04673 (* equal contribution)
14. Y. Peng, J. Chen, A. Song, P. Catrysse, P-C Hsu, L. Cai, B. Liu, **Y. Zhu**, G. Zhou, D.S. Wu, H.R. Lee, S. Fan, Y. Cui, "Nanoporous polyethylene microfibre for large scale radiative cooling fabric", ***Nature Sustainability***, 1, p. 105-112, 2018. doi: 10.1038/s41893-018-0023-2
15. S. Somasundarama, **Y. Zhu**, Z. Lu, S. Adera, H. Bin, M. Wei, C.S. Tan, E.N. Wang, "Thermal design optimization of evaporator micropillar wicks", ***International Journal of Thermal Sciences***, 134, p.179-187, 2018. doi: 10.1016/j.ijthermalsci.2018.07.036
16. Z. Lu, D.J. Preston, D.S. Antao, **Y. Zhu**, E.N. Wang, "Co-existence of pinning and moving on a contact line", ***Langmuir***, 33(36), p. 8970–8975, 2017. doi: 10.1021/acs.langmuir.7b02070
17. **Y. Zhu,** D.S. Antao, D.W. Bian, S.R. Rao, J. Sircar, T.J. Zhang, E.N. Wang, "Suppressing High-Frequency Temperature Oscillations in Microchannels with Surface Structures", ***Applied Physics Letters***, 110(3), p. 033501, 2017. doi: 10.1063/1.4974048
18. D.J. Preston, A. Anders, B. Barabadi, E. Tio, **Y. Zhu**, D. Dai, E.N. Wang, "Electrowetting-on-Dielectric Actuation of a Spatial and Angular Manipulation Stage", ***Applied Physics Letters***, 109(24), p. 244102, 2016. doi: 10.1063/1.4971777
19. H.J. Cho, D.J. Preston, **Y. Zhu**, E.N. Wang, "Nanoengineered Materials for Liquid-Vapour Phase-Change Heat Transfer", ***Nature Reviews Materials***, 2, p. 16092, 2016. doi: 10.1038/natrevmats.2016.92
20. **Y. Zhu**, D.S. Antao, K.-H. Chu, S. Chen, T.J. Hendricks, T.J. Zhang, E.N. Wang, "Surface Structure Enhanced Microchannel Flow Boiling", ***Journal of Heat Transfer***, 138(9), p. 091501, 2016. doi: 10.1115/1.4033497
21. **Y. Zhu**, D.S. Antao, T. Zhang, E.N. Wang, "Suppressed Dry-out in Two-Phase Microchannels via Surface Structures", ***Journal of Heat Transfer***, 138(8), p. 080905, 2016. doi: 10.1115/1.4033818

22. **Y. Zhu,** D.S. Antao, Z. Lu, S. Somasundaram, T.J. Zhang, E.N. Wang, "Prediction and Characterization of Dry-out Heat Flux in Micropillar Wick Structures", ***Langmuir***, 32(7), p. 1920–1927, 2016. doi: 10.1021/acs.langmuir.5b04502
23. D.S. Antao**,** S. Adera, **Y. Zhu**, E. Farias, R. Raj, E.N. Wang, "Dynamic Evolution of the Evaporating Liquid-Vapor Interface in Micropillar Arrays", ***Langmuir***, *32* (2), p. 519–526, 2016. doi: 10.1021/acs.langmuir.5b03916
24. **Y. Zhu**, D.S. Antao, R. Xiao, E.N. Wang, "Real-Time Manipulation with Magnetically Tunable Structures", ***Advanced Materials***, 26(37), p. 6442–6446, 2014. doi: 10.1002/adma.201401515
    - Featured on the front cover of *Advanced Materials*, and highlighted in MIT news, MIT home page.
    - Video news: https://www.youtube.com/watch?v=gq6SYIrbcrk
25. R. Raj, R. Enright, **Y. Zhu**, S. Adera, E.N. Wang, "Unified Model for Contact Angle Hysteresis on Heterogeneous and Superhydrophobic Surfaces", ***Langmuir***, 28(45), p. 15777-15788, 2012. doi: 10.1021/la303070s
26. **Y. Zhu**, B. Zhao, B. Zhou, Z. Tan, "A Particle Resuspension Model in Ventilation Ducts," ***Aerosol Science and Technology***, 46(2), p. 222-235, 2012. doi: 10.1080/02786826.2011.618471

BOOK CHAPTERS

1. **Y. Zhu**, H.K. Mutha, Y. Zhao, E.N. Wang, "Manipulating Water and Heat with Nanoengineered surfaces", in P. Norris and L. Friedersdorf (ed.), ***Women in Nanotechnology***, Springer, 2019.
2. **Y. Zhu,** D.S. Antao, E.N. Wang, "Bio-Inspired Surfaces for Enhanced Boiling", in T. Deng (ed.), ***Bio-inspired Engineering of Thermal Materials***, Wiley, 2018.
3. D.S. Antao, **Y. Zhu**, E.N. Wang, "Boiling on Enhanced Surfaces", in F. Kulacki, ***Handbook of Thermal Science and Engineering***, Springer, 2017.

CONFERENCE PAPERS AND PRESENTATIONS

Peer reviewed conference papers:

1. **Y. Zhu**, J. Xie, A. Pei, Y. Cui, "Localized temperature hotspot induced fast lithium growth and short circuit in lithium batteries", Proceedings of the 2nd Pacific Rim Thermal Engineering Conference, Hawaii, Dec 13-17, 2019
2. J. Sircar, **Y. Zhu**, S.R. Rao, D.S. Antao, T.J. Zhang, E.N. Wang, "Height-dependent, Surface structure enhanced, Intrachip Flow Boiling of Methanol", Proceedings of the 2nd Pacific Rim Thermal Engineering Conference, Hawaii, Dec 13-17, 2019
3. L. Zhang*, **Y. Zhu***, S.R. Rao, K.R. Bagnall, D.S. Antao, A. Leroy, L. Zhao, B. Bhatia, C.C., Kelsall, E.N. Wang, "In situ temperature measurement of evaporation in micropillar wick structures using micro-Raman spectroscopy", Proceedings of the 16th International Heat Transfer Conference, IHTC-16, Beijing, China, Aug 10-15, 2018. (* equal contribution) doi: 10.1615/IHTC16.bae.023152
4. Y. Song, **Y. Zhu**, D.J. Preston, H.J. Cho, Z. Lu, E.N. Wang, "Investigating the relationship between surface wickability and CHF during pool boiling", Proceedings of the 16th International Heat Transfer Conference, IHTC-16, Beijing, China, Aug 10-15, 2018. doi: 10.1615/IHTC16.bae.023315
5. K.L. Wilke*, K.B. Kalinina*, **Y. Zhu**, D.J. Preston, D.S. Antao, E.N. Wang, "Enhancement of dry-out heat flux in non-uniform variable permeability wicking structures", Proceedings of the 16th International Heat Transfer Conference, IHTC-16, Beijing, China, Aug 10-15, 2018. doi: 10.1615/IHTC16.bae.024136

6. **Y. Zhu**, Z. Lu, D.S. Antao, H. Li, T.J. Zhang, E.N. Wang, "Model optimization of dry-out heat flux from micropillar wick structures," ITHERM, Las Vegas, NV, May 31-Jun 3, 2016. doi: 10.1109/ITHERM.2016.7517573 (**Outstanding Poster Award**)
7. **Y. Zhu**, D.S. Antao, D.W. Bian, T. Zhang, E.N. Wang, "Reducing instability and enhancing critical heat flux using integrated micropillars in two-phase microchannel heat sinks," 18th International Conference on Solid-State Sensors, Actuators and Microsystems (TRANSDUCERS), Anchorage, AK, June 21-25, 2015. doi: 10.1109/TRANSDUCERS.2015.7180931
8. **Y. Zhu**, D.S. Antao, K.-H. Chu, T.J. Hendricks, E.N. Wang, "Enhancing flow boiling heat transfer in microchannels with structured surfaces," International Heat Transfer Conference, Kyoto, Japan, August 10-15, 2014. doi: 10.1615/IHTC15.nms.009508
9. **Y. Zhu**, R. Xiao, E.N. Wang, "Design and fabrication of magnetically tunable microstructured surfaces," 17th International Conference on Solid-State Sensors, Actuators and Microsystems (TRANSDUCERS), Barcelona, Spain, June 16-20, 2013. doi: 10.1109/Transducers.2013.6627079
10. K.-H. Chu, **Y. Zhu**, N. Miljkovic, Y. Nam, R. Enright, E.N. Wang, "Enhanced boiling heat transfer with copper oxide hierarchical surfaces," 17th International Conference on Solid-State Sensors, Actuators and Microsystems (TRANSDUCERS), Barcelona, Spain, June 16-20, 2013. doi: 10.1109/Transducers.2013.6627258

Conference presentations:

1. L Zhao, S. Seshadri, J. Read de Alaniz, P. Luzzatto-Fegiz., **Y. Zhu**, "Manipulating Bubble Dynamics via Photo-Responsive Surfactants and Light for Microgravity Boiling", ASME 2020 Summer Heat Transfer Conference, July 13-15, 2020.
2. **Y. Zhu**, "Temperature Hotspots Induced Lithium Growth and Short Circuit in Lithium Batteries", **invited talk** at the 5th International Conference on Energy Conversion and Storage, Beijing, August 14-16, 2019.
3. **Y. Zhu**, D.S. Antao, E.N. Wang, "Suppressed dry-out in two-phase microchannels via surface structures," ASME International Mechanical Engineering Congress & Exposition, Houston, TX, November 13-19, 2015.
4. **Y. Zhu**, D.S. Antao, D.W. Bian, E.N. Wang, "The role of microstructured surfaces in microchannel flow boiling," Gordon Research Conference on Micro & Nanoscale Phase Change Heat Transfer, Galveston, TX, January 11-16, 2015.
5. **Y. Zhu**, R. Xiao, E.N. Wang, "Tunable magnetic microstructured surfaces for microfluidic and thermal management applications," ASME 2013 Summer Heat Transfer Conference, Minneapolis, MN, July 14-19, 2013.
6. K.-H. Chu, **Y. Zhu**, N. Miljkovic, Y. Nam, R. Enright, E.N. Wang, "Copper oxide hierarchical surfaces for enhanced pool boiling heat transfer," ASME 2013 Summer Heat Transfer Conference, Minneapolis, July 14-19, 2013.
7. R. Raj, R. Enright, **Y. Zhu**, S. Adera, E.N. Wang, "Thermodynamic model for contact angle hysteresis on heterogeneous and superhydrophobic surfaces," ASME 2013 Summer Heat Transfer Conference, Minneapolis, MN, July 14-19, 2013.

US PATENTS

1. E.N. Wang, **Y. Zhu**, R. Xiao, "Magnetically tunable microstructured surfaces, " Application No.: 14/294,829, Publication Date: 12/04/2014
2. E.N. Wang, **Y. Zhu**, D.S. Antao, K-H. Chu, "Enhanced flow boiling heat transfer in microchannels with structured surfaces," Application No.: 14/811,811, Publication Date: 02/04/2016

INVITED SEMINARS

1. Y. Zhu, "Microscopic Thermal-Fluids Engineering for Next-generation Energy and Electronic Systems", invited seminar at the Institute of Energy Efficiency, UCSB, 11/14/2019
2. Y. Zhu, "Microscopic Thermal-Fluids Engineering for Next-generation Energy and Electronic Systems", invited seminar at Texas A&M University, 11/07/2019
3. Y. Zhu, "Microscopic Thermal-Fluids Engineering for Next-generation Energy and Electronic Systems", invited ACRC seminar at University of Illinois, Urbana-Champaign, 09/12/2019
4. Y. Zhu, "Microscopic Thermal-Fluids Engineering for Next-generation Energy and Electronic Systems", invited seminar at
   Department of Mechanical Engineering, University of California, Berkeley, 04/02/2019
   Department of Mechanical Engineering, Carnegie Mellon University, 01/30/2019
   Department of Mechanical Engineering and Materials Science, Yale University, 01/23/2019
   Department of Mechanical Engineering, University of California, Santa Barbara, 01/16/2019
   Department of Mechanical Engineering, University of Houston, 11/17/2019
5. Y. Zhu, "Micro/Nanostructures for Enhanced Thermo-fluidic Transport", invited seminar at Western Digital, Milpitas, CA, 09/28/2018
6. Y. Zhu, "Micro/Nanostructures for Enhanced Thermo-fluidic Transport", invited seminar at Department of Mechanical Science and Engineering, University of Illinois, Urbana-Champaign, 02/14/2017

MENTORING AND OUTREACH

1. Present lectures on thermal fluids engineering at Laguna Blanca high school, Santa Barbara (Dec 2019).
2. Mentored high school summer intern and undergraduate summer intern on hydrogen thermal battery (Jun – Sept 2018).
3. Completed postdoc workshop "Mentoring in Research" offered by Stanford University (Dec 2017).
4. Supervised MIT undergraduate research thesis, "Enhanced Flow Boiling Heat Transfer in Micro-channels with Structured Surfaces at Varied Mass Flow Rates" (Sept 2014 – May 2015).
5. Completed the *Kaufman Teaching Certificate Program* (Spring 2016, link) offered by MIT.
6. Teaching Assistant for class *2.51 Intermediate Heat and Mass Transfer* at MIT (Sept – Dec 2013).
7. Mentored high school summer interns from Thayer Academy on nanotechnology (July – Aug 2012).

ACADEMIC ACTIVITIES

Referee for journals:

Nano Letters	Nanoscale and Microscale Thermophysical Engineering
Advanced Functional Materials	Soft Matter
ACS Energy Letters	International Journal of Heat and Mass Transfer
Journal of Heat Transfer	International Journal of Multiphase Flow
Applied Thermal Engineering	Transactions on Components, Packaging and Manufacturing Technology
Scientific Reports	Joule

LEADERSHIP AND EXTRACURRICULAR ACTIVITIES

1. Initiated and organized the first MIT Asian Career Fair on April 20, 2013 (http://asiancareerfair.mit.edu/)
2. MIT Emerson scholar for piano performance study and the MIT Chamber Music Society (2012-2016)

SELECTED MEDIA COVERAGE

1. “Aerosols vs. Droplets”, S. Fernandez, **The Current**, Oct 14, 2020
   https://www.news.ucsb.edu/2020/020063/aerosols-vs-droplets
2. "Probing battery hotspots for safer energy storage", E. Carlson, **SLAC News**, May 8, 2019
   https://www6.slac.stanford.edu/news/2019-05-08-brief-probing-battery-hotspots-safer-energy-storage.aspx?from=timeline&isappinstalled=0
3. "New Material Structures Bend Like Microscopic Hair", J. Chu, **MIT News**, Aug. 6, 2014
   http://news.mit.edu/2014/magnetic-hair-directs-water-flow-0806
4. "Magnetically Activated Hairs Direct Fluid Flow", **Materials Today**, Aug. 6, 2014
   http://www.materialstoday.com/metals-alloys/news/magnetically-activated-hairs-direct-fluid-flow/
5. "A Helping Hair", J. Chu, **MIT Technological Review**, Oct. 21, 2014
   http://www.technologyreview.com/article/531581/a-helping-hair/