Lyu Zhou

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Assistant Professor in Electrical & Computer Engineering

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Education

Ph.D.	University at Buffalo, SUNY (UB)	*02/2018 ~ 05/2022*
M.S.	University at Buffalo, SUNY (UB)	*09/2016 ~ 02/2018*
B.S.	University of Electronic Science and Technology of China	*09/2011 ~ 06/2015*
Visiting student	King Abdullah University of Science and Technology	*08/2019 ~ 01/2020*

Work Experience

Assistant Professor	Texas Tech University	*09/2025 ~ present*
Postdoctoral Researcher	The University of Texas at Dallas (UTD)	*06/2022 ~ 07/2025*
Product Engineer Intern	Sunny Clean Water, LLC	*05/2019 ~ 08/2019*

Research Interests

- Multifunctional composites for semiconductor packaging
- Photothermal energy conversion and storage
- Dynamic metamaterials for tunable thermal and optical performance
- Building energy efficiency
- Intelligent thermochromism and electrochromic
- Additive manufacturing

Research Projects

High-temperature thermochemical energy for concentrated solar plants (*2023-present, at UTD*): This project studies the carbonation/calcination reactions for high temperature thermochemical energy storage in concentrated solar plants using hydration reactivation and synthetic sorbents.

Multidisciplinary building thermal regulation (*2022-present, at UTD*): This project studies multi-discipline thermoregulation for building thermal management using thermal energy storage, radiative cooling, and thermochromism, aiming to improve the building energy efficiency.

Wood upcycling using additive manufacturing *(2023-present, at UTD*): This project studies the material design of functional building envelopes using additive manufacturing. We propose to formulate inks for 3-D printing using recycled cellulose fibers and functional additives by investigating their printability and functionality.

Radiative cooling materials and systems *(2018-2022, at UB*): This project studies the material and system designs of passive daytime radiative cooling. We developed two scalable cooling materials based on polydimethylsiloxane, engineered a V-shaped double-sided cooling system, and demonstrated its effective performance in enhancing thermal comfort in buildings and cooling photovoltaic cells.

Funding Proposals Application Experience

2024 National Science Foundation (NSF) Future Manufacturing (Co-Principal Investigator)

2024 Department of Energy (DOE) Solar-thermal fuels and thermal energy storage via concentrated solar-thermal energy

2024 DOE Buildings Energy Efficiency Frontiers & Innovation Technologies (BENEFIT)

2023 UT Dallas Seed Program for Interdisciplinary Research-Sustainability (***Awarded***)

2023 DOE Advanced Research Projects Agency-Energy (ARPA-E), Exploratory Topics

2023 UT Dallas Seed Program for Interdisciplinary Research

2022 NSF Environmental Convergence Opportunities in Chemical, Bioengineering, Environmental, and Transport Systems (ECO-CBET)

Publications

***Journal articles*:**

[23] **Zhou, L.**, Manchikatla, S., John, M., Madeline, V. W., Dhakal, D., Zeng, Y., Vidal, J., Gill, S., and Cui, S., 2024, Cyclic Moisture Reactivation of Calcium Sorbents for Long Duration Thermochemical Energy Storage, *under review*.

[22] **Zhou, L.**, Feng, L., Faheem, Z. A., Zhu, L., and Cui, S., 2024, Transparent Phase Change Hydrogel for Energy-Efficient Thermal Regulation in Window Applications, *under revision*.

[21] **Zhou, L.**, Roma, A., Umer, A., Magalindan, B., Balkus Jr., K. J., and Cui, S., 2024, Synergetic Effect of Radiative Cooling and Thermal Energy Storage for Advanced Thermal Management, *under review*.

[20] Yang, K., Wu, X., **Zhou, L.**, Wu, P., Gereige, I., and Gan, Q., 2024, Bridging fundamentals and practical applications of radiative cooling for clean technology development, *Nature Reviews Clean Technology*, *accepted*.

[19] Gan, Q. and **Zhou, L.**, 2024. Synergizing radiative cooling and solar power generation. *Joule*, *8*(5), pp.1205-1207.

[18] Fang, H., **Zhou, L.**, Xu, L., Dang, S., De Wolf, S., and Gan, Q. 2024. Radiative cooling for vertical solar panels. *iScience*. 27, 108806

[17] **Zhou, L.**, Yin, X. and Gan, Q., 2023. Best practices for radiative cooling. *Nature Sustainability*, 6(9), pp.1030-1032.

[16] Wu, S., Jian, R., **Zhou, L.**, Tian, S., Luo, T., Cui, S., Zhao, B. and Xiong, G., 2023. Eggshell Biowaste-Derived Flexible and Self-Cleaning Films for Efficient Subambient Daytime Radiative Cooling. *ACS Applied Materials & Interfaces*.15(38), p. 44820–44826.

[15] Tua, D., Liu, R., Yang, W., **Zhou, L.**, Song, H., Ying, L. and Gan, Q., 2023. Imaging-based intelligent spectrometer on a plasmonic rainbow chip. *Nature Communications*, 14(1), p.1902.

[14] Xu, L., Aydin, E., De Bastiani, M., Babics, M., Liu, J., Azmi, R., Alamer, M., Salvador, M.F., Liu, W., Allen, T. and Xu, F., Kang, J., Subbiah, A., Yan, W., Rehman, A. U., **Zhou, L.**, Raja, W., Gan, Q., Liu, Z., and De Wolf, S., 2023. Parasitic Heating of Perovskite-and Silicon-Based Photovoltaics. *Advanced Energy Materials*, p.2300013.

[13] Zhang, C., Shi, B., He, J., **Zhou, L.**, Park, S., Doshi, S., Shang, Y., Deng, K., Giordano, M., Qi, X. and Cui, S., 2023. Carbon Additive Manufacturing with a Near-Replica "Green-to-Brown" Transformation. *Advanced Materials*, 35(38), p.2208230.

[12] **Zhou, L.**, Rada, J., Tian, Y., Han, Y., Lai, Z., McCabe, M.F. and Gan, Q., 2022. Radiative cooling for energy sustainability: Materials, systems, and applications. *Physical Review Materials*, 6(9), p.090201. *(invited)*

[11] **Zhou, L.**, Zhang, N., Hsu, C.C., Singer, M., Zeng, X., Li, Y., Song, H., Jornet, J., Wu, Y. and Gan, Q., 2022. Super-Resolution Displacement Spectroscopic Sensing over a Surface "Rainbow". *Engineering*, 17, pp.75-81.

[10] Rada, J., Hu, H., **Zhou, L.**, Zeng, J., Song, H., Zeng, X., Shimul, S., Fan, W., Zhan, Q., Li, W. and Wu, L., 2021. Multiple concentric rainbows induced by microscale concave interfaces for reflective displays. *Applied Materials Today*, 24, p.101146.

[9] Liu, Y., Song, H., Bei, Z., **Zhou, L.**, Zhao, C., Ooi, B.S. and Gan, Q., 2021. Ultra-thin dark amorphous TiOx hollow nanotubes for full spectrum solar energy harvesting and conversion. *Nano Energy*, 84, p.105872.

[8] **Zhou, L.**, Rada, J., Zhang, H., Song, H., Mirniaharikandi, S., Ooi, B.S. and Gan, Q., 2021. Sustainable and inexpensive polydimethylsiloxane sponges for daytime radiative cooling. *Advanced Science*, 8(23), p.2102502.

[7] **Zhou, L.**, Song, H., Zhang, N., Rada, J., Singer, M., Zhang, H., Ooi, B.S., Yu, Z. and Gan, Q., 2021. Hybrid concentrated radiative cooling and solar heating in a single system. *Cell Reports Physical Science*, 2(2). *(featured by Research News in Nature)*

[6] **Zhou, L.**, Rada, J., Song, H., Ooi, B., Yu, Z. and Gan, Q., 2021. Colorful surfaces for radiative cooling. *Journal of Photonics for Energy*, 11(4), pp.042107-042107. *(invited)*

[5] Zhang, N., Hu, H., Singer, M., Li, K.H., **Zhou, L.**, Ooi, B.S. and Gan, Q., 2020. Large-Scale Sub-1-nm Random Gaps Approaching the Quantum Upper Limit for Quantitative Chemical Sensing. *Advanced Optical Materials*, 8(24), p.2001634.

[4] **Zhou, L.**, Song, H., Liang, J., Singer, M., Zhou, M., Stegenburgs, E., Zhang, N., Xu, C., Ng, T., Yu, Z. and Ooi, B., 2019. A polydimethylsiloxane-coated metal structure for all-day radiative cooling. *Nature Sustainability*, 2(8), pp.718-724. *(featured by News & Views article in Nature Sustainability)*

[3] Li, T., Li, Z., Chen, S., **Zhou, L.**, Zhang, N., Wei, X., Song, G., Gan, Q. and Xu, Y., 2019. Efficient generation of broadband short-wave infrared vector beams with arbitrary polarization. *Applied Physics Letters*, 114(2).

[2] Song, H., Liu, Y., Liu, Z., Singer, M.H., Li, C., Cheney, A.R., Ji, D., **Zhou, L.**, Zhang, N., Zeng, X. and Bei, Z., 2018. Cold vapor generation beyond the input solar energy limit. *Advanced Science*, 5(8), p.1800222.

[1] Gao, J., Zhang, N., Ji, D., Song, H., Liu, Y., **Zhou, L.**, Sun, Z., Jornet, J.M., Thompson, A.C., Collins, R.L. and Song, Y., 2018. Superabsorbing Metasurfaces with Hybrid Ag–Au Nanostructures for Surface-Enhanced Raman Spectroscopy Sensing of Drugs and Chemicals. *Small Methods*, 2(7), p.1800045.

***Conferences and proceedings*:**

[16] **Zhou, L.**, Feng, L., and Cui, S., All-in-one composite integrating optical and thermal regulation for all-season building thermal comfort, *ASME 2024 International Mechanical Engineering Congress and Exposition (IMECE) Conference*, Portland, US, 2024.

[15] **Zhoul., L.**, Mangum, J., Dhakal, D., Zeng, Y., Avhad, R., Gill S., Vidal, J., and Cui, S., Moisture Reactivated Calcium Sorbents for Long Duration Thermochemical Energy Storage, *ASME 2024 IMECE Conference*, Portland, US, 2024.

[14] **Zhou, L.**, Faheem, Z., Cui, S., 2024, Nov., A Transparent Phase Change Hydrogel Window for Energy Efficient Building Thermal Regulation. *ASME 2024 IMECE Conference*, Portland, US, 2024.

[13] **Zhoul., L.**, Avhad, R., Mangum, J., Dhakal, D., Zeng, Y., Jungjohann, K. L., Gill S., Vidal, J., and Cui, S., Moisture Reactivation of Calcium Sorbents for Long Duration Thermochemical Energy Storage. *Materials Research Society (MRS) Fall Meeting*, Boston, US, 2024.

[12] **Zhou, L.**, Zeng, Y., Avhad, R., Vidal, J., and Cui, S., Carbon dioxide capture and storage enabled by enhanced Calcium-looping reactions. *American Chemical Society (ACS) Fall meetings*, Denver, US, 2024.

[11] **Zhou, L.**, Avhad, R., Cui, S., Synergetic Effect of Radiative Cooling and Thermal Energy Storage for Advanced Thermal Management. *MRS Spring 2024*, Seattle, US, 2024.

[10] **Zhou, L.**, Faheem, Z., Cui, S., Ultra Low-cost Phase Change Hydrogel for Building Thermal Regulation. *MRS Spring 2024*, Seattle, US, 2024.

[9] **Zhou, L.**, Faheem, Z., Magalindan, B., Wu, S., Xiong, G., Cui, S., Nanoconfined Polyethylene Glycol with Expanded Graphite for Energy-Efficient Thermal Energy Storage. *ASME 2023 Energy Sustainability (ES2023),* Washington D.C., US, 2023.

[8] Tua, D., Liu, R., **Zhou, L.**, Yang, W., Song, H., Ying, L. and Gan, Q., A plasmonic "rainbow" chip for intelligent spectrometer. *Conference on Lasers and Electro-Optics (CLEO) 2023 conference,* San Jose, US, 2023.

[7] **Zhou, L.**, Rada, J., Zhang, H., Song, H., Ooi, B.S. and Gan, Q., Sustainable porous Polydimethylsiloxane for efficient radiative cooling. *CLEO 2022 conference,* San Jose, US, 2022.

[6] Rada, J., Hu, H., **Zhou, L.**, Zeng, J., Song, H., Zeng, X., Shimul, S., Fan, W., Zhan, Q., Li, W. and Wu, L., Microscale concave interfaces for reflective displays generate concentric rainbows. *Frontiers in Optics + Laser Science 2022*. Rochester, US, 2022.

[5] **Zhou, L.**, Song, H., Zhang, N., Rada, J., Signer, M. and Gan, Q., A double-sided radiative cooling architecture with a record local cooling power density of 270 W/m2. *CLEO 2021 conference,* San Jose, US, 2021.

[4] Zhang, N., Singer, M., Li, K.H., **Zhou, L.**, Ooi, B.S. and Gan, Q., Quantum upper limit SERS from sub-1-nm random gaps for quantitative chemical and biological sensing. *CLEO 2021 conference,* San Jose, US, 2021.

[3] Liu, Y., Song, H., Singer, M.H., **Zhou, L.**, Zhang, N., Bei, Z. and Gan, Black TiO2 on nanoporous substrates for improved solar vapor generation. *CLEO 2020 conference,* San Jose, US, 2020.

[2] Zhang, N., Ji, D., Song, H., Liu, Y., **Zhou, L.**, Collins, L. and Gan, Q., Lithography-free hybrid Ag–Au super absorbing metasurfaces for addictive drug sensing. *CLEO 2019 conference,* San Jose, US, 2019.

[1] **Zhou, L.**, Song, H., Liang, J., Singer, M., Zhou, M., Stegenburgs, E., Zhang, N., Ng, T.K., Yu, Z., Ooi, B. and Gan, Q., All-day radiative cooling using beam-controlled architectures. *CLEO 2019 conference,* San Jose, US, 2019.

***Patent*:**

[1] Q. Gan, **L. Zhou**, Z. Yu, H. Song. BEAM-CONTROLLED SPECTRAL-SELECTIVE ARCHITECTURE FOR A RADIATIVE COOLER, US Patent App. 17/269,117, 2021.

Teaching & Mentoring Experience

Guest lecturer *(2024 Fall)*: served as a guest lecturer for graduate courses in the Department of Mechanical Engineering, MECH6374-Conductive and Radiative Heat Transfer.

Student mentor *(2022-present)*: mentored three Ph.D. students and two master students at UTD on their individual projects.

Student mentor (*2023 summer*): served as a mentor for five high school students in 2023 STEM bridge Summer Camp at UTD and won the 3rd place in the final competition.

Student mentor *(2018-2022*): served as a mentor for undergraduate senior design and individual graduate research projects at UB.

Teaching assistant (*2017 spring*): served as a teaching assistant for EE200-Electrical Engineering Concepts with enrollment of over 200 students at UB.

Professional Service

Membership:

- The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
- The American Society of Mechanical Engineers (ASME)
- Materials Research Society (MRS)
- Optica (formerly Optical Society of America)

Reviewer:

Served as journal reviewers for Energy & Environmental Science, Chemical Engineering Journal, ACS Applied Materials & Interfaces, ACS Applied Energy Materials, Applied energy, Photonics journal, Journal of Photonics for Energy, Materials Today Communications, Materials Today Physics.

Achievements

Award:

2022 Chinese government award for outstanding self-financed students abroad

2024 Best Poster Award – Third Place at *ASME 2024 IMECE Conference*, Portland, US, 2024.

Selected Media & Press:

[1] A heat-radiating material goes sideways to keep its cool, ***Nature*** 590, 530 (2021) Research Highlight (https://www.nature.com/articles/d41586-021-00428-x)

[2] The super-cool materials that send heat to space, ***Nature*** 577, 18 (2020) News Feature, feature article summarizing the major progress on radiative cooling, including two of my works. (https://www.nature.com/articles/d41586-019-03911-8)

[3] New sustainable cooling technology seizes the day, ***Nature Middle East*** (2019) Research