

# Siyu Zou (邹思宇)

Lecturer, Ph.D.

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University, China

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<https://zousiyu1995.github.io/zousiyu/>

Born in Songzi (松滋), Hubei, China



## Research Interests

My main research interests lie in mathematical modeling and numerical simulation of transport phenomena (fluid dynamics, mass and heat transfer, and reaction kinetics) in nature and industry. I leverage chemical engineering principles to develop multi-physics models to understand, design, and optimize these processes. Some examples of application,

- Modeling and design of biosensor, e.g, enzyme electrodes.
- Modeling and optimization of chemical reactors, e.g, fixed bed reactors, CVD reactors.
- Understanding biological systems from chemical engineering perspective, e.g, eyelashes, digestive system, cardiovascular system.

## Employment

Since 09/2024

**Lecturer**

School of Chemical Engineering, Xiangtan University, Xiangtan, Hunan Province, China

07/2021 –  
06/2024

**Post-Doc in Physical Chemistry**

College of Chemistry, Chemical Engineering and Materials Science, Soochow University, Suzhou, Jiangsu Province, China

Co-Advisors: Prof. [Xinjian Feng](#) and Prof. [Jie Xiao](#)

Project: “Mathematical Modeling of Three-Phase Interface Enzyme Electrode”

## Education

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|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 09/2016 –<br>06/2021 | <b>Ph.D. in Applied Chemistry</b><br>School of Chemical and Environmental Engineering, Soochow University, Suzhou, Jiangsu Province, China<br>Advisors: Prof. <a href="#">Xiao Dong Chen</a> and Prof. <a href="#">Jie Xiao</a><br>Dissertation: “Modeling and Simulation of Reactors with Unique Structures” (Defense 02/06/2021) |
| 09/2016 –<br>09/2018 | <b>M.Eng. in Chemical Engineering</b><br>School of Chemical and Environmental Engineering, Soochow University, Suzhou, Jiangsu Province, China<br>Advisor: Prof. <a href="#">Jie Xiao</a><br>Successive postgraduate and doctoral programs of study. Transferred to Ph.D. in Applied Chemistry                                     |
| 09/2012 –<br>06/2016 | <b>B.Eng. in Chemical Engineering</b><br>School of Chemical Engineering and Pharmacy, Jingchu University of Technology, Jingmen, Hubei Province, China                                                                                                                                                                             |

## Skills

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|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Expertise</b>                 | Chemical Engineering, Transport Phenomena, Fluid Mechanics, Mass Transfer, Heat Transfer, Reaction Engineering, Reacting Flows, Porous Media, Incompressible Flows, Chemical Process Intensification, Process Modeling and Simulation, Mathematical Modeling, Numerical Simulation |
| <b>Modeling &amp; Simulation</b> | Physics-Based Modeling, Continuum Modeling, Multi-Physics Modeling, Multi-Scale Modeling, Machine Learning, Deep Learning, Differential Equation, Finite Element Method (FEM), Computational Fluid Dynamics (CFD), Turbulence Modeling, Moving Mesh                                |
| <b>Software</b>                  | ANSYS Fluent, COMSOL Multiphysics, MATLAB, $\LaTeX$ , Pandas, Numpy, Matplotlib, Linux, Blender                                                                                                                                                                                    |
| <b>Programming</b>               | MATLAB, Python, C, Algorithms, Data Structures                                                                                                                                                                                                                                     |
| <b>Languages</b>                 | Chinese (native speaker), English (intermediate)                                                                                                                                                                                                                                   |

## Honours and Awards

- 01/12/2024 **Best Oral Presentation Award:** In the 4<sup>th</sup> National Conference on Process Modeling and Simulation (hosted by South China University of Technology), my talk “Mathematical Modeling of Three-Phase Interface Enzyme Electrode” was honored with the Best Oral Presentation Award. This work has been published in [AIChE Journal](#) and [Industrial & Engineering Chemistry Research](#).
- 07/2022 **Jiangsu Funding Program for Excellent Postdoctoral Talent:** This funding is provided by the Jiangsu provincial government.
- 16/07/2020 **Best Student Oral Presentation Award:** In the 2<sup>nd</sup> National Conference on Process Modeling and Simulation, my talk on eyelashes (“Inhibition of Ocular Water Evaporation by Eyelashes: Computer Simulation and Mechanism Analysis”) was honored with the Best Student Oral Presentation Award (1 of 12 awardees out of 62 student talks). This work has been published in [Journal of the Royal Society Interface](#). This conference was organized by the [Simulation & Virtual Process Engineering Committee](#), one of the professional committees of the [Chemical Industry and Engineering Society of China \(CIESC\)](#).

## Publications

- [Google Scholar](#): 114 citations, 5 h-index, 4 i10-index.
- [Research Gate](#): 100 citations, 5 h-index.
- Also find me on [ORCID](#), [ScholarGPS](#), and [Github](#).
- ∇ denotes the corresponding author.

## Main Publications

7. Siyu Zou, Jie Xiao<sup>∇</sup>, and Xinjian Feng<sup>∇</sup>. “Engineering a Three-Dimensional Three-Phase Interface for Enhanced Enzymatic and Electrochemical Cascade Reactions”. In: *In preparation* (2025)
6. Siyu Zou, Jie Xiao<sup>∇</sup>, and Xiao Dong Chen<sup>∇</sup>. “A Comprehensive Comparison of Different RANS Turbulence Models in Modeling Turbulent Plane Jets”. In: *In preparation* (2025)
5. Siyu Zou, Jie Xiao<sup>∇</sup>, and Xinjian Feng<sup>∇</sup>. “Modeling Enzymatic and Electrochemical Cascade Reactions at the Three-Phase Interface Enzyme Elec-

- trode”. In: *AIChE Journal* 70.6 (Mar. 2024), e18420. ISSN: 1547-5905. DOI: [10.1002/aic.18420](https://doi.org/10.1002/aic.18420)
4. Siyu Zou, Dandan Wang, Jie Xiao<sup>▽</sup>, and Xinjian Feng<sup>▽</sup>. “Mathematical Model for a Three-Phase Enzymatic Reaction System”. In: *Industrial & Engineering Chemistry Research* 62.10 (Mar. 2023), pp. 4337–4343. ISSN: 1520-5045. DOI: [10.1021/acs.iecr.2c04492](https://doi.org/10.1021/acs.iecr.2c04492)
  3. Siyu Zou, Jie Xiao<sup>▽</sup>, Viola Wu, and Xiao Dong Chen<sup>▽</sup>. “Analyzing Industrial CVD Reactors Using a Porous Media Approach”. In: *Chemical Engineering Journal* 415 (July 2021), p. 129038. ISSN: 1385-8947. DOI: [10.1016/j.cej.2021.129038](https://doi.org/10.1016/j.cej.2021.129038)
  2. Siyu Zou, Jinping Zha, Jie Xiao<sup>▽</sup>, and Xiao Dong Chen. “How Eyelashes Can Protect the Eye through Inhibiting Ocular Water Evaporation: A Chemical Engineering Perspective”. In: *Journal of The Royal Society Interface* 16.159 (Oct. 2019), p. 20190425. ISSN: 1742-5662. DOI: [10.1098/rsif.2019.0425](https://doi.org/10.1098/rsif.2019.0425)
  1. Siyu Zou, Ersuo Ling, Shurong Le, Shengpeng Sun, Zhangxiong Wu, Xiao Dong Chen, Duo Wu, and Jie Xiao<sup>▽</sup>. “Numerical Simulation and Analysis of the Catalytic Ozonation Reactor”. In: *Chemical Industry and Engineering Progress* 38.9 (May 15, 2019), pp. 3969–3978. ISSN: 1000-6613. DOI: [10.16085/j.issn.1000-6613.2018-2476](https://doi.org/10.16085/j.issn.1000-6613.2018-2476) (In Chinese)

## Other Publications

5. Kaixin Li, Siyu Zou, Jun Zhang<sup>▽</sup>, Yang Huang, Lin He<sup>▽</sup>, and Xinjian Feng<sup>▽</sup>. “Superhydrophobicity-Enabled Efficient Electrocatalytic CO<sub>2</sub> Reduction at a High Temperature”. In: *ACS Catalysis* 13.14 (June 2023), pp. 9346–9351. ISSN: 2155-5435. DOI: [10.1021/acscatal.3c01444](https://doi.org/10.1021/acscatal.3c01444)
4. Xiao Dong Chen<sup>▽</sup> and Siyu Zou. “Reaction Engineering Approach to Turbulence Modelling—Universal Law of the Wall, Pipe Flow, and Planar Jet Flow”. In: *Journal of Chemical Engineering of Japan* 54.1 (Jan. 2021), pp. 1–11. ISSN: 1881-1299. DOI: [10.1252/jcej.20we056](https://doi.org/10.1252/jcej.20we056)
3. Jinping Zha, Siyu Zou, Jianyu Hao, Xinjuan Liu, Guillaume Delaplace, Romain Jeantet, Didier Dupont, Peng Wu, Xiao Dong Chen, and Jie Xiao<sup>▽</sup>. “The Role of Circular Folds in Mixing Intensification in the Small Intestine: A Numerical Study”. In: *Chemical Engineering Science* 229 (Jan. 2021), p. 116079. ISSN: 0009-2509. DOI: [10.1016/j.ces.2020.116079](https://doi.org/10.1016/j.ces.2020.116079)

2. Hongtao Xia, **Siyu Zou**, and Jie Xiao<sup>▽</sup>. “Numerical Simulation of Shear-Thinning Droplet Impacting on Randomly Rough Surfaces”. In: *CIESC Journal* 70.2 (Feb. 5, 2019), pp. 634–645. ISSN: 0438-1157. DOI: [10.11949/j.issn.0438-1157.20181213](https://doi.org/10.11949/j.issn.0438-1157.20181213) (In Chinese)
1. Jie Xiao<sup>▽</sup>, Fei Pan, Hongtao Xia, **Siyu Zou**, Hui Zhang, Oluwafemi Ayodele George, Fei Zhou, and Yinlun Huang. “Computational Study of Single Droplet Deposition on Randomly Rough Surfaces: Surface Morphological Effect on Droplet Impact Dynamics”. In: *Industrial & Engineering Chemistry Research* 57.22 (May 2018), pp. 7664–7675. ISSN: 1520-5045. DOI: [10.1021/acs.iecr.8b00418](https://doi.org/10.1021/acs.iecr.8b00418)

## Conference Presentations

- |                       |                                                                                                                                                                                                                                    |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 29/11 –<br>01/12/2024 | Contributed Talk, Mathematical Modeling of Three-Phase Interface Enzyme Electrode, The 4 <sup>th</sup> National Conference on Process Modeling and Simulation, Guangzhou, China                                                    |
| 16/07 –<br>17/07/2020 | Contributed Talk, The Inhibitory Effect of Eyelashes on Water Evaporation on Ocular Surface: Computer Simulation and Mechanism Analysis, The 2 <sup>nd</sup> National Conference on Process Modeling and Simulation, Online, China |
| 25/08 –<br>27/08/2018 | Poster, Multiscale Numerical Simulation of the Catalytic Ozonation Reactor for Wastewater Treatment, The 1 <sup>st</sup> National Conference on Process Modeling and Simulation, Shanghai, China                                   |

## Research Grants

- |                      |                                                                                                                                                                               |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 01/2025 –<br>12/2030 | <b>Mathematical Modeling of Three-Phase Interface Enzyme Electrode</b><br>Funded by Xiangtan University (KZ0809969)<br>Budget: CNY 100,000<br>Role: Proposal, Project Manager |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Research Project Participations

- 06/2020 – 05/2025      **High-Efficiency Enzyme Catalysis and Sensing System at Nanointerface**  
Funded by Ministry of Science and Technology of the People's Republic of China (2019YFA0709200)  
Budget: CNY 21,760,000  
Role: Post-Doc, Researcher
- 01/2020 – 12/2023      **Basics of Particle Structure Control and Process Optimization of Uniform Particle Size Droplet Spray Drying Products at Multi-Scale Levels**  
Funded by National Natural Science Foundation of China (21978184)  
Budget: CNY 650,000  
Role: PhD student, Researcher

## Teaching

- Fall 2024      **Virtual Simulation of Chemical Technology & HAZOP Safety Analysis**, undergraduate level, 2 credits, 34 students.

Last updated: 21/03/2025