

# Siyu Zou (邹思宇)

Lecturer, Ph.D.

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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

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

## Skills

<b>Expertise</b>	Chemical Engineering, Process System Engineering, Transport Phenomena, Mathematical Modeling, Numerical Simulation, Fluid Mechanics, Mass Transfer, Heat Transfer, Reaction Engineering, Reacting Flows, Porous Media, Incompressible Flows, Chemical Process Intensification
<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, L <sup>A</sup> T <sub>E</sub> X, 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

▽ denotes the corresponding author. Also find me on [Google Scholar](#), [Research Gate](#), [ORCID](#), [ScholarGPS](#), and [Github](#).

### Main Publications

7. **Siyu Zou**, Jie Xiao<sup>▽</sup>, and Xinjian Feng<sup>▽</sup>. “Engineering Enzyme Electrode with 3d Three-Phase Interface to Boost Enzymatic and Electrochemical Cascade Reactions”. In: *Chemical Engineering Science* 318 (Dec. 2025), p. 122189. ISSN: 0009-2509. doi: [10.1016/j.ces.2025.122189](https://doi.org/10.1016/j.ces.2025.122189)
6. **Siyu Zou**<sup>▽</sup>, Jie Xiao, and Xiao Dong Chen<sup>▽</sup>. “A Comprehensive Comparison of Different Reynolds-Averaged Navier–Stokes Turbulence Models in Modeling Turbulent Plane Jets”. In: *ACS Omega* 10.19 (May 20, 2025), pp. 19873–19886. ISSN: 2470-1343. doi: [10.1021/acsomega.5c01448](https://doi.org/10.1021/acsomega.5c01448)
5. **Siyu Zou**, Jie Xiao<sup>▽</sup>, and Xinjian Feng<sup>▽</sup>. “Modeling Enzymatic and Electrochemical Cascade Reactions at the Three-Phase Interface Enzyme Electrode”. 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

8. Zhiping Liu, **Siyu Zou**, Xi Chen, Lihui Huang, Xia Sheng<sup>▽</sup>, and Xinjian Feng<sup>▽</sup>. “Interfacial Microenvironment and Catalyst Modulation for Efficient Hydrogen Peroxide Synthesis via Mimicking Oxidase Catalysis”. In: *Materials Horizons* (2026), 10.1039.D5MH01332A. ISSN: 2051-6347, 2051-6355. doi: [10.1039/D5MH01332A](https://doi.org/10.1039/D5MH01332A)
7. Tianmin Wang, **Siyu Zou**, Peng Wu, Renpan Deng, Chaoping Fu, Changyong Li<sup>▽</sup>, and Ai-Zheng Chen. “CFD Modeling of Flow, Mixing, Digestion, and Absorption in the Small Intestine”. In: *Food Engineering Reviews* (Dec. 2025). ISSN: 1866-7910, 1866-7929. doi: [10.1007/s12393-025-09421-w](https://doi.org/10.1007/s12393-025-09421-w)
6. Xi Chen, Xia Sheng<sup>▽</sup>, **Siyu Zou**, Zhiping Liu, Jingyu Lu, Zhao Yue Tan, and Xinjian Feng<sup>▽</sup>. “Creation of a Triphasic Reaction Interface to Boost Colloidal Photooxidation under Visible Light”. In: *Langmuir* 41.33 (Aug. 26, 2025), pp. 22152–22159. ISSN: 0743-7463, 1520-5827. doi: [10.1021/acs.langmuir.5c02306](https://doi.org/10.1021/acs.langmuir.5c02306)
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

- 21/09 – 19/09/2025 Contributed Talk, “Construction of a Multiphase Reaction-Diffusion Model for Three-Phase Interface Enzyme Electrodes and Its Guidance for Electrode Optimization”, The 4<sup>th</sup> Symposium on Simulation Methods and Technologies in Process Industries, Changsha, China.
- 04/08 – 06/08/2025 Contributed Talk, “Mathematical Modeling of Three-Phase Interface Enzyme Electrode”, Young Scholar Forum, The 17<sup>th</sup> Annual Conference of the Global Academy of Chinese Chemical Engineering Scholars (GACCE-2025), Zhengzhou, China.
- 29/11 – 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 – 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 – 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 – 12/2030 **Mathematical Modeling of Three-Phase Interface Enzyme Electrode**  
Funded by Xiangtan University (KZ0809969)  
Budget: CNY 100,000  
Role: Proposal, Project Manager

## Research Project Participations

06/2020 – 05/2025	<b>High-Efficiency Enzyme Catalysis and Sensing System at Nanointerface</b> 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	<b>Basics of Particle Structure Control and Process Optimization of Uniform Particle Size Droplet Spray Drying Products at Multi-Scale Levels</b> Funded by National Natural Science Foundation of China (21978184) Budget: CNY 650,000 Role: PhD student, Researcher

## Student Supervision

### Master Students

1. Qi Peng (彭琦), 2025, Master thesis, xxx, Supervisor.
2. Chongyang Bu (卜重阳), 2025, Master thesis, xxx, Supervisor.

## Teaching

Spring 2026	<b>Analysis and Synthesis of Chemical Processes</b> , undergraduate level, 3 credits, x students.
Fall 2025	<b>Principles of Food Engineering</b> , undergraduate level, 3 credits, 62 students.
Fall 2024	<b>Virtual Simulation of Chemical Technology &amp; HAZOP Safty Analysis</b> , undergraduate level, 2 credits, 34 students.

Last updated: 05/01/2026