Pangmiaomiao Zhang

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EDUCATION

University of Texas at Austin — Aug 2022 - Present
Department of Chemistry / PhD — GPA: 3.95/4.00

Tsinghua University — Sep 2019 - Jun 2022
Department of Chemistry / Master — GPA: 3.90/4.00 (top 3)

Southern University of Science and Technology — Sep 2015 - Jun 2019
Department of Chemistry / Bachelor — GPA: 3.85/4.00 (top 5%)

RESEARCH EXPERIENCE

Department of Chemistry, UT Austin — Advisor: Prof. Yi-Chih Lin

Real-time Structural and Functional Studies of SARS-CoV-2 Spike Proteins and Interactions with Related Biomolecules *(In progress)* — Feb 2023 - Present

- Visualized single spike protein, ACE2 and neutralizing antibody (NTD binder) using high speed atomic force microscopy (HS-AFM) and compared with simulated AFM images
- Analyzed single molecule dynamics of neutralizing antibody
- Investigated interactions between spike protein and neutralizing antibody
- *This research is supported by a NIH Maximizing Investigators' Research Award ($1.95M)*

Real-time Visualization of G2L4 Reverse Transcriptase in DNA Repair by Microhomology-Mediated End Joining *(Manuscript in preparation)* — Nov 2023 - Present

- Investigated single-molecule structure and dynamics of G2L4 and DNA substrates (MMEJ) using HS-AFM
- Visualized binding modes of G2L4 and MMEJ substrates using HS-AFM
- Uncovered diverse DNA repair products and potential repair mechanism
- Studied DNA ligation of DNA products using T4 ligase

Structural and Functional Investigation of SARS-CoV-2 Membrane Proteins *(In progress)* — Dec 2024 - Present

- Prepared and characterized membrane protein in *E.coli* system
- Reconstituted membrane proteins in lipid and visualized the formation of membrane protein lattice using HS-AFM and TEM
- Visualized membrane protein proteoliposomes using cryo-electron tomography (cryo-ET) *(collaborating with Dr. Zunlong Ke lab)*

Department of Chemistry, Tsinghua University — Advisor: Prof. Chunyan Tan

Analyzing Amyloid Beta 42 Aggregates with a Fluorescence Sensor Array *(Published, first author)* — Jan 2021 - Apr 2022

- Prepared different aggregation states of amyloid beta peptide, and characterized them using transmission electron microscopy (TEM) and CD spectrometer
- Discriminated different aggregation states using fluorescence sensor array containing conjugated polyelectrolytes and small molecules, and analyzed by PCA and LDA algorism written by Matlab
- Prepared of on-pathway and off-pathway aggregates by adding various stimuli, and discriminated them using the constructed fluorescence sensor array
- Explored aggregation kinetics using the constructed fluorescence sensor array

Detection of Histone Acetylation Related Enzymes Using Conjugated Polyelectrolytes Nov 2019 - Jan 2021

- Synthesized conjugated polymer PPE-IDA through Sonogashira coupling and characterized the spectroscopic properties
- Designed some polylysine peptide substrates of acetylation-related enzymes (p300 and SIRT1), and explored their interaction with several conjugated polyelectrolytes
- Explored the optimal catalytic condition of enzymes
- Utilized peptide-polymer probes to detect p300 and SIRT1

Fluorescence Sensor Array for Discrimination of Urine Proteins and Differentiation Diagnosis of Urinary System Diseases *(Published, third author)* Nov 2018 - May 2019

- Constructed three-unit fluorescence sensor array and realized discrimination of six common urine proteins, their different concentrations and their complex mixtures
- Processed real urine samples with centrifugation, filtration and dialysis
- Distinguished protein profiles of urine samples from healthy people and patients with different urine diseases, such as tubular injury, diabetic nephropathy and nephropathy

Department of Chemistry, Southern University of Science and Technology Advisor: Associate Prof. Pengfei Li

Phosphine-Catalyzed Enantioselective [1+4] Annulation of Morita-Baylis-Hillman Carbonates with α,β-Unsaturated Imines *(Published, co-first author)* Mar 2018 - Sep 2018

- Established an organic methodology using phosphine catalyst for [4+1] cycloaddition of unsaturated imine and MBH ester with a wide range of substituent groups to obtain chiral 2-pyrrolines with high yields and good enantioselectivities
- Familiar to use glove box for synthesis, column chromatography for purifying chemicals, and HPLC/NMR to characterize reaction products

A Catalyst-Free Cycloaddition Reaction: Access to Spiro[chroman-3,2'-indene-1',3'-dione] Scaffolds *(Published, third author)* Mar 2017 - Oct 2017

- Constructed a facile [3+2] cycloaddition reaction to obtain spiro[chroman-3,2'-indene-1',3'-dione] which incorporated two biologically active scaffolds without need of catalysts and complex operation
- Products with high yields were obtained and characterized by NMR, HPLC and X-ray crystallography

PUBLICATIONS, POSTERS&PATENTS

- **Zhang, P.**; Chou, C.-W.; Finkelstein, I. J.; Lin, Y.-C., Real-Time Visualization of Intermolecular Interactions between SARS-CoV-2 Spike Protein and NTD-Binding Antibody Using High-Speed Atomic Force Microscopy. *Biophys. J.* **2024,** *123* (3), 196a. **(Poster)**
- **Zhang, P.**; Tan, C., Cross-Reactive Fluorescent Sensor Array for Discrimination of Amyloid Beta Aggregates. *Anal. Chem.* **2022,** *94*, 5469-5473.
- Shen, Y.; Huang, Y.; **Zhang, P.**; Guo, B.; Jiang, H.; Tan, C.; Jiang, Y., Fluorescence Sensor Array for Discrimination of Urine Proteins and Differentiation Diagnosis of Urinary System Diseases. *ACS Applied Bio Materials* **2020**, *3* (9), 5639-5643.
- Qian, C.*; **Zhang, P.***; Li, W.; Li, P., Phosphine Catalyzed Enantioselective [1 + 4]-Annulation of Morita-Baylis-Hillman Carbonates with α,β-Unsaturated Imines. *Asian Journal of Organic Chemistry* **2019**, *8*, 242-245. **(*Qian and Zhang contributed equally)**
- Han, Y.; Zhu, Y.; **Zhang, P.**; Li, W.; Li, P., A Catalyst-Free Cycloaddition Reaction: Access to Spiro [chroman-3,2'-indene-1',3'-dione] Scaffolds. *ChemistrySelect* **2017**, *2* (35), 11380-11383.
- Li, P.; Qian, C.; **Zhang, P.**, Method for efficient synthesis of optically active 2-pyrroline compound with catalysis of asymmetric organic phosphine. China National Patent, CN 201811539457.4. **(Patent)**

PROFESSIONAL EXPERIENCES

Associate Consultant, Texas Venture Lab Jan 2025 – May 2025

- Collaborated with cross-disciplinary teams at Texas Venture Lab to conduct market research, competitive analysis, and financial modeling to support investment decisions of Synvect, a biological start-up company which applies novel gene-editing method to control mosquito populations.

Project Manager, SUSTech Volunteer Association Sep 2016 – Jun 2017

- Led and organized community service activities (Blood Donation, Charity Flower Sale, Earth Hour, etc.); achieved a top-five ranking in internal evaluations, reflecting substantial contributions to the club and significant volunteer hours
- Contributed over 51 hours as a volunteer in various initiatives throughout Shenzhen, including significant involvement in the 'Assisting Young Migratory Birds' project, where I provided after-school tutoring to underprivileged children.

SCHOLARSHIPS&AWARDS

Outstanding M.Sc. Thesis Award, Tsinghua University	Jun 2022
Outstanding Master Graduate of 2022, Tsinghua University	Jun 2022
Integrated second-class scholarship, SIGS, Tsinghua University	Oct 2021
Performance Team in 2020 SDG Open Hack @ Tsinghua University	Nov 2020
Tsinghua-Shanghai HuaYi Scholarship, Tsinghua (top 5%)	Oct 2020
Outstanding B.Sc. Thesis Award, SUSTech	Jun 2019
Outstanding Graduate of 2019, SUSTech	May 2019
Outstanding Volunteer of Zhixin College, SUSTech	2017
Merit-Based Undergraduate Scholarship, SUSTech	2016, 2017, 2018
Outstanding Freshmen Award, SUSTech	Sep 2015

SKILLS

- **Operation:** HS-AFM, NMR, HPLC-MS, CD spectrometer, fluorescence spectrometer, UV-vis spectrophotometer, microplate reader, Nanodrop, TEM, cryo-EM, etc.
- **Experiments:** Protein expression, column chromatography, glove box, protein and DNA gel electrophoresis, etc.
- **Softwares:** Python, ChimeraX, ImageJ, Adobe Illustrator, IgorPro, Origin, Chemdraw, MestReNova, Endnote, Zotelo, Matlab, Scifinder, Final Cut Pro, etc.