Yuchen Zhang

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Research Areas

Bio-composite, interfacial phenomena, defect engineering, adsorption, stimuli-responsive materials, green energy, soft robots, silk, *B. subtills*, silk, 2D materials, molybdenum disulfide, food science.

Education

Ph.D. May 2028 (Expected)	Chemical Engineering, The City College of New York, CUNY Thesis: Functional bio-composites for water-responsive applications Advisor: Dr. Xi Chen
M.S. May 2023	Chemical Engineering, New York University Thesis: Surface engineering of colloidal MoS_2 nanosheets for tuning hydrodesulfurization catalytic performance (link) Advisor: Dr. Ayaskanta Sahu
B.S. May 2020 Dual-degree program	Biological Engineering, Beijing University of Chemical Technology Bioprocess Engineering (*magna cum laude*), SUNY College of Environmental Science and Forestry

Publications

1. **Zhang Y**, Sun C, Wong E, Khan MK, Podbevšek D, MacSwain W, Tu R.S*, Chen X*. Interfacial water confinement couples hygroactuation and mechanical robustness in free-standing bio-composites. *Advanced Functional Materials* (2026), e77708.
2. Fang S, **Zhang Y**, Khan MK, Chen X, Voiculescu I*. Water-property-dependent impedance modulation for silk-based humidity sensor. *Sensors & Actuators: A. Physical*, 409, 118148 (2026).
3. Farrell SL, Osinski N, Paredes IJ, Ebrahim AM, Zheng H, **Zhang Y**, Oyuela C, Ma L, Ehrlich SN, Rangarajan S*, Frenkel AI*, Sahu A*. Basal plane doping to activate colloidal MoS_2 nanosheets for catalytic hydrodeoxygenation of para-cresol. *ACS Applied Materials & Interfaces*, 18, 20838 (2026).
4. Khan MK, Athiyarath V, Podbevšek D, Jung Y, Kim S, **Zhang Y**, Kilavuz-Ecker G, Tu RS, Chen X*. Modulating water-responsive actuation energy of regenerated silk fibroin *via* tyrosine modification. *Soft Matter*, 21, 4150–4155 (2025).
5. MacSwain W, Zhang S, Wang T, Sun C, K.T. S, **Zhang Y**, Shu E, Khan MK, Tu RS*, Chen X*. Nanoscale domain architecture dictates hydration-force transmission in biomaterials, submitted.

Presentations

1. Oral presentation. **Zhang Y**, Chen, X*. Interfacial water confinement enables enhanced water-responsive actuation in free-standing bio-composites. *CUNY ASRC 2nd Annual Nanoscience Day*. 2026 June 17; New York, NY.
2. Oral and poster presentation. **Zhang Y**, Chen X*. Engineering cell-containing free-standing films for scalable water-responsive actuation. *CCNY 2026 ChE Graduate Research Symposium*. 2026 April 16; New York, NY.

3. Oral presentation. **Zhang Y**, Evaporation energy. *Guest Scientist Field Trip Talk*. 2026 July 16; New York, NY.
4. Oral presentation. **Zhang Y**, My journey into nanoscience graduate research assistant. *Guest Scientist Field Trip Talk*. 2025 February 27; New York, NY.

AWARDS

- Wasserman Center Internship Grant, New York University, 2022 ($1,000)
- Merit-based scholarship, New York University, 2021 and 2022 ($7,000/school year)

RESEARCH AND INDUSTRY EXPERIENCE

Graduate Research Assistant, Advanced Science Research Center at CUNY, New York, New York, USA
Nov. 2023-Present, Advisor: Dr. Xi Chen

- Designed and optimized biomaterials and bio-composites with tunable pore size to control confined water and enhance hydrogel actuation performance.
- Directed a mechanistic study of cell-silk interfacial interactions using SEM, FTIR, DVS, and mechanical testing, linking interfacial structure and water behavior to composite performance and guiding process optimization.
- Led process development and scale-up of bacterial cell culture and biomaterial-film fabrication, improving product yield by 48% and reducing production time. Established scalable hot-pressing and blade-casting processes for macroscale films.
- Established and standardized laboratory workflows by developing SOPs for material fabrication, tensile testing, DVS, and lyophilization; collaborated with a vendor engineer and research group mate to diagnose and resolve lyophilizer temperature-control issues and the DVS pressure sensor for reliable measurements.
- Authored and co-authored 4 journal publications, 1 patent application, and 2 annual grant renewal reports.

Graduate Research Assistant, New York University, Brooklyn, New York, USA
Jun. 2022-May 2023, Advisor: Dr. Ayaskanta Sahu

- Synthesized ligand-free MoS_2 catalysis to investigate structure-property relationships in hydrodeoxygenation performance.
- Performed SEM-EDX to study surface features and composition of synthesized catalysts.

Administrative Intern, Dermatology and Immunology Medical Science Liaison Team, Sanofi (China) Investment Co., Ltd., Beijing, China
Nov 2020-Apr. 2021, Supervisor: Dr. Xiaoqing Li, D&I MSL Lead

- Managed data for 700+ key opinion leaders (KOLs), medical meetings, and doctors' insights using Excel.
- Designed templates for a 30+ member team to ensure consistency using PowerPoint/Word.
- Coordinated and scheduled in-person and virtual meetings for the D&I MSL Lead. Recorded meeting minutes.

Undergraduate Research Assistant, Chinese Academy of Agricultural Sciences, Beijing, China
Feb. 2019-Jul. 2019, Advisor: Dr. Jie Zhang

- Monitored grapes' freshness over storage time by measuring enzyme (SOD, POD, CAT) activities using UV-vis.
- Performed sample preparation for HPLC quantification of vitamin C, four B vitamins, and carbohydrates in 96 food samples.

MENTORING EXPERIENCE

Undergraduate Students (3)
Feb. 2025-present, Xi Chen Research Lab

- Supervised 3 undergraduate students on projects related to bio-composite and material applications: mentored them in laboratory techniques, data interpretation, and presentation of results. Mentored 1 oral and 2 poster presentations.
- One student co-authored on 1 journal publication.

Undergraduate Mentees

2026-present	Sofia Alsailani — Velay Summer Undergraduate Research Fellow Chemical Engineering, Class of 2028
2026-present	Sambou Toure — Transfer to STEM Student Success Summer Undergraduate Research Fellow Chemical Engineering, Class of 2028
2025-2026	Erica Wong Chemical Engineering, Class of 2027

TEACHING EXPERIENCE

Teaching Assistant
Sep. 2024-present, The City College of New York, CUNY, New York, New York, USA

- **Introduction to Nanotechnology** (CHEM 78500, Spring 2026): Created grading rubrics, course schedule, and syllabus by coordinating 6 instructors and organizing 3 lab demonstration sessions. Hosted office hours and provided feedback on scientific proposals, reports, and presentations.
- **Chemical Reaction Engineering** (CHE 43200, Fall 2024): Led weekly recitations, engaged with a group of 7 to 9 students by breaking down important concepts and fostering a collaborative environment. Collaborated with the instructor to provide weekly homework feedback and evaluating exam problems.

English Teacher
Feb. 2017, School of Lily English, Beijing, China

- Taught English as a second language to children ages 6-12 in an English winter camp program, leading daily reading and singing activities.

SERVICE AND OUTREACH

Research Laboratory Coordinator
Mar. 2026-present, Xi Chen Research Lab, New York, New York, USA

- Planned in-person lab events, including thesis defense receptions hosting 40+ attendees.
- Maintained and updated the lab's website using WordPress.
- Oversaw lab inventory and purchased lab supplies. Managed the payment of invoices and reimbursements.

Guest Scientist Speaker
Feb. 2025-present, The CUNY ASRC IlluminationSpace Hub, New York, New York, USA

- Communicated water-responsive materials research to K-12 students through presentations, hands-on demonstrations using cellophane and adhesive tape, and facilitated Q&A sessions.

Science Community Outreach Volunteer
Feb. 2025-present, BioBus, New York, New York, USA

- Lead science demonstrations and hands-on activities for the local community.