

Yuchen Wu

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QUALIFICATION SUMMARY

Materials Scientist with over 9 years of experience in materials formulation design, materials characterization, MD simulation and data analysis. With 5 years of hands-on experience in the cleanroom. Expertise in collaborating and conveying technical insights to industrial partners.

EDUCATION

Ph.D. in Macromolecular Science and Engineering 09/2021 - 08/2025

University of Michigan Ann Arbor, United States

Cumulative GPA: 3.97/4.00, Rackham Predoctoral Fellowship (Awarded to 5% of Ph.D.)

M.S. in Materials Science and Engineering 09/2019 - 04/2021

University of Michigan Ann Arbor, United States

Cumulative GPA: 4.00/4.00

B.E. in Macromolecular Materials and Engineering 09/2015 - 06/2019

Nanjing Tech University Nanjing, China

Cumulative GPA: 3.55/4.00

SKILLS AND LEADERSHIP

Software: Materials Studio, GROMACS, C++, Python, MATLAB, AutoCAD

Material Characterization: SFG, FTIR, XPS, AFM, SEM, XRD, Ellipsometer, Raman, TGA, Circular Dichroism, Instron, Plasma Cleaner, UV-VIS, DSC, Profilometer, Contact Angle Goniometer.

Cleanroom: PVD, PECVD, ALD, Plasma cleaner, HF cleaning process

Lab Instrument and Safety Manager: Maintain and repair three laser systems (1 fs-laser and 2 ps-laser). Oversee all aspects of lab safety (Instrument operations, chemical handling and safety check).

Lab Mentoring: Trained 10+ new students (Experiment design, instruments, simulations and lab safety)

Industrial Collaborations: Collaborate with Dow, BASF, Ford and Merck on 7 projects.

Teaching: Taught General Chemistry Lab as Graduate Student Instructor. (2021, 2022)

SELECTED PUBLICATIONS AND CONFERENCES

18 co-author papers, 5 first-author papers, 5 papers under review or in preparation (2 first-author papers), 5 conference presentations (2 oral and 3 poster)

- **Wu, Y.**, Gandhi, Z., Rossi, D., Guo, W., Chen, X., Gomez, F., Lu, T., Smith, J.P., Deng J.Z. & Chen, Z. (2025). Investigating Interfacial Interactions between Adjuvant and Antigens in Pneumococcal Conjugate Vaccine in Situ at the Molecular Level. (*Under Review by Analytical Chemistry*).
- **Wu, Y[&]**, Rossi, D[&], Wu, G., Bilby, D., Getsoian, A. B., Kempema, N. J., & Chen, Z. (2025). In Operando and Ex Situ Investigation of the Formation and Aging Processes of SEI/CEI C–H Chemistry in Liquid Electrolyte Lithium-Ion Batteries. *J. Phys. Chem. Lett.*, 16, 2759-2763.
- **Wu, Y.**, Rossi, D., Labrague, G., Li, R., Santos, E., Ahn, D., ... & Chen, Z. (2024). Environmental Effects on the Interfacial Chemical Reactions at RTV Silicone–Silica Interfaces. *Langmuir*, 40(49), pp.26303-26313.

- **Wu, Y.,** Lin, T., Santos, E., Ahn, D., Marson, R., Sarker, P., ... & Chen, Z. (2024). Molecular behavior of silicone adhesive at buried polymer interface studied by molecular dynamics simulation and sum frequency generation vibrational spectroscopy. *Soft Matter*, 20(24), 4765-4775.
- **Wu, Y.,** Wang, T., Fay, J.D., Zhang, L., Hirth, S., Hankett, J. and Chen, Z., (2023). Silane Effects on Adhesion Enhancement of 2K Polyurethane Adhesives. *Langmuir*, 39(51), pp.19016-19026.
- **Wu, Y.,** Wang, T., Gao, J., Zhang, L., Fay, J.D., Hirth, S., Hankett, J. and Chen, Z., (2023). Molecular behavior of 1K polyurethane adhesive at buried interfaces: Plasma treatment, annealing, and adhesion. *Langmuir*, 39(9), pp.3273-3285.
- **47th Adhesion Society (2024)**
- **ACS Fall (2024)**
- **248th ECS Meeting (2025)**

RESEARCH EXPERIENCE

Surfaces and interfaces, Thin films deposition, Etching inhibitor, Electronic materials, Lithium battery, Problem solving, Spectroscopy, Process optimization, Coating, Ultrafast laser, Optics **Materials for semiconductor applications (Collaboration with BASF)**

- ✓ Developed a methodology for rapidly (2 min) achieving high-quality self-assembled monolayer (SAM) deposition of etching inhibitors (ODPA) on copper coated wafer surfaces.
- ✓ Developed an analytical methodology integrating XPS and SFG data to quantitatively assess the surface coverage, molecular orientation, and quality of ODPA thin films.
- ✓ Combined AFM and Ellipsometer to measure the thickness and of the ODPA monolayer film.
- ✓ Optimized the deposition process to achieve high-quality, uniform silica and metal thin coatings.
- ✓ Correlated the ultrafast dynamics of semi-conducting polymers with their conducting performance using time-resolved pump-probe SFG experiments.

Surfaces and Interfaces (Collaboration with DOW, BASF)

- ✓ Nondestructively unveiled the working mechanisms of the polydimethylsiloxane (PDMS) adhesives and polyurethane (PU) adhesives at the molecular level by Sum Frequency Generation (SFG) Vibrational Spectroscopy and Molecular Dynamics (MD) simulation.
- ✓ Molecularly understood the effects of additives (Silane, Fillers) and surficial modifications (Plasma treatment, Silylation) on the adhesion between polymer adhesives and substrates by FTIR, AFM, XPS, and SFG.
- ✓ Developed Python and C++ scripts to analyze the simulation results.

Lithium Battery (Collaboration with FORD)

- ✓ Elucidated the formation and aging of the solid electrolyte interphase (SEI) at the molecular level using commercial electrolyte formulations through in situ and ex situ experiments, thereby optimizing SEI formation and enhancing lithium battery manufacturing efficiency.
- ✓ Investigated the additive effects on the growth and quality of SEI films.

Proteins (Collaboration with MERCK, BASF)

- ✓ Unveiled molecular interactions between antigen/adjuvant, antibody/substrate, and antifouling polymer/protein systems to elucidate protein orientations and conformations during the adsorption process on various surfaces, using SFG, CD, FTIR, and Hamiltonian calculation.
- ✓ Demonstrate the surfactant and salt effect on the protein absorption.
- ✓ Ran MD simulations by GROMACS to simulate the adsorptions of proteins on multiple surfaces.