

Chung-Hao Liu, Ph.D.

+1 (630) 991-3922

chung.liu@uconn.edu

www.linkedin.com/in/chung-hao-liu

EDUCATION

2018 – 2023	University of Connecticut <i>Ph.D. Polymer Science, GPA: 3.91/4.0</i>	CT, USA
2012 – 2015	National Taiwan University <i>M.S. Polymer Science and Engineering, GPA: 3.96/4.3</i>	Taipei, TW
2008 – 2012	National Cheng Kung University <i>B.S. Chemistry, GPA: 3.73/4.0</i>	Tainan, TW

WORK/ TEACHING EXPERIENCE

2023 – Present	Oak Ridge National Laboratory <i>Postdoctoral Research Associate (Advisor: Gergely Nagy)</i> <ul style="list-style-type: none">• Structural characterization of photosynthesis membrane via neutron scattering• Studied the structural-dynamics property of the thylakoid membranes via neutron spin echo (NSE) spectroscopy	TN, USA
2019, 2021, 2022	University of Connecticut <ul style="list-style-type: none">• Teaching assistant of scattering experiments in polymer characterization I (08,2019 and 01, 2022, Instructor: Yao Lin)• Teaching senior high school teachers in the Joule Fellow Program (<i>Summer 2019</i>). Final report is https://www.youtube.com/watch?v=g0X_hfr3Oyk&t=300s• Teaching assistance of polymeric materials (01, 2021, Instructor: Mu-Ping Nieh)	CT, USA
2017 – 2018	National Taiwan University <ul style="list-style-type: none">• Designed and developed more than 25 different experiments in X-ray, thermal analysis, and phase diagram, surface tension, FT-IR, and kinetic studies of coordination complex• Taught 150 students physical chemistry experiments in three classes, for two 14-week semesters• Supervised 13 graduate assistant who facilitated and discussed with students	Taipei, TW
2016 – 2017	Chang Chun Group <ul style="list-style-type: none">• Director of the fifth factory in the Dept. of the First (PVA) Production• Managed safety and environment (ISO 9000 and ISO 15000) in the Dept. of the First (PVA) Production• Supervised the quality of PVA in the collaboration with Research & Development	Miaoli, TW

GRADUATE RESEARCH EXPERIENCE

2018 – 2023	University of Connecticut <i>Graduate Research Assistant (Advisor: Mu-Ping Nieh)</i>	CT, USA
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- Established the protocol of one-pot template polymerization via lipids self-assembly to synthesize polymer nano-ring and nano-mesh
- Studied the structure – optical properties of 3D supermolecule-lipids nano-complex to explain fluorescence enhancement
- Investigated the correlation between rheological and structural properties of surfactant in the presence of cross-linked poly-acrylic acid (PAA) with the Unilever team
- Synthesized the modified diacid molecules for a nanodisc self-assembly
- Using small-angle X-ray/ neutron scattering to characterize the biomaterials, conjugated molecules, PVA hydrogel, single chain polypeptide nanoparticles, 3D supermolecules and self-assembly of amphiphilic block copolymers in collaboration with Prof. Raman Bahal (UConn), Prof. Samuel W Thomas (Tufts Univ.), Prof. Ximin He (UCLA), Prof. Jianjun Cheng (UIUC/ Westlake Univ.), Prof. Xiaopeng Li (USF/ Shenzhen Univ.), and Prof. Jie He (UConn)
- Using X-ray/ light scattering to characterize the commercial materials with nano or micron scale for Moderna, Pfizer, Duracell, Otis, Henkel, and Unilever
- User of small angle X-ray/ neutron scattering at National Institute of Standards and Technology (NIST) and Brookhaven National Laboratory (BNL)

2012 – 2014

National Taiwan University

Taipei, TW

Graduate Research Assistant (Advisor: Shih-Huang Tung)

- Studied the effect of amorphous poly (3-hexylthiophene) on active-layer structure and solar cells performance
- Evaluated the morphology of the organic solar cells by using atomic force microscopy and grazing-incidence small-angle X-ray scattering in collaboration with Prof. Pi-Tai Chou of the Dept. Chemistry at National Taiwan Univ.

LEADERSHIP

2019 – 2020

President, Society of Plastic and Engineering Student Chapter

CT, USA

- Managed club operations, including inviting guest speakers, hosting the seminar, and social event for graduate students

2021 – 2023

Lab Manager, Nieh Lab

CT, USA

- Foster a lab culture of safety and collaboration
- Organize group meetings and serve as the first point of contact for incoming graduate/ undergraduate students
- Mentoring the undergraduates for independent studies

PUBLICATIONS

1. Zygadlo, K., **Liu, C.-H.**, Bernardo, E.R., Ai, H., Nieh, M.-P., Hanson, L.A.; “Correlating structural changes in thermoresponsive hydrogels to the optical response of embedded plasmonic nanoparticles” Under Preparation
2. Wang, K.-S., **Liu, C.-H.**, Nieh, M.-P., Su, W.-F.; “Block Sequence Effects on the Self Assembly Behaviors of Polypeptides-Based Penta-Block Copolymer Hydrogels” To be submitted
3. **Liu, C.-H.**, Chang, S.-Y., Shih, K.-C., Nieh, M.-P., Ma, A.; “Correlation between Rheological and Structural Properties of Potassium Stearate/Stearic Acid/Glycerol Stearate in Presence of Cross-linked PAA” To be submitted

4. Shih, K.-C., Leriche, G., **Liu, C.-H.**, Fang, J., Baker, J., Wagner, N., Nagao, M., Yang, L., Yang, J., Nieh, M.-P.; "Non-Stacking Membrane Fragments Induced by Tail-Tethering of Bolalipids" To be submitted
5. **Liu, C.-H.**, Krueger, S., Nieh, M.-P.; "Synthesis of Polymer Nanoweb via a Lipid Template" *ACS Macro Letters* **2023**, 12, 993-998
6. Xian, W.K., **Liu, C.-H.**, Kangarlou, B., Chang, S.-Y., Chao, W., Yang, C., Sun, L, Ma, A., Nieh, M.-P., Maiti, A., Saab, A., Li, Y., "Effect of Diphenyl Content on Viscoelasticity of Poly(dimethyl-co-diphenyl) siloxane Melt and Network" *ACS Applied Polymer Materials* **2023**, 5, 1915-1925
7. Wei, Z., **Liu, C.-H.**, Luo, Q., Thanneeru, S., Angeles-Boza, A., Nieh, M.-P., He, J., "Hydrophobic pockets built in polymer micelles to enhance reactivity of Cu²⁺ ions" *Materials Chemistry Frontiers* **2023**, 7, 2038-2048
8. **Liu, C.-H.**, Cheu, C., Baker, J., Yang, L., Nieh, M.-P.; "Facile Polymerization of Controllable Well-Defined Nano-Rings" *Journal of Colloid and Interface* **2023**, 630, 629-637
9. Masese, F.K., Ndaya, D., **Liu, C.-H.**, Eddy, N., Morales-Acosta, M.D., Nieh, M.-P., Kasi, R.M., "Self-Assembled Materials from Cellulose Nanocrystals Conjugated with a Thermotropic Liquid Crystalline Moiety" *Soft Matter* **2022**, 18, 8165-8174
10. Zheng, W., **Liu, C.-H.**, Nieh, M.-P., Cornelius, C.; "Morphological Anisotropy of Solvent-Cast Midblock-Sulfonated Pentablock Copolymer Membranes and Its Impact on Swelling and Transport" *Macromolecules* **2022**, 55, 9269-9281
11. Wei, Z., **Liu, C.-H.**, Duan, H., Luo, Q., Huang, M., Thanneeru S., Nieh, M.-P., He, J.; "Self-Assembly of Gold Nanoparticles Grafted with Amphiphilic Supramolecular Block Copolymers" *Giant* **2022**, 10, 100102
12. Duan, H., Malesky, T., Wang, J., **Liu, C.-H.**, Tan, H., Nieh, M.-P., Lin, Y., He, J.; "Patchy Metal Nanoparticles with Polymers: Controllable Growth and Two-Way Self-Assembly" *Nanoscale* **2022**, **19**, 7364-7371
13. Malik, S., Kumar, V., **Liu, C.-H.**, Shih, K.-C., Krueger, S., Nieh, M.-P., Bahal, R.; "Head on Comparison of Self-and Nano-Assemblies of Gamma Peptide Nucleic Acid Amphiphiles" *Adv. Funct. Mater.* **2022**, 32, 2109552
14. Lei, J., **Liu, C.-H.**, Cintron, D., Luo, Q., Nieh, M.-P., He, J.; "Structural Engineering in the Self-Assembly of Amphiphilic Block Copolymers with Reactive Additives: Micelles, Vesicles, and Beyond" *Langmuir* **2021**, 32, 9865-9872
15. **Liu, C.-H.**, Wang, H., Yang, L., Liu, Y., Li, X., Nieh, M.-P.; "Nanocomplex made up of antimicrobial metallo-supramolecules and model biomembranes—characterization and enhanced fluorescence" *Nanoscale* **2021**, 35, 14973-14979
16. Yin, G., Kandapal, S., **Liu, C.-H.**, Wang, H., Huang, J., Jiang, S.-T., Ji, T., Yan, Y., Khalife, S., Zhou, R., Ye, L., Xu, B., Yang, H.-B., Nieh, M.-P., Li, X.; "Metallo-Helicoid with Double Rims: Polymerization Followed by Folding via Intramolecular Coordination" *Angew.Chem. Int.Ed.* **2021**, 60,1281 –1289
17. Li, M., Heller, W., **Liu, C.-H.**, Gao, C., Cai, Y., Hou, Y., Nieh, M.-P.; "Effects of Fluidity and Charge Density on the Morphology of a Bicellar Mixture – A SANS Study" *Biochimica et Biophysica Acta (BBA)-Biomembranes* **2020**, 1862, 9, 183315
18. Wang, H.* , **Liu, C.-H.*** , Wang, K., Wang, M., Yu, H., Kandapal, S., Brzozowski, R., Xu, B., Wang, M., Lu, S., Hao, X.-Q., Eswara, P., Nieh, M.-P., Cai, J., Li, X.; Assembling Pentatopic Terpyridine Ligands with Three Types of Coordination Moieties into a Giant Supramolecular Hexagonal Prism: Synthesis, Self-Assembly, Characterization, and Antimicrobial Study" *J. Am. Chem. Soc.* **2019**, 141, 40, 16108-16116 (**co-first author**)

19. **Liu, C.-H.**, Tseng, W.-H., Cheng, C.-Y., Wu, C.-I., Chou, P.-T., Tung, S.-H.; "Effects of Amorphous Poly(3-hexylthiophene) on Active-Layer Structure and Solar Cells Performance" *Journal of Polymer Science Part B: Polymer Physics* **2016**, 54, 975-985
20. Chen, H.-C., Chen, Y.-H., **Liu, C.-H.**, Hsu, Y.-C., Chien, Y.-C., Chuang, W.-T., Cheng, C.-Y., Liu, C.-L., Chou, S.-W., Tung, S.-H., Chou, P.-T.; "Fluorinated thienyl-quinoxaline-based D- π -A-type copolymer toward efficient polymer solar cells: synthesis, characterization, and photovoltaic properties" *Polymer Chemistry* **2013**, 4, 3411-3418

AWARDS

- Pre-Doctoral Travel Award, Department of Chemical and Biomolecular Engineering, May 2023
- Society of Plastic Engineers Scholarship, June 2022
- The Samuel J. Huang Graduate Student Research Award, May 2022
- Doctoral Dissertation Fellowship, March 2022
- Conference Participation Award, December 2021
- Best Poster Award for Annual Meeting of the Polymer Society, January 2014
- Distinguished Achievement Award for Calculus Contest, June 2009

CONFERENCE

1. **Liu, C.-H.**, Cheu, C., Nieh, M.-P.; "Shape and Size Controllable Polymer Nanostructures via Facile Polymerization in a Bicellar Template" **2023** American Chemical Society Meeting, Indianapolis, Indiana
2. **Liu, C.-H.**, Nieh, M.-P.; "The Influence of Short-Chain Lipid (Detergent-like Molecules) on the Morphology of Bicelles" **2023** American Chemical Society Meeting, Indianapolis, Indiana
3. **Liu, C.-H.**, Cheu, C., Nieh, M.-P.; "Facile template-polymerization to Produce Polymer Nano-Rings" 2022 American Chemical Society Meeting, Chicago, Illinois
4. **Liu, C.-H.**, Nieh, M.-P.; "Controllable Nanostructures via a Bicellar Template – Characterized by Contrast-Variation SANS" 2022 American Conference on Neutron Scattering, Boulder, Colorado
5. **Liu, C.-H.**, Cheu, C., Nieh, M.-P.; "Controllable Polymer Nano-Ring Synthesized via a Lipid Self-Assembled Template" 2022 American Chemical Society Meeting, San Diego, California
6. **Liu, C.-H.**, Nieh, M.-P.; "The Formation of Polystyrene Rings in the Fluid Phase of Lipids Nanodiscs" "Spring 2021 Polymer event, University of Connecticut
7. **Liu, C.-H.**, Tung, S.-H.; "Morphology, Solar Cell Performance and Stability of Ternary Mixing System" 2014 Annual Meeting of the Polymer Society, Taichung, Taiwan; Poster
8. **Liu, C.-H.**, Tung, S.-H.; "Temperature Induced Structures of P3HT and P3MBT in Dilute 1,2-Dichlorobenzene Solution and its Influence on Thin Film Morphology" The 13th Pacific Polymer Conference, Kaohsiung, Taiwan; Poster

INVITED TALKS

1. Applications of Small Angle Scattering for Revealing Nanostructures of Lipid Self-Assemblies, Brookhaven National Laboratory, Upton, New York, USA (Feb. 17, 2023)
2. Facile Polymerization in a Bicellar Template to Produce Shape-Controllable Nanostructures, Chang Gung University, Taoyuan City, Taiwan (Aug. 8, 2022)

EXPERIMENTAL SKILLS

Grazing incidence X-ray scattering (GIXS), Small-angle scattering (X-ray, neutron, and light), Microscopy (Optical, Electron and Atomic Force), Optical Spectroscopy (UV-vis and Fluorescence), Differential Scanning Calorimetry, Rheology, Python (basic), and Mechanical Testing for Materials