

Curriculum Vitae

Personal Information

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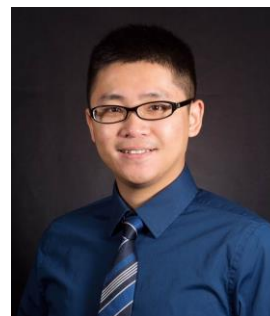
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Education

Institution	Degree	Supervisor	Year
The Scripps Research Institute	PhD in Chemical Biology	Jeffery Kelly	2015
National University of Singapore	B. Appl. Sci. (1 st Class Honours)	Hardy Chan Sze On	2010

Employment

- **2019.01 --- Now**
Principal Investigator, Dalian Institute of Chemical Physics, Chinese Academy of Sciences;
- **2015.10 --- 2018.12**
Research Associate, the Pennsylvania State University, United States;
Supervisor: Prof. Xin Zhang;
- **2009.05 --- 2009.08**
Research Intern, Institute of Materials Research and Engineering (IMRE), Singapore;
Supervisor: Dr. Jianwei Xu;
- **2008.06 --- 2008.12**
Research Intern, the University of British Columbia, Canada;
Supervisor: Prof. David Perrin;

Research Interests

Development of chemical biology tools to study proteome misfolding and aggregation including:

- **Imaging dyes** to visualize and distinguish misfolded and aggregated proteome;
- **Chemical sensors** to study the physiochemical heterogeneity of aggregated proteome;
- **Proteomics probes** to analyze the contents of aggregated proteomes upon stresses;
- **Regulators** to modulate the degradation of aggregated proteome in diseases.

Publications (¹Co-first authors, * Corresponding authors)**Independent Works**

1. Dong, X.; Wan, W.; Zeng, L.; Jin, W.; Huang, Y.; Shen, D.; Bai, Y.; Zhao, Q.; Zhang, L.; **Liu, Y.***; Gao, Z.*; Regulation of Fluorescence Solvatochromism to Resolve Cellular Polarity upon Protein Aggregation. **Anal. Chem.**, 2021, 93 (49), 16447-16455.
2. Bai, Y.; Huang, Y.; Wan, W.; Jin, W.; Shen, D.; Lyu, H.; Zeng, L.; **Liu, Y.***, Derivatizing Merocyanine Dyes to Balance Their Polarity and Viscosity Sensitivities for Protein Aggregation Detection. **Chem. Comm.** 2021, 57, 13313-13316.
3. Liu, L.; Jin, W.; Huang, Y.; Dai, J.; Zheng, X.; **Liu, Y.**; Ju, M.; Shen, B.*; Detecting the Insoluble Protein Aggregates in Live Cells Using an AIE Derivative of Fluorescent Protein Chromophore. **Sens. Actuators B Chem.**, 2022, 353, 131098.
4. Sun, F.; Liu, J.; Huang, Y.; Zhu, X.; **Liu, Y.**; Zhang, L.; Yan, J.*; A quinoline derived D-A-D type fluorescent probe for sensing tetrameric transthyretin. **Bioorganic Med. Chem. Lett.**, 2021, 52, 128408.
5. Wan, W.¹; Zeng, L.¹; Jin, W.; Chen, X.; Shen, D.; Huang, Y.; Wang, M.; Bai, Y.; Lyu, H.; Dong, X.; Gao, Z.; Wang, L.; Liu, X.; **Liu, Y.***; A Solvatochromic Fluorescent Probe Reveals Polarity Heterogeneity upon Protein Aggregation in Cells. **Angew. Chem. Int. Ed.**, 2021, 60, 25865-25871.
6. Bai, Y.; **Liu, Y.***; Illuminating Protein Phase Separation: Reviewing Aggregation-Induced Emission, Fluorescent Molecular Rotor and Solvatochromic Fluorophore based Probes. **Chem. - Eur. J.**, 2021, 27, 1-14.
7. Shen, D.; Bai, Y.; **Liu, Y.***; Chemical Biology Toolbox to Visualize Protein Aggregation in Live Cells. **ChemBioChem**, 2021, accepted.
8. Huang, Y.¹; Bai, Y.¹; Jin, W.; Shen, D.; Lyu, H.; Zeng, L.; Wang, M.; **Liu, Y.***; Common Pitfalls and Recommendations for using Turbidity Assay to Study Protein Phase Separation. **Biochemistry**, 2021, 60 (32), 2447-2456.
9. Bai, Y.; Wan, W.*; Huang, Y.; Jin, W.; Lyu, H.; Xia, Q.; Dong, X.; Gao, Z.; **Liu, Y.***; Quantitative Interrogation of Protein Co - aggregation using Multicolor Fluorogenic Protein Aggregation Sensors. **Chem.Sci.**, 2021, 12, 8468 - 8476. (**Most popular 2021 chemical biology articles**)
10. Shen, D.; Jin, W.; Bai, Y.; Huang, Y.; Lyu, H.; Zeng, L.; Wang, M.; Tang, Y.; Wan, W.; Dong, X.; Gao, Z.; Piao, H.; Liu, X.; **Liu, Y.***; Rational Design of Crystallization Induced Emission Probes to Detect Amorphous Protein Aggregation in Live Cells. **Angew. Chem. Int. Ed.** 2021, 60, 16067-16076.
11. Wan, W.; Huang, Y.; Xia, Q.; Bai, Y.; Jin, W.; Wang, M.; Lyu, H.; Tang, Y.; Dong, X.; Gao, Z.; Zhao, Q.; Zhang, L.; **Liu, Y.***; Covalent Probes for Aggregated Protein Imaging via Michael Addition. **Angew. Chem. Int. Ed.**, 2021, 60, 11335-11343. (**Hot paper**)
12. Wan, W.; Jin, W.; Huang, Y.; Xia, Q.; Bai, Y.; Lyu, H.; Liu, D.; Dong, X.; Li, W.*; **Liu, Y.***; Monitoring the Dynamics of Proteome Aggregation in Live Cells Using a Solubilized and Noncovalent Analogue of Fluorescent Protein Chromophores. **Anal. Chem.**, 2021, 93(3), 1717-1724.
13. Wolstenholme, C.; Hu, H.; Ye, S.; Funk, B. E.; Jain, D.; Hsiung, C. H.; Ning, G.; **Liu, Y.***; Li, X.*; Zhang, X.*; AggFluor: Fluorogenic Toolbox Enables Direct Visualization of the Multi-Step Protein Aggregation Process in Live Cells. **J. Am. Chem. Soc.**, 2020, 142(41), 17515-17523.
14. Yu, J.; Li, T.; **Liu, Y.**; Wang, X.; Zhang, J.; Wang, X.; Shi, G.; Lou, J.; Wang, L.; Wang, C. C.; Wang, L.*; Phosphorylation switches protein disulfide isomerase activity to maintain proteostasis and attenuate ER stress. **EMBO J.**, (2020) e103841.

Postdoctoral Works

15. Hoelzel, C., Hu, H., Wolstenholme, C. H.; Karim, B. A.; Munson, K. T.; Jung, K. H.; Zhang, H.; **Liu, Y.**; Yennawar, H. P.; Asbury, J. B.; Li, X.*; Zhang, X.*; A General Strategy to Enhance Donor - Acceptor Molecules Using Solvent - Excluding Substituents. *Angew. Chem. Int. Ed.*, 2020, *59*, 2-10. (**Hot Paper**)
16. Jung, K. H.; Fares, M.; Grainger, L. S.; Wolstenholme, C. H.; Hou, A.; **Liu, Y.**; Zhang, X.*, A SNAP-tag fluorogenic probe mimicking the chromophore of the red fluorescent protein Kaede. *Org. Biomol. Chem.*, 2019, *17*(7), 1906-1915.
17. **Liu, Y.**; Fares, M.; Zhang, X.*, Monitoring Proteome Stress in Live Cells Using HaloTag-Based Fluorogenic Sensor. Book Chapter, *Protein Misfolding Diseases*, 2019, Page 171-182.
18. Jung, K. H.; Kim, S. F.; **Liu, Y.**; Zhang, X.*, A Fluorogenic AggTag Method Based on Halo- and SNAP-Tags to Simultaneously Detect Aggregation of Two Proteins in Live Cells. *ChemBioChem.*, 2019, *20*, 1078-1087.
19. Kim, S. H.; **Liu, Y.**; Hoelzel, C.; Zhang, X.; Lee, T. H., Super-Resolution Optical Lithography with DNA. *Nano Lett.*, 2019, *19*, 9, 6035-6042.
20. **Liu, Y.**; Wolstenholme, C. H.; Carter, G. C.; Liu, H.; Hu, H.; Grainger, L. S.; Miao, K; Fares, M; Hoelzel, C. A.; Yennawar, H. P.; Ning, G.; Du, M.; Bai, L.; Li, X.; Zhang, X., Modulation of Fluorescent Protein Chromophores to Detect Protein Aggregation with Turn-on Fluorescence. *J. Am. Chem. Soc.*, 2018, *140*(24), 7381-7384. (Highlighted by **F1000Prime**)
21. **Liu, Y.**; Zhang, X.*, Heat Shock Protein Reports on Proteome Stress, *Biotechnol. J.*, 2018, *13*, 1800039.
22. **Liu, Y.**; Miao, K; Li, Y; Fares, M; Chen, S; Zhang, X.*, A HaloTag-Based Multicolor Fluorogenic Sensor Visualizes and Quantifies Proteome Stress in Live Cells Using Solvatochromic and Molecular Rotor-Based Fluorophores. *Biochemistry*, 2018, *57*, 31, 4663-4674.
23. Fares, M.; Li, Y.; **Liu, Y.**; Miao, K.; Gao, Z.; Zhai, Y.; Zhang, X.*, A molecular rotor-based Halo-tag ligand enables a fluorogenic proteome stress sensor to detect protein misfolding in mildly stressed proteome. *Bioconjugate Chem.*, 2018, *29* (1), pp 215–224.
24. **Liu, Y.**; Fares, M.; Dunham, N. P.; Gao, Z.; Miao, K.; Jiang, X.; Bollinger, S. S.; Boal, A. K.; Zhang, X.*, AgHalo: A Facile Fluorogenic Sensor to Detect Drug Induced Proteome Stress. *Angew. Chem. Int. Ed.*, 2017, *56*, 8672-8676; (Highlighted by **F1000Prime**)
25. **Liu, Y.**; Miao, K.; Dunham, N. P.; Liu, H.; Fares, M.; Boal, A. K.; Li, X.; Zhang, X.*, The Cation- π Interaction Enables a Halo-Tag Fluorogenic Probe for Fast No-Wash Live Cell Imaging and Gel-Free Protein Quantification. *Biochemistry*, 2017, *56* (11), 1585-1595. (**ACS Editor's Choice**)

Graduate Works

26. Chen, W.¹; Dong, J.¹; Li, S.; **Liu, Y.**; Wang, Y.; Yoon, L.; Wu, P.; Sharpless, K. B.*; Kelly, J. W.*, Synthesis of Sulfotyrosine-Containing Peptides by Incorporating Fluorosulfated Tyrosine Using an Fmoc-Based Solid-Phase Strategy. *Angew. Chem. Int. Ed.*, 2016, *55* (5), 1835-8.
27. Chen, W.¹; Dong, J.¹; Plate, L.¹; Mortenson, D. E.; Brighty, G. J.; Li, S.; **Liu, Y.**; Galmozzi, A.; Lee, P. S.; Hulce, J. J.; Cravatt, B. F.; Saez, E.; Powers, E. T.; Wilson, I. A.; Sharpless, K. B.*; Kelly, J. W.*, Arylfluorosulfates Inactivate Intracellular Lipid Binding Protein(s) through Chemoselective SuFEx Reaction with a Binding Site Tyr Residue. *J. Am. Chem. Soc.*, 2016, *138* (23), 7353-64.
28. Chen, W.; Kong, L.; Connelly, S.; Dendle, J. M.; **Liu, Y.**; Wilson, I. A.; Powers, E. T.; Kelly, J. W.*, Stabilizing the CH2 Domain of an Antibody by Engineering in an Enhanced Aromatic Sequon. *ACS Chem. Biol.*, 2016, *11* (7), 1852-61.

29. Liu, Y.¹; Zhang, X.¹; Chen, W.; Tan, Y. L.; Kelly, J. W.*; Fluorescence Turn-On Folding Sensor To Monitor Proteome Stress in Live Cells. *J. Am. Chem. Soc.*, 2015, 137 (35), 11303-11.
30. Baranczak, A.; Liu, Y.; Connelly, S.; Du, W. G.; Greiner, E. R.; Genereux, J. C.; Wiseman, R. L.; Eisele, Y. S.; Bradbury, N. C.; Dong, J.; Noodleman, L.; Sharpless, K. B.; Wilson, I. A.; Encalada, S. E.; Kelly, J. W., A fluorogenic aryl fluorosulfate for intraorganellar transthyretin imaging in living cells and in *Caenorhabditis elegans*. *J. Am. Chem. Soc.*, 2015, 137 (23), 7404-14.
31. Cho, Y.¹; Zhang, X.¹; Pobre, K. F.¹; Liu, Y.; Powers, D. L.; Kelly, J. W.*; Gierasch, L. M.*; Powers, E. T.*, Individual and collective contributions of chaperoning and degradation to protein homeostasis in *E. coli*. *Cell Reports*, 2015, 11 (2), 321-33.
32. Liu, Y.¹; Tan, Y. L.¹; Zhang, X.^{1*}; Bhabha, G.; Ekiert, D. C.; Genereux, J. C.; Cho, Y.; Kipnis, Y.; Bjelic, S.; Baker, D.; Kelly, J. W.*, Small molecule probes to quantify the functional fraction of a specific protein in a cell with minimal folding equilibrium shifts. *Proc. Natl. Acad. Sci. U.S.A.*, 2014, 111 (12), 4449-54; (*highlighted in ACS Chem. Biol.*)
33. Liu, Y.¹; Zhang, X.¹; Tan, Y. L.; Bhabha, G.; Ekiert, D. C.; Kipnis, Y.; Bjelic, S.; Baker, D.; Kelly, J. W.*, De novo-designed enzymes as small-molecule-regulated fluorescence imaging tags and fluorescent reporters. *J. Am. Chem. Soc.*, 2014, 136 (38), 13102-5.
34. Zhang, X.; Liu, Y.; Genereux, J. C.; Nolan, C.; Singh, M.; Kelly, J. W.*, Heat-shock response transcriptional program enables high-yield and high-quality recombinant protein production in *Escherichia coli*. *ACS Chem. Biol.*, 2014, 9 (9), 1945-9; 1. (*ACS Editor's Choice*, highlighted in *C&EN News*, and *ACS Chem. Biol.*).
35. Suh, E. H¹; Liu, Y.¹; Connelly, S.; Genereux, J. C.; Wilson, I. A.; Kelly, J. W.*, Stilbene vinyl sulfonamides as fluorogenic sensors of and traceless covalent kinetic stabilizers of transthyretin that prevent amyloidogenesis. *J. Am. Chem. Soc.*, 2013, 135 (47), 17869-80.
36. Baranczak, A.¹; Connelly, S.¹; Liu, Y.¹; Choi, S.; Grimster, N. P.; Powers, E. T.; Wilson, I. A.; Kelly, J. W.*, Fluorogenic small molecules requiring reaction with a specific protein to create a fluorescent conjugate for biological imaging--what we know and what we need to learn. *Biopolymers*, 2014, 101 (5), 484-95.

Awards

- 2020: Pfizer ASPIRE Award, United States;
- 2019: Liaoning Revitalization Talents Program, China;
- 2018: National Talent Program for Young Scientists, China;
- 2015: Chinese Government Award for Outstanding Self-Finance Students Abroad, China;
- 2008: Lee Foundation Award, Singapore.
- 2006-2010, NUS Undergraduate Scholarship, Ministry of Education, Singapore.

Funding

- 2020-2022: National Natural Science Foundation of China (21907091);
- 2020-2022: Liaoning Revitalization Talents Program (XLYC1907048);
- 2020-2022: Dalian Innovation Fund (2020JJ26GX027);
- 2020-2021: Pfizer ASPIRE award for transthyretin amyloidosis basic research;
- 2019-2021: Chinese Academy of Sciences Start-up Fund;
- 2019-2021: National Natural Science Foundation Start-up Fund;
- 2019-2024: Dalian Institute of Chemical Physics Stat-up Fund;
- 2019-2020: President Fund, Dalian Institute of Chemical Physics.

Conferences

- 2020 AIE Conference, Shanghai, China (Invited Oral Presentation).
- 2019 11th National Meeting on Chemical Biology, Guangzhou, China (Invited Oral Presentation).
- 2018 Annual Meeting of the American Society of Biochemistry and Molecular Biology, San Diego, CA, USA (Invited Oral Presentation & Poster).
- 2016 International Chemical Biology Society, Madison, Wisconsin, USA (Poster).
- 2014 International Conference on Fluorescent Biomolecules and their Building Blocks – Design and Applications (FB³), San Diego, CA, USA (Invited Oral Presentation).
- 2014 Annual Meeting of the American Society of Biochemistry and Molecular Biology, San Diego, CA, USA (Poster).

Academic Services

- Graduate admission committee member at Dalian Institute of Chemical Physics (DICP), 2019-now;
- Thesis committee member for 12 graduate students at both DICP and other institutions;
- Organizing committee member for 12th National Chemical Biology Conference, China, 2021;
- Reviewer for National Science Foundation of China, 2020;
- Reviewer for Liaoning Provincial Bureau of Science and Technology, 2021;
- Reviewing panel for Dalian City Bureau of Science and Technology (Biomedical Direction), 2020;
- Journal reviewer for ACS publications, Wiley publications, and RSC publications since 2014.