

## Han Xiao

Chemistry, Biosciences, and Bioengineering, Rice University, [han.xiao@rice.edu](mailto:han.xiao@rice.edu)

### PROFESSIONAL EXPERIENCES

Assistant Professor, Department of Chemistry, Rice University (07/2017-present)  
Assistant Professor, Department of Biosciences, Rice University (07/2017-present)  
Assistant Professor, Department of Bioengineering, Rice University (08/2018-present)  
CPRIT Scholar in Cancer Research, Cancer Prevention & Research Institute of Texas (07/2017-present)  
OsteoLogic Therapeutics (Biotechnology Startup), co-founder, 2022.

### EDUCATION AND TRAINING

Postdoctoral Research, Stanford University (06/2015-06/2017)  
— Research Advisor: Professor Carolyn R. Bertozzi  
Ph. D. in Chemical Biology, The Scripps Research Institute (08/2010-03/2015)  
— Research Advisor: Professor Peter G. Schultz  
B. S. in Chemistry, University of Science and Technology of China (09/2006-06/2010)  
— Research Advisor: Professor Liu-Zhu Gong

### HONORS AND AWARDS

2021 Breast Cancer Research Program (BCRP) Breakthrough Award – Level 2, Department of Defense  
2020 Edward S. and Fofa Lewis Award, Rice University  
2019 Baker College’s Best Professor, Baker College, Rice University  
2019 Maximizing Investigators’ Research Award for Early Stage Investigators (MIRA), National Institute of General Medical Sciences  
2018 Hamill Innovation Award, Hamill Foundation  
2018 John S. Dunn Foundation Collaborative Research Award, Gulf Coast Consortia  
2017 CPRIT Faculty Recruitment Award, Cancer Prevention & Research Institute of Texas  
2017 Norman Hackerman - Welch Young Investigator, Welch Foundation  
2016 Good Ventures Postdoctoral Fellowship, Life Science Research Foundation  
2016 Travel Award Sialoglyco 2016, Sialoglyco Conference  
2014 Aldrich Alfred R. Bader Award for Student Innovation, Sigma-Aldrich Co. LLC  
2013 Outstanding Self-Financed Students Abroad, Ministry of Education of the People’s Republic of China  
2010 Honors Degree in Physical Science, University of Science and Technology of China  
2010 Outstanding Graduate Scholarship of Anhui Province, Department of Education of Anhui Province, P. R. China  
2010 Outstanding Graduate Scholarship of USTC, Chinese Academy of Sciences, P. R. China  
2009 Di Ao Scholarship, Chinese Academy of Sciences, P. R. China  
2008 National Scholarship, Ministry of Education of the People’s Republic of China  
2007 Outstanding Student Scholarship, Chinese Academy of Sciences

### PATENTS

1. Karsenty, G., Berger, J. M., Xiao, H. “Methods for Controlling Osteocalcin Release.” **U. S. Provisional Patent 63/255,104**, issued October 13, 2021.
2. Karsenty, G., Berger, J. M., Xiao, H. “Methods, Compositions and Uses Thereof for Reversing Sarcopenia.” **U. S. Patent 17/504,158**, issued October 18, 2021.
3. Xiao, H., Yu, C., Tian, Z. “Engineered Antibodies for Bone-Targeted Therapy.” **U. S. Provisional Patent 63/223,875**, issued July 20, 2021.

4. Xiao, H., Zhang, X. “Bone-Specific Delivery of Antibodies.” **U. S. Provisional Patent 63/138,972**, issued February 19, 2021.
5. Xiao, H., Yu, C., Tang, J. “Proximity Induced Site-specific Antibody Conjugation.” **PCT US 2019/031836**, issued Nov 10, 2020.
6. Xiao, H., Tang, J. “Visible Light-Activated Dyes and Methods of Use Thereof.” **U. S. Patent 16/798,992**, issued February 24, 2020.
7. Gray, M., Woods, E. C., Xiao, H., Bertozzi, C. R. “Conjugates for Targeted Cell Surface Editing.” **U. S. Patent 16/308,732**, issued December 10, 2018.
8. Woods, E. C., Xiao, H., Bertozzi, C. R. “Inhibitory Immune Receptor Inhibition Methods and Compositions.” **U. S. Patent 16/307,428**, issued December 5, 2018.
9. Woods, E. C., Xiao, H., Bertozzi, C. R. “Inhibitory Immune Receptor Inhibition Methods and Compositions.” **PCT Int. Appl. WO 2018/006066 A1**, issued June 30, 2017.
10. Gray, M., Woods, E. C., Xiao, H., Bertozzi, C. R. “Conjugates for Targeted Cell Surface Editing.” **PCT Int. Appl. WO 2018/006034 A1**, issued June 20, 2017.

**PUBLICATIONS** († contributed equally; \* corresponding author; *Italic* undergraduate author)

1. Wang, S., Shi, H., Wang, L., Espinoza, V. B., Lored, A., Bachilo, S. M., *Wu, W.*, Tian, Z., Chen, Y., Weisman, R. B., Zhang, X., Cheng, Z.\*, Xiao, H.\* (2022) “Photostable Small-Molecule NIR-II Fluorescent Scaffolds that Cross the Blood–Brain Barrier for Noninvasive Brain Imaging.” ***Journal of the American Chemical Society***, DOI: 10.1021/jacs.2c11223.  
-Selected as a Cover Article.
2. Wang, L.†, Hsiung, C. H.†, Wang, S., Lored, A., Zhang, X.\*, Xiao, H.\* (2022) “Xanthone-based solvatochromic fluorophores for quantifying micropolarity of protein aggregates.” ***Chemical Science***, DOI: 10.1039/d2sc05004h.
3. Chen, Y.†, Jin, S., Zhang, M., Wu, K., *Chang, A.*, Wang, S., Tian, Z., Wolynes, P. G., Xiao, H.\* (2022) “Unleashing the Potential of Noncanonical Amino Acid Biosynthesis for Creation of Cells with Site-Specific Tyrosine Sulfation.” ***Nature Communications***, DOI: 10.1038/s41467-022-33111-4.  
-Featured in NSF News, GEN News, Rice News, and ScienceDaily.
4. Wu, K. L., Moore, J. A., Chen, Y., *Lee, C.*, Xu, D., Miller, M. D., *Peng, Z.*, Duan, Q., Philips, G. N., Uribe, R. A., Xiao, H.\* (2022) “Expanding the Eukaryotic Genetic Code with a Biosynthesized 21st Amino Acid.” ***Protein Science***, DOI: 10.1002/PRO.4443.
5. Tian, Z.†, Yu, C.†, Zhang, W., Wu, K. L., Wang, C., Gupta, R., Zhan, X., Ling, W., Chen, Y., Zhang, X., Xiao, H.\* (2022) “Bone-Specific Enhancement of Antibody Therapy for Breast Cancer Metastasis to Bone.” ***ACS Central Science***, 8, 312.  
-Selected as a Front Cover Article.
6. Chen, Y., Lored, A., *Chang, A.*, Zhang, M., Liu, R., Xiao, H.\* (2022) “Biosynthesis and Genetic Incorporation of *L*-3,4-Dihydroxyphenylalanine into Proteins.” ***Journal of Molecular Biology***, 434, 167412.
7. Cameron, T., Vega, D., Yu, C., Xiao, H., Margolin, W.\* (2021) “ZipA uses a two-pronged FtsZ-binding mechanism necessary for cell division.” ***mBio***, 12, e02529-21.
8. Wang, L.†, Wang, S.†, Tang, J., Espinoza, V. B., Lored, A., Tian, Z., Weissman, R. B., Xiao, H.\* (2021) “Oxime as a General Photocage for the Design of Visible Light Photoactivatable Fluorophores.” ***Chemical Science***, 12, 15572.
9. Adeniji, O. S., Kuri-Cervantes, L., Yu, C., Xu, Z., Ho, M., Chew, G. M., Shikuma, C., Tomescu, C., George, A. F., Roan, N. R., Ndhlovu, L. C., Muthumani, K., Weiner, D. B., Xiao, H., Abdel-Mohsen, M. (2021) “Siglec-9 Defines and Restrains a Natural Killer Subpopulation Highly Cytotoxic to HIV-infected Cells.” ***Plos Pathogens***, 11, e1010034.
10. Cao, Y. J.†\*, Yu, C.†, Wu, K. L.†, Wang, X., Tian, Z., Liu, D., Zhao, L., Li, R., Lored, A., *Chung, A.*, Xiao, H.\* (2021) “Synthesis of Precision Antibody Conjugates using Proximity-Induced Chemistry.” ***Theranostics***, 11, 9107.
11. Wu, K. L., Yu, C., *Lee, C.*, Zuo, C., Ball, Z., Xiao, H.\* (2021) “Precision Modification of Native Antibodies.” ***Bioconjugate Chemistry***, 32, 1947.
12. Tian, Z.†, Ling, W.†, Yu, C., Chen, Y., Xu, Z., Bado, I., Lored, A., Wang, L., Wang, H., Wu, K. L., Zhang, W., Zhang, X. \*, Xiao, H.\* (2021) “Harness the Power of the Antibody to Fight Bone Metastasis.” ***Science***

*Advances*, 7, eabf2051.

-Selected as an Online Rotator Article.

13. Tang, J.<sup>†</sup>, Yu, C.<sup>†</sup>, Loredo, A., Chen, Y., Xiao, H.\* (2021) “*Very Important Paper: Site-Specific Incorporation of a Photoactivatable Fluorescent Amino Acid.*” *ChemBioChem*, 22, 501.
  14. Ortiz-Rodríguez, L. A., Hoehn, S.<sup>†</sup>, Loredo, A., Wang, L., Xiao, H., Crespo-Hernández, C. E.\* (2021) “Electronic Relaxation Pathways in Heavy-Atom-Free Photosensitizers Absorbing Near-Infrared Radiation and Exhibiting High Yields of Singlet Oxygen Generation.” *Journal of the American Chemical Society*, 143, 2676.
  15. Dharmaraj N., Xiao, H., Carson, D. D. (2021) “Protein Modifications | Mucins in Embryo Implantation.” *Encyclopedia of Biochemistry 3<sup>rd</sup> Edition*, Elsevier.
  16. Loredo, A.<sup>†</sup>, Wang, L., Shichao, W., Xiao, H.\* (2021) “Single-Atom Switching as a General Approach to Designing Colorimetric and Fluorogenic Probes for Mercury Ions.” *Dyes and Pigments*, 186, 109014.
  17. Chen, Y., Tang, J. Wang, L., Tian, Z., Cardenas, A., Fang, X., Chatterjee, A., Xiao, H.\* (2020) “Creation of Bacterial cells with 5-Hydroxytryptophan as a 21<sup>st</sup> Amino Acid Building Block.” *Chem*, 6, 2717.  
-Highlighted by Nature Chemical Biology.  
-Featured in Rice News, PHYS.ORG, and ScienceDaily.
  18. Tang, J.<sup>†</sup>, Wang, L. S.<sup>†</sup>, Loredo, A., Cole, C., Xiao, H.\* (2020) “Single-Atom Replacement as a General Approach Towards Visible-Light/Near-Infrared Heavy-Atom-Free Photosensitizers for Photodynamic Therapy.” *Chemical Science*, 11, 6701.  
-Highlighted in 2020 Chemical Science HOT Article Collection.  
-Featured in Rice News, PHYS.ORG, and ScienceDaily
  19. Gray, M. A., Stanczak, M. A., Mantuano, N. R., Xiao, H., Pijnenborg, J. F. A., Malaker, S. A., Weidenbacher, P.A., Miller, C. L., Tanzo, J. T., Ahn, G., Woods, E. C., Läubli, H., Bertozzi, C.\* (2020) “Targeted Glycan Degradation Potentiates the Anticancer Immune Response in vivo.” *Nature Chemical Biology*, 16, 1376.
  20. Loredo, A.<sup>†</sup>, Tang, J.<sup>†</sup>, Wang, L.<sup>†</sup>, Wu, K. L., Zang, P., Xiao, H.\* (2020) “Tetrazine as a General Phototrigger to Turn on Fluorophores.” *Chemical Science*, 11, 4410.  
-Featured in ChemistryViews.
  21. Stanford, M. G., Li, J., Chen, Y., McHugh, E. A., Liopo, A., Xiao, H., Tour, J. M.\* (2019) “Self-Sterilizing Laser-Induced Graphene Bacterial Air Filter.” *ACS Nano*, 13, 11912.
  22. Chen, Y.<sup>†</sup>, Wu, K. L.<sup>†</sup>, Pei, J., Tang, J., Loredo, A., Peng, Z., Gupta, R., Xiao, H.\* (2019) “Addition of Isocyanide-containing Amino Acids to the Genetic Code for Protein Labeling and Activation.” *ACS Chemical Biology*, 14, 2793.
  23. Tang, J.<sup>†</sup>, Robichaux, M.<sup>†</sup>, Wu, K. L., Nguyen, T. N., Zhou, Y., Wensel, T. G.\*, Xiao, H.\* (2019) “Single-Atom Fluorescence Switch: A General Approach towards Visible Light-Activated Dyes for Biological Imaging.” *Journal of the American Chemical Society*, 141, 14699.  
-Highlighted by JACS Spotlight, and C&EN.  
-Featured in Rice News, TMC NEWS, FUTURITY, EurekAlert, and ScienceDaily.
  24. Yu, C.<sup>†</sup>, Tang, J.<sup>†</sup>, Loredo, A., Chen, Y., Jung, S. Y., Jain, A., Gordon, A., Xiao, H.\* (2018) “Proximity-induced Site-Specific Antibody Conjugation.” *Bioconjugate Chemistry*, 29, 3522.  
-Featured in Rice News, Medical Express, TMC NEWS, Laboratory Equipment, TECHNOLOGY NETWORKS, CNU, BIONITY@Germany, News Archives UK, FUTURITY, EurekAlert, R&D.  
-Most read article within 1 month and 12 months
  25. Chen, Y., Loredo, A., Gordon, A., Tang, J., Yu, C., Ordonez, J., Xiao, H.\* (2018) “A noncanonical Amino Acid-Based Relay System for Site-specific Protein Labeling.” *Chemical Communications*, 54, 7187.
- Prior to Rice University:-----
26. Xuan, W. M.<sup>†</sup>, Collins, D.<sup>†</sup>, Koh, M., Shao, S., Yao, A. Z., Xiao, H., Garner, P. P., Schultz, P. G.\* (2018) “Site-specific Incorporation of a Thioester Containing Amino Acid into Proteins.” *ACS Chemical Biology*, 13, 578-581.
  27. Xiao, H.<sup>†</sup>, Woods, E. C.<sup>†</sup>, Vukojcic, P., Bertozzi, C. R.\* (2016) “Precision Glycocalyx Editing as a Strategy for Cancer Immunotherapy.” *Proceedings of the National Academy of Sciences*, 113, 10304-10309.  
-Highlighted by *Science Translational Medicine*, *PNAS Commentary*, *ACS Chemical Biology*.  
-Featured in *Stanford News*, *Next Big Future*, *MedicalXpress*.
  28. Xiao, H., Schultz, P. G.\* (2016) “At the Interface of Chemical and Biological Synthesis: An Expanded

- Genetic Code.” *Cold Spring Harbor Perspectives in Biology*, 8, a023945.
29. Liu, T., Wang, Y., Luo, X. Z., Li, J., Reed, S. A., Xiao, H., Young, T. S., Schultz, P. G.\* (2016) “Enhancing Protein Stability with Extended Disulfide Bonds.” *Proceedings of the National Academy of Sciences*, 113, 5910-5915.
  30. Cao, Y., Rodgers, D. T., Du, J., Ahmad, I., Hampton, E. N., Ma, J. S., Mazagova, M., Choi, S. H., Yun, H. Y., Xiao, H., Yang, P., Luo, X., Lim, R. K., Pugh, H. M., Wang, F., Kazane, S. A., Wright, T. M., Kim, C. H., Schultz, P. G.\* , Young, T. S.\* (2016) “Design of Switchable Chimeric Antigen Receptor T cells Targeting Breast Cancer.” *Angewandte Chemie International Edition*, 55, 7520-7524.
  31. Xiao, H.†, Nasertorabi, F.†, Choi, S. H., Han, G. W., Reed, S. A., Stevens, R. C.\* , Schultz, P. G.\* (2015) “Exploring the Potential Impact of an Expanded Genetic Code on Protein Function.” *Proceedings of the National Academy of Sciences*, 112, 6961-6966.
  32. -Featured in The San Diego Union-Tribune.
  33. Xiao, H.†, Xuan, W.†, Shao, S., Liu, T., Schultz, P. G.\* (2015) “Genetic Incorporation of  $\epsilon$ -N-2-Hydroxyisobutyryl-lysine into Recombinant Histones.” *ACS Chemical Biology*, 10, 1599-1603.
  34. Chatterjee, A.†, Lajoie, M. J.†, Xiao, H.†, Church, G. M., Schultz, P. G.\* (2014) “A Bacterial Strain with a Unique Quadruplet Codon Specifying Nonnative Amino Acids.” *ChembioChem*, 15, 1782-1786.
  35. Xiao, H.†, Peters, F. B.†, Yang, P. Y., Reed, S., Chittuluru, J. R., Schultz, P. G.\* (2014) “Genetic Incorporation of Histidine Derivatives Using an Engineered Pyrrolysyl-tRNA Synthetase.” *ACS Chem Biol*, 9, 1092-1096.
  36. Xiao, H.†, Chatterjee, A.\* , Choi, S. H., Bajjuri, K. M., Sinha, S. C., Schultz, P. G.\* (2013) “Genetic Incorporation of Multiple Unnatural Amino Acids into Proteins in Mammalian Cells.” *Angewandte Chemie International Edition*, 52, 14080-14083.
  37. Chatterjee, A.†, Xiao, H.†, Bollong, M., Ai, H. W., Schultz, P. G.\* (2013) “Efficient Viral Delivery System for Unnatural Amino Acid Mutagenesis in Mammalian Cells.” *Proceedings of the National Academy of Sciences*, 110, 11803-11808.
  38. Chatterjee, A.†, Xiao, H.†, Yang, P. Y., Soundararajan, G., Schultz, P. G.\* (2013) “A Tryptophanyl-tRNA Synthetase/tRNA Pair for Unnatural Amino Acid Mutagenesis in *E. coli*.” *Angewandte Chemie International Edition*, 52, 5106-5109.
  39. Chatterjee, A.†, Xiao, H.†, Schultz, P. G.\* (2012) “Evolution of Multiple, Mutually Orthogonal Prolyl-tRNA Synthetase/tRNA Pairs for Unnatural Amino Acid Mutagenesis in *Escherichia coli*.” *Proceedings of the National Academy of Sciences*, 109, 14841-14846.
  40. Chatterjee, A., Sun, S. B., Furman, J. L., Xiao, H., Schultz, P. G.\* (2013) “A Versatile Platform for Single- and Multiple-Unnatural Amino Acid Mutagenesis in *Escherichia coli*.” *Biochemistry*, 52, 1828-1837.
  41. Mei, T. S., Leow, D. S., Xiao, H., Laforteza, B. N., Yu, J. Q.\* (2013) “Pd (II)-Catalyzed C-H Activation Route to Indolines.” *Synfacts*, 9, 1163.
  42. Mei, T. S., Leow, D. S., Xiao, H., Laforteza, B. N., Yu, J. Q.\* (2013) “Synthesis of Indolines via Pd(II)-Catalyzed Amination of C-H Bonds Using PhI(OAc)<sub>2</sub> as the Bystanding Oxidant.” *Organic Letters*, 15, 3058-3061.
  43. Han, Z. Y., Guo, R., Wang, P. S., Chen, D. F., Xiao, H., Gong, L. Z.\* (2011) “Enantioselective Concomitant Creation of Vicinal Quaternary Stereogenic Centers via Cyclization of Alkynols Triggered Addition of Azlactones.” *Tetrahedron Letter*, 52, 5963-5967.
  44. Han, Z. Y., Xiao, H., Gong, L. Z.\* (2009) “Consecutive Intramolecular Hydroamination/Asymmetric Transfer Hydrogenation under Relay Catalysis of an Achiral Gold Complex/Chiral Brønsted Acid Binary System.” *Journal of the American Chemical Society*, 131, 9182-9183.
  45. Han, Z. Y., Xiao, H., Gong, L. Z.\* (2009) “Dynamic Kinetic Asymmetric Transfer Hydrogenation of Racemic 2,4-diaryl-2,3-dihydrobenzo[b][1,4]diazepines Catalyzed by Chiral Phosphoric Acids.” *Bioorganic & Medicinal Chemistry Letters*, 19, 3729-3732.
  46. Chen, X. H., Wei, Q., Luo, S. W., Xiao, H., Gong, L. Z.\* (2009) “Organocatalytic Synthesis of Spiro[pyrrolidin-3,3'-oxindoles] with High Enantiopurity and Structural Diversity.” *Journal of the American Chemical Society*, 131, 13819-13825.