Yuzhong Liu, Ph.D.

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Education & Research Positions

2023 – Now	Assistant Professor, Department of Chemistry The Scripps Research Institute, La Jolla *Topic: Complex Natural Product Biosynthesis Using Natural and Evolved Enzymes*
2018 – 2023	Postdoctoral Fellow, Joint BioEnergy Institute, Lawrence Berkeley National Laboratory *Advisor:* Professor Jay D. Keasling *Topic: Plant Triterpene Biosynthesis in Engineered Microbial Hosts*
2013 – 2018	Ph.D., Chemistry, University of California, Berkeley *Advisor:* Professor Omar M. Yaghi *Topic: Woven Crystalline Covalent Organic Frameworks*
2009 – 2012	B.S., Chemistry, University of Michigan, Ann Arbor *Advisor:* Professor Mi Hee Lim *Topic: Bifunctional Small Molecules to Study the Role of Metal-associated Amyloid−β Species in Alzheimer's Disease*

Teaching and Outreach Experiences

2025 – Now	Lecturer, CHEM520 Biosynthesis, The Scripps Research Institute
2023 – Now	Lecturer, Chemical Biology Lecture Series, The Scripps Research Institute
2021	"Synthetic Biology for a Sustainable Future", Midday Science Cafe, UC Berkeley
2021	"Women's Empowerment Through STEAM", the Jane Goodall Institute
2013 – 2018	Teaching assistant, Department of Chemistry, UC Berkeley
4 semesters	Graduate student instructor, CHEM 3A & 3B (advanced level organic chemistry)

Awards, Fellowships, and Other Positions

2025	The PhRMA Foundation Faculty Starter Grants Awardee
2024	Michelson Next-Generation Grants Awardee
2024	Scripps Research Collaborative Innovation Fund Recipient
2023	Berkeley Postdoctoral Association Professional Development Award
2021 – 2022	Consultant for Compound Foods, an alternative food biotechnology startup company
2020 – 2022	Associate Director of Commercialization, Joint BioEnergy Institute, LBNL
2017 – 2018	UC Berkeley Outstanding Graduate Student Instructor Award
2017 – 2018	The Philomathia Graduate Student Fellowship in the Environmental Sciences
2016	Chinese Government Award for Outstanding Self-financed Students Abroad
2016	UC Berkeley Conference Travel Grants for *MOF 2016*
2016	UC Berkeley Conference Travel Grants for *252nd ACS National Meeting & Exposition*

Publications

1. San Martín, R.*; **Liu, Y.***; Yang, Y.; Fox, C. B.; Iyer, L. R.; Mohamath, R.; Ramer-Denisoff, G.; Kinsey, R.; Guderian, J. A.; Schwabach, J.; Deng, S.; de Andrade Teixeira Fernandes; N., Radke, C. "Immunologically active QS-21 variant from *Quillaja saponaria* aerial biomass", *Front. Immunol.* **2026**, *17*, 1771912.

2. Zhan, C.; Lan, G.; Dan, Q.; Qin, N.; Pearson, A. N.; Mellinger, P.; **Liu, Y.**; Wang, Z.; Cheong, S.; Dou, C.; Li., C.; Haushalter, R.; Keasling, J. D.* "Hybrid biological-chemical strategy for converting polyethylene into a recyclable plastic monomer using engineered *Corynebacterium glutamicum*" *Metab. Eng.* **2025**, *90*, 106–116.
3. **Liu, Y.**; Zhao, X.; Gan, F.; Chen, X.; Deng, K.; Crowe, S. A.; Hudson, G. A.; Belcher, M. S.; Schmidt, M.; Astolfi, M. C. T.; Kosina, S.; Pang, B.; Shao, M.; Yin, J.; Sirirungruang, S.; Iavarone, A. T.; Reed, J.; Martin, L. B. B.; El-Demerdash, A.; Kikuchi, S.; Misra, R. C.; Liang, M.; Cronce, M. J.; Chen, X.; Zhan, C.; Kakumanu, R.; Baidoo, E. E. K.; Chen, Y.; Petzold, C. J.; Northen, T.; Osbourn, A.; Scheller, H. V.; Keasling, J. D.* "Complete biosynthesis of QS-21 in engineered yeast" *Nature*, **2024**, *629,* 937–944.
4. Crowe, S. A.; Zhao, X.; Gan, F.; Chen, X.; Hudson, G. A.; Astolfi, M. C. T.; Scheller, H. V.; **Liu, Y.***; Keasling, J. D.* "Engineered *Saccharomyces cerevisiae* as a biosynthetic platform of nucleotide sugars" *ACS Syn. Biol.* **2024**, *13*, 1215–1224.
5. Crowe, S. A.; **Liu, Y.**; Zhao, X.; Scheller, H. V.; Keasling, J. D.* "Advances in engineering nucleotide sugar metabolism for complex glycosylation in *Saccharomyces cerevisiae*" *ACS Syn. Biol.* **2024**, *13*, 1589–1599.
6. Martin, L. B. B.; Kikuchi, S.; Rejzek, M.; Owen, C.; Reed, J.; Orme, A.; Misra, R. C.; Demerdash, A. E-.; Hill, L.; Hodgson, H.; **Liu, Y.**; Keasling, J. D.; Field, R. A.; Truman, A. W.; Osbourn, A.* "Complete biosynthesis of the potent vaccine adjuvant QS-21" *Nat. Chem. Biol.*, **2024**, *20*, 493–502.
7. Luckie, B. A.; Kashyap, M.; Pearson, A. N.; Chen, Y.; **Liu, Y.**; Valencia, L. E.; Romero, A. C.; Hudson, G. A.; Tao, X. B.; Wu, B.; Petzold, C. J.; Keasling, J. D.* "Development of *Corynebacterium glutamicum* as a monoterpene production platform" *Metab. Eng.* **2024**, *81*, 110–122.
8. Chen, X.; Hudson, G.; Mineo, C.; Amer, B.; Baidoo, E. K. K.; Crowe, S. A.; **Liu, Y.**; Keasling, J. D.; Scheller, H. V.* "Deciphering triterpenoid saponin biosynthesis by leveraging transcriptome response to methyl jasmonate elicitation in *Saponaria vaccaria*" *Nat Comm.*, **2023**, *14*, 7101.
9. Eng, T.; Banerjee, D.; Menasalvas, J.; Chen, Y.; Gin, J. W.; Choudhary, H.; Baidoo, E. K. K.; Chen, J. H.; Ekman, A.; Kakumanu, R.; **Liu, Y.**; Codik, A.; Larabell, C.; Gladden, J. M.; Simmons, B. A.; Keasling, J. D.; Petzold, C. J.; Mukhopadhyay, A.* "Maximizing microbial bioproduction from sustainable carbon sources using iterative systems engineering" *Cell Rep.*, **2023**, *42*, 113087.
10. Zhan, C.; Lee, N.; Lan, G.; Dan, Q.; Cowan, A.; Wang, Z.; Baidoo, E. E. K.; Kakumanu, R.; Luckie, B.; Kuo, R. C.; McCauley, J.; **Liu, Y.**; Valencia, L.; Haushalter, R. W.; Keasling, J. D.* "Leveraging propionate-induced growth inhibition in *Corynebacterium glutamicum* to evolve improved methylmalonyl-CoA-dependent polyketide production" *Nat. Metab*. **2023**, *5*, 1127–1140.
11. Englund, E.; Schmidt, M.; Nava, A. A.; Lechner, A.; Deng, K.; Jocic, R.; Lin, Y.; Roberts, J. B.; Benites, V. T.; Kakumanu, R.; Gin, J. W.; Chen, Y.; **Liu, Y**.; Petzold, C. J.; Baidoo, E. E. K.; Northen, T. R.; Adams, P. D.; Katz, L.; Yuzawa, S.; Keasling, J. D.* "Expanding extender substrate selection for unnatural polyketide biosynthesis by acyltransferase domain exchange within a modular polyketide synthase", *J. Am. Chem. Soc.*, **2023**, *145*, 8822–8832.
12. Carruthers, D. N.; Kim, J.; Mendez-Perez, D.; Monroe, E.; Myllenbeck, N.; **Liu, Y.**; Davis, R.; Sundstrom, E.; Lee, T. S.* "Microbial production of high octane and high sensitivity olefinic ester biofuels" *Biotechnol. biofuels bioprod.*, **2023**, *16*, 60.
13. Zhan, C.; Li, X.; Lan,G.; Baidoo, E. E. K.; Yang, Y.; **Liu,Y.**; Sun, Y.; Wang, S.; Wang, Y.; Wang, G.; Nielsen, J.; Keasling, J. D.*; Chen, Y.*; Bai, Z.* "Reprogramming methanol utilization pathways to convert Saccharomyces cerevisiae to a synthetic methylotroph" *Nat. Cat.*, **2023**, *6*, 435–450.
14. Ma, T.; Zhou, Y.; Diercks, C. S.; Kwon, J.; Gándara,F.; Lyu, H.; Hanikel, N.; Pena-Sánchez, P.; **Liu, Y.**; Diercks, N. J.; Ritchie, R.; Proserpio, D.; Terasaki, O.; Yaghi, O. M.* "Infinite catenanes of polyhedra in covalent organic frameworks" *Nat. Syn.*, **2023**, *2*, 286–295.
15. Cruz-Morales, P.; Yin, K.; Landera, A.; Cort, J.; Young, R. P.; Kyle, J. E.; Bertrand, R.; Iavarone, A.; Acharya, S.; Cowan, A.; Gin, J. W.; Petzold, C. J.; Araujo-Barcelos, C.; Sundstorm, E.; George, A.; **Liu, Y.**; Klass, S.; Nava, A.; Keasling, J. D.* "Biosynthesis of polycyclopropanated high energy biofuels" *Joule*, **2022**, *6*, 1590–1605.
16. **Liu, Y.**; Cruz-Morales, P.; Zargar, A.; Pang, B.; Belcher, M.; Englund, E. D.; Dan, Q.; Yin, K.; Keasling J. D.* "Biofuels for a sustainable future" *Cell*, **2021**, *184*, 1636–1647.

17. Banerjee, D.; Eng, T.; Lau, A. K.; Sasaki, Y.; Wang, B.; Chen, Y.; Prahl, J. -P.; Singan, V. R.; Herbert, R. A.; **Liu, Y.**; Tanjore, D.; Petzold, C. J.; Keasling, J. D.; Mukhopadhyay A.* "Genome-scale metabolic rewiring improves titers rates and yields of the non-native product indigoidine at scale" *Nat. Commun.* **2020**, *11*, 5385.
18. Thompson, M. G.; Incha, M. R.; Pearson, A. N.; Schmidt, M.; Sharpless, W. A.; Eiben, C. B.; Cruz-Morales, P.; Blake-Hedges, J. M.; **Liu, Y.**; Adams, C. A.; Haushalter, R. W.; Krishna, R. N.; Lichtner, P.; Blank, L. M.; Mukhopadhyay, A.; Deutschbauer, A. M.; Shih, P. M.; Keasling, J. D.* "Fatty acid and alcohol metabolism in Pseudomonas putida: functional analysis using random barcode transposon sequencing" *Appl. Environ. Microbiol.* **2020**, *86*, e01665–20.
19. Thompson, M. G.; Blake-Hedges, J. M.; Pereira, J. H.; Hangasky, J. A.; Belcher, M. S.; Moore, W. M.; Barajas, J. F.; Cruz-Morales, P.; Washington, L. J.; Haushalter, R. W.; Eiben, C. B.; **Liu, Y.**; Skyrud, W.; Benites, V. T.; Barnum, T. P.; Baidoo, E. E. K.; Scheller, H. V.; Marletta, M. A.; Shih, P. M.; Adams, P. D.; Keasling, J. D.* "An Iron (II) dependent oxygenase performs the last missing step of plant lysine Catabolism" *Nat. Commun.* **2020**, *11*, 1–10.
20. Zargar, A.; Lal, R.; Valencia, L.; Wang, J.; Backman, T. W. H.; Cruz-Morales, P.; Kothari, A.; Werts, M.; Wong, A. R.; Bailey, C .B.; Loubat, A.; **Liu, Y.**; Chen, Y.; Chang, S.; Benites, V. T.; Hernández, A. C.; Barajas, J. F.; Thompson, M. G.; Barcelos, C.; Anayah, R.; Martin, H. G.; Mukhopadhyay, A.; Petzold, C. J.; Baidoo, E. E. K.; Katz, L.; Keasling, J. D.* "Chemoinformatic-guided engineering of polyketide synthases" *J. Am. Chem. Soc.* **2020**, *142*, 9896–9901.
21. Incha, M. R.; Thompson, M. G.; Blake-Hedges, J. M.; **Liu, Y.**; Pearson, A. N.; Schmidt, M.; Gin, J. W.; Petzold, C. J.; Deutschbauer, A. M.; Keasling, J. D.* "Leveraging host metabolism for bisdemethoxycurcumin production in *Pseudomonas putida*" *Metab. Eng. Commun.* **2020**, *10*, e00119.
22. Pei, X.; Buergi, H. -B.; Kapustin, E.; **Liu, Y.**; Yaghi, O. M.* "Coordinative alignment in the pores of MOFs for the structural determination of N-, S-, and P-containing organic compounds including complex chiral molecules" *J. Am. Chem. Soc.* **2019**, *141*, 18862–18869.
23. Wehrs M.; Gladden, J. M.; **Liu, Y.**; Platz, L.; Prahl, J. -P.; Moon, J.; Papa, G.; Sundstrom, E.; Geiselman, G. M.; Tanjore, D.; Keasling, J. D.; Pray, T. R.; Simmons, B. A.; Mukhopadhyay, A.* "Sustainable bioproduction of the blue pigment indigoidine: Expanding the range of heterologous products in *R. toruloides* to include non-ribosomal peptides" *Green Chem.* **2019**, *21*, 3394–3406.
24. **Liu, Y.**; Diercks, C. S.; Ma, Y.; Lyu, H.; Zhu, C.; Yaghi, O. M.* "3D covalent organic frameworks of interlocking complex 1D threads" *J. Am. Chem. Soc.* **2019**, *141*, 677–683.
25. **Liu, Y.**; Ma, Y.; Yang, J.; Diercks, C. S.; Tamura, N.; Jin, F.; Yaghi, O. M.* "Molecular weaving of covalent organic frameworks for adaptive guest inclusion" *J. Am. Chem. Soc.* **2018**, *140*, 16015–16019. **(Highlighted on the *JACS* cover)**
26. **Liu, Y.**; O'Keeffe, M.* "Regular figures, minimal transitivity, and reticular chemistry" *Isr. J. Chem.* **2018**, *58*, 962–970. (Invited accounts article in honor of Professor Omar M. Yaghi receiving the 2018 Wolf Prize)
27. **Liu, Y.**; O'Keeffe, M.*; Treacy, M. M. J.*; Yaghi, O. M.* "The geometry of periodic knots, polycatenanes and weaving from a chemical perspective: A library for reticular chemistry" *Chem. Soc. Rev.*, **2018**, *47*, 4642–4664.
28. **Liu, Y.**; Yaghi, O. M.* "Metal coordination as a template strategy to make resilient woven materials" *Bull. Chem. Soc. Jpn.* **2018**, *71*, 12–17. (Invited award accounts article for Professor Omar M. Yaghi receiving the 2017 Japanese Society of Coordination Chemistry International Award)
29. Diercks, C. S.; **Liu, Y.**; Cordova, K. E.; Yaghi, O. M.* "The role of reticular chemistry in the design of CO_2 reduction catalysts" *Nat. Mater.*, **2018**, *17*, 301–307.
30. **Liu, Y.**;[§] Ma, Y.;[§] Zhao, Y.;[§] Sun, X.; Furukawa, H.; Gandara, F.; Liu, Z.; Zhu, H.; Zhu, C.; Suenaga, K. Oleynikov, P.; Zhang, X.; Terasaki, O.; Yaghi, O. M.* "Weaving of organic threads into a crystalline covalent organic framework" *Science,* **2016**, *351*, 365–369. **(Highlighted on the *Science* cover, *Science* perspective, *Nature*, C&EN news, Forbes news, LBNL news, ScienceDaily, The Daily Californian, Chemistryworld)**
31. Savelieff, M. G.; **Liu, Y.**; Senthamarai, R. R. P.; Korshavn, K. J.; Lee, H. J.; Ramamoorthy, A.; Lim, M. H.* "A small molecule that displays marked reactivity toward copper–versus zinc–amyloid–β implicated in Alzheimer's Disease" *Chem. Commun.* **2014**, *50*, 5301–5303. (Highlighted in *Chem. Commun.* "Contributors to the Emerging Investigators Issue 2014")

32. **Liu, Y.**;[§] Kochi, A.;[§] Pithadia, A. S.; Lee, S.; Nam, Y.; Beck, M. W.; He, X.; Lee, D.; Lim, M. H.* "Tuning reactivity switching of diphenylpropynone derivatives with metal-associated amyloid–β species *via* structural modifications" *Inorg. Chem.* **2013**, *52*, 8121–8130.
33. Savelieff, M. G.; Lee, S.; **Liu, Y.**; Lim, M. H.* "Alzheimer's Disease: Untangling amyloid–β, tau, and metals" *ACS Chem. Biol.* **2013**, *8*, 856–865.
34. Pithadia A. S.;[§] Kochi, A.;[§] Soper, T. S.; Beck, M. W.; **Liu, Y.**; Lee, S.; DeToma, A. S.; Ruotolo, B. T.; Lim, M. H.* "Reactivity of dipheylpropynone derivatives toward metal-associated amyloid–β species" *Inorg. Chem.* **2012**, *51*, 12959–12967.

Patents

1. **Liu, Y.**; Crowe, S. A.; Keasling, J. D.; Chen, X.; Hudson, G. A.; Gan, F.; Scheller, H. V.; Reed, J.; Martin, L. "Saponin production in yeast", **2023**, WO2023122801A3.
2. Keasling, J. D.; **Liu, Y.** "Triterpene production" **2022**, US20220112523A1.
3. Cruz-Morales, P.; Yin, K.; Bertrand, R.; Oksen, E.; Cowan, A.; **Liu, Y.**; Sundstrom, E.; Keasling, J. D. "Novel cyclopropane compounds and genetically modified host cells and methods useful for producing thereof" US Patent App. US20220098622A1, **2021**.
4. Yaghi, O. M.; **Liu, Y.** "Covalent Organic Frameworks with a Woven Structure" **2020**, US10597408B2.

Book Chapter

1. **Liu, Y.**; Gan, F.; Cruz-Morales, P.; Keasling, J. D. "Engineering Natural Product Biosynthetic Pathways to Produce Commodity and Specialty Chemicals" Book Chapter in *Comprehensive Natural Products III*, 352-376, **2020**.

Oral & Poster Presentations

1. **Liu, Y.** "Biosynthesis of natural and new-to-nature glycosides in engineered yeast", *Invited Seminar*, *Cold Spring Harbor Asia*, Suzhou, China, November **2026**.
2. **Liu, Y.** "Biosynthesis of natural and new-to-nature glycosides in engineered yeast", *Invited Seminar*, *The 5th International Conference on Bioengineering and Technological Innovation*, Hanghzou, China, November **2026**.
3. **Liu, Y.** "Biosynthesis of natural and new-to-nature glycosides in engineered yeast", *Invited Seminar*, *Gordon Research Conference on Heterocyclic Compounds*, Salve Regina University, Newport, RI, June **2026**.
4. **Liu, Y.** "Biosynthesis of natural and new-to-nature glycosides in engineered yeast", *Invited Seminar*, *Gordon Research Conference on Natural Products and Bioactive Compounds*, Proctor Academy, Andover, NH, July–August **2025**.
5. **Liu, Y.** "Biosynthesis of natural and new-to-nature glycosides in engineered yeast", *Invited Seminar*, *The Genomic Wave: New Frontiers in Natural Product Discovery*, San Diego, CA, January **2025**.
6. **Liu, Y.** "Biosynthesis of natural and new-to-nature glycosides in engineered yeast" *Invited Seminar*, Aiiso Yufeng Li Family Department of Chemical and Nano Engineering at UC San Diego, November **2024**.
7. **Liu, Y.** "Complete biosynthesis of QS-21, a potent vaccine adjuvant", *Invited Seminar*, *5th European Conference on Natural Products,* Wurzburg, Germany, October **2024**.
8. **Liu, Y.** "Complete biosynthesis of QS-21, a potent vaccine adjuvant", *Invited Seminar*, *Young Glycosciences Investigators Symposium*, *ACS Fall 2024,* Denver, CO, August **2024**.
9. **Liu, Y.** "Microbial hosts as a biosynthetic platform to make complex (un)natural glycosides", *The San Diego Natural Products Affinity Group*, San Diego, CA, March **2024**.
10. **Liu, Y.**; Keasling, J. D. "Complete biosynthesis of QS-21, a potent vaccine adjuvant", *Society for Industrial Microbiology and Biotechnology (SIMB) Annual Meeting*, Minneapolis, MN, July **2023**.
11. **Liu, Y.**; Keasling, J. D. "Complete biosynthesis of QS-21, a potent vaccine adjuvant", *Metabolic Engineering 15*, Singapore, June **2023**.
12. **Liu, Y.**; Yaghi, O. M. "Molecular Weaving", *Invited Seminar*, *Tangle 2022: The interdisciplinary world of tangling*, Potsdam, Germany, September **2022**.

13. **Liu, Y.**; Gan, F.; Keasling, J. D. "Quillaic acid biosynthesis in *Saccharomyces cerevisiae* through combinatorial studies of heterologous proteins", Poster, *3rd International Conference on Natural Product Discovery and Development in the Genomic Era*, San Diego, CA, January **2020**.
14. **Liu, Y.**; Yaghi, O. M. "Molecular Weaving for Adaptive Guest Inclusion" *Self-Assembly and Supramolecular Chemistry Gordon Research Conference*, Poster, Les Diablerets Conference Center, Switzerland, May **2019**.
15. **Liu, Y.**; Yaghi, O. M. "Weaving as a Strategy to Make Covalent Organic Frameworks" Poster, *253rd ACS National Meeting & Exposition*, San Francisco, CA, August **2017**.
16. **Liu, Y.**; Ma, Y.; Terasaki, O.; Yaghi, O. M. "Weaving as a Strategy to Make Covalent Organic Frameworks" Oral presentation, *MOF 2016*, Long Beach, CA, September **2016**.
17. **Liu, Y.**; Yaghi, O. M. "Weaving of Organic Threads into a Crystalline Covalent Organic Framework" Oral presentation, *252nd ACS National Meeting & Exposition*, Philadelphia, PA, August **2016**. **(Best Presentation in the ACS Session)**
18. **Liu, Y.**; Kochi, A.; Lee, S.; Beck, M. W.; Pithadia, A. S.; DeToma, A. S.; Lim, M. H. "Chemical Reagents to Study the Role of Metal-Associated Amyloid−β Species in Alzheimer's Disease" Poster, *Bioinorganic Chemistry Gordon Research Seminar*, Ventura, CA, January **2013**.
19. **Liu, Y.**; Kochi, A.; Lee, S.; Beck, M. W.; Pithadia, A. S.; DeToma, A. S.; Lim, M. H. "Chemical Reagents to Study the Role of Metal-Associated Amyloid−β Species in Alzheimer's Disease" Poster, *Ohio Inorganic Weekend*, Wayne State University, Detroit, MI, October **2012**.
20. **Liu, Y.**; Kochi, A.; Lee, S.; Beck, M. W.; Pithadia, A. S.; DeToma, A. S.; Lim, M.H. "Chemical Reagents to Study the Role of Metal-Associated Amyloid−β Species in Alzheimer's Disease" Poster, *Novartis Symposium*, University of Michigan, Ann Arbor, MI, October **2012**.
21. **Liu, Y.**; Bilgir, C.; Pletcher, S. "*Drosophila Melanogaster* Olfaction and Longevity-Related Physiology" Poster, *Undergraduate Research Opportunity Program (UROP) Symposium*, University of Michigan, Ann Arbor, MI, April **2011**.

Editorial and Scientific Service

Serve as an *Associate Editor* for the following journal:

- *Frontiers in Immunology*

Serve as a *Reviewer* for the following journals:

- *ACS Materials Letters*
- *ACS Omega*
- *ACS Synthetic Biology*
- *Inorganic Chemistry*
- *Journal of American Chemical Society*
- *Journal of Industrial Microbiology and Biotechnology*
- *Metabolic Engineering*
- *Nature Biotechnology*
- *Nature Chemistry*
- *Nature Communications*
- *Natural Product Reports*
- *Organic Letters*
- *RSC Advances*
- *Science*