Yu CHEN 陈禹

PhD, PI, Professor
Institute of Synthetic Biology
Shenzhen Institute of Advanced Technology (SIAT)
Chinese Academy of Sciences (CAS)
E-mail: y.chen3@siat.ac.cn

BRID: 02199.00.62286
ORCID: 0000-0003-3326-9068
ResearcherID: AAL-3329-2020

Education & Degrees

June 2018	Ph.D. in Biochemical engineering	East China University of Science and Technology
June 2012	B.E. in Bioengineering	Huazhong Agricultural University

Positions

July 2024 – Present	Adjunct professor	Shenzhen University of Advanced Technology
Jan 2024 – Present	Professor	SIAT, CAS
Feb 2023 – Jan 2024	Associate professor	SIAT, CAS
Feb 2018 – Dec 2022	Post doc	Chalmers University of Technology

Key Publications

1. **Chen Y**#, Gustafsson J#, Tafur Rangel A# et al (2024) Reconstruction, simulation and analysis of enzyme-constrained metabolic models using GECKO Toolbox 3.0. **Nature Protocols** [highlighted by Nature Reviews Genetics & Current Opinion in Chemical Biology]
2. **Chen Y** & Nielsen J (2022) Yeast has evolved to minimize protein resource cost for synthesizing amino acids. **Proceedings of the National Academy of Sciences**
3. **Chen Y** & Nielsen J (2021) In vitro turnover numbers do not reflect in vivo activities of yeast enzymes. **Proceedings of the National Academy of Sciences** [highlighted by Current Opinion in Microbiology, and recommended in Faculty Opinions]
4. **Chen Y**#, van Pelt-KleinJan E# et al (2021) Proteome constraints reveal targets for improving microbial fitness in nutrient-rich environments. **Molecular Systems Biology** (# co-first author)
5. **Chen Y** et al (2021) Yeast optimizes metal utilization based on metabolic network and enzyme kinetics. **Proceedings of the National Academy of Sciences** [highlighted by Current Opinion in Genetics & Development, and picked up by Mirage News]
6. **Chen Y** & Nielsen J (2019) Energy metabolism controls phenotypes by protein efficiency and allocation. **Proceedings of the National Academy of Sciences** [recommended in Faculty Opinions, and picked up by ScienceDaily etc.]

Grants

2024 – 2026	Shenzhen Science and Technology Program	0.75 M CNY
2024 – 2026	Shenzhen Medical Research Fund	0.8 M CNY
2024 – 2026	Chinese Academy of Sciences Talents Program	X M CNY
2024 – 2026	National Talents Program	X M CNY
2023 – 2028	National Key Research and Development Program of China	1.2 M CNY

Supervision

Jingyu Yang 杨晶宇	PhD student (Guest)	2024 – Present
Yilan Xie 谢怡兰	Master student (UCAS)	2024 – Present
Jiazi Peng 彭佳姿	Master student (SUSTech)	2024 – Present
Yuhang Li 李渝航	Research assistant	2024 – Present
Yupeng Liao 廖渝鹏	Master student (Guest)	2024 – Present
Yuanyuan Huang 黄媛媛	Research assistant	2024 – Present
Yulong Deng 邓育珑	Research assistant	2024 – Present
Longtao Li 李龙涛	Research assistant	2024 – Present
Yu Huang 黄煜	Research assistant	2024 – Present
Jiawei Huang 黄家蔚	Research assistant	2024 – Present
Weihang Dong 董伟航	Master student (Guest)	2024 – Present
Yongzhu Li 李永珠	Master student (UCAS)	2023 – Present
Siyu Han 韩思宇	Master student (Guest)	2023 – Present
Zhihao Liu 刘志豪	PhD student (Guest)	2023 – 2024
Jingyu Yang 杨晶宇	Research assistant	2023 – 2024

Editorial Experience

2024 – Present Advanced Biotechnology Youth editor

Peer Review Experience

Reviewer for scientific journals including Nature Communications, Trends in Biotechnology, PNAS, Cell Systems, Molecular Systems Biology, Analytical Chemistry, Computational and Structural Biotechnology Journal, Bioinformatics, Biotechnology and Bioengineering, Current Opinion in Systems Biology, Biotechnology Journal, ChemBioChem and FEMS Microbiology Letters.
Web of Science: https://www.webofscience.com/wos/author/record/2235260

Teaching Experience

- Mathematical modeling of energy metabolism. Lecture at Chalmers University of Technology. Sweden. Oct 10, 2022
- Constraint-based modeling of metabolism. Lecture at Shandong University. Virtual. Nov 10, 2021

Presentations

- Enzyme-constrained metabolic modeling. Symposium on Synthetic Biotechnology and Intelligent Biomanufacturing. Fuzhou, China. Aug 3, 2024 (Oral)
- Genome-scale modeling of metabolism with enzyme constraints. Sino-German MegaSyn Symposium 2024 by Dalian Institute of Chemical Physics of Chinese Academy of Sciences. Dalian, China. Jun 28, 2024 (Oral)
- Understanding metabolism by constraint-based models. The 207th Academic Seminar of the Institute of Synthetic Biology by Shenzhen Institute of Synthetic Biology of Chinese Academy of Sciences. Virtual. Jan 11, 2022 (Oral)
- Understanding metabolism by constraint-based models. International Forum for Young Scholars by Institute of Biological and Molecular Smart Manufacturing of ZJU-Hangzhou Global Scientific and Technological Innovation Center. Virtual. May 29, 2021 (Oral)

- Understanding metabolism by constraint-based models. International Forum for Young Scholars by School of Life Sciences of Nanjing University. Virtual. May 26, 2021 (Oral)
- Yeast optimizes metal utilization based on metabolic network and enzyme kinetics. International Forum for Young Scholars by School of Biotechnology of East China University of Science and Technology. Virtual. May 15, 2021 (Oral)
- Modeling energy metabolism with proteome constraints in *E. coli* and yeast. Annual Meeting of Novo Nordisk Foundation Center for Biosustainability. Lyngby, Denmark. Sept 4, 2019 (Poster)

Full List of Publications

Google scholar: https://scholar.google.com/citations?hl=en&user=tArfdEcAAAAJ

# equal contribution, * corresponding author

- Peer-reviewed research articles

1. Han S, Wu K, Wang Y*, Li F*, **Chen Y*** (2024) Auxotrophy-based curation improves the consensus genome-scale metabolic model of yeast. ***Synthetic and Systems Biotechnology*** (https://doi.org/10.1016/j.synbio.2024.07.006)
2. **Chen Y**#, Gustafsson J#, Tafur Rangel A#, Anton M, Domenzain I, Kittikunapong C, Li F, Yuan L, Nielsen J, Kerkhoven EJ* (2024) Reconstruction, simulation and analysis of enzyme-constrained metabolic models using GECKO Toolbox 3.0. ***Nature Protocols*** (https://doi.org/10.1038/s41596-023-00931-7)
3. Li F#*, **Chen Y**#, Anton M#, Nielsen J* (2022) GotEnzymes: an extensive database of enzyme parameter predictions. ***Nucleic Acids Research*** (https://doi.org/10.1093/nar/gkac831)
4. **Chen Y**, Nielsen J* (2022) Yeast has evolved to minimize protein resource cost for synthesizing amino acids. ***Proceedings of the National Academy of Sciences*** (https://doi.org/10.1073/pnas.2114622119)
5. **Chen Y**, Nielsen J* (2021) In vitro turnover numbers do not reflect in vivo activities of yeast enzymes. ***Proceedings of the National Academy of Sciences*** (https://doi.org/10.1073/pnas.2108391118)
6. **Chen Y**#, van Pelt-KleinJan E#, van Olst B, Douwenga S, Boeren S, Bachmann H, Molenaar D, Nielsen J*, Teusink B* (2021) Proteome constraints reveal targets for improving microbial fitness in nutrient-rich environments. ***Molecular Systems Biology*** (https://doi.org/10.15252/msb.202010093)
7. **Chen Y**, Li F, Mao J, Chen Y, Nielsen J* (2021) Yeast optimizes metal utilization based on metabolic network and enzyme kinetics. ***Proceedings of the National Academy of Sciences*** (https://doi.org/10.1073/pnas.2020154118)
8. **Chen Y**, Sun Y, Liu Z, Dong F, Li Y, Wang Y* (2020) Genome-scale modeling for *Bacillus coagulans* to understand the metabolic characteristics. ***Biotechnology and Bioengineering*** (https://doi.org/10.1002/bit.27488)
9. **Chen Y**, Nielsen J* (2019) Energy metabolism controls phenotypes by protein efficiency and allocation. ***Proceedings of the National Academy of Sciences*** (https://doi.org/10.1073/pnas.1906569116)
10. **Chen Y**, Wang Y*, Nielsen J* (2017) Systematic inference of functional phosphorylation events in yeast metabolism. ***Bioinformatics*** (https://doi.org/10.1093/bioinformatics/btx110)
11. **Chen Y**, Dong F, Wang Y* (2016) Systematic development and optimization of chemically defined medium supporting high cell density growth of *Bacillus coagulans*. ***Applied Microbiology and Biotechnology*** (https://doi.org/10.1007/s00253-016-7644-z)
12. Qin N#, Li L#, Wan X, Ji X, **Chen Y**, Li C, Liu P, Zhang Y, Yang W, Jiang J, Xia J, Shi S, Tan T, Nielsen J*, Chen Y*, Liu Z* (2024) Increased CO_2 fixation enables high carbon-yield production of 3-hydroxypropionic acid in yeast. ***Nature Communications*** (https://doi.org/10.1038/s41467-024-45557-9)
13. Zhang Y, Su M, **Chen Y**, Wang Z, Nielsen J, Liu Z* (2023) Engineering yeast mitochondrial metabolism for 3-hydroxypropionate production. ***Biotechnology for Biofuels and Bioproducts*** (https://doi.org/10.1186/s13068-023-02309-z)

14. Qin N, Li L, Ji X, Pereira R, **Chen Y**, Yin S, Li C, Wan X, Qiu D, Jiang J, Luo H, Zhang Y, Dong G, Zhang Y, Shi S, Jessen HJ, Xia J, Chen Y, Larsson C, Tan T, Liu Z*, Nielsen J* (2023) Flux regulation through glycolysis and respiration is balanced by inositol pyrophosphates in yeast. ***Cell*** (https://doi.org/10.1016/j.cell.2023.01.014)
15. Cao X, Yu W, **Chen Y**, Yang S, Zhao ZK, Nielsen J, Luan H, Zhou YJ* (2023) Engineering yeast for high-level production of diterpenoid sclareol. ***Metabolic Engineering*** (https://doi.org/10.1016/j.ymben.2022.11.002)
16. Li F#, Yuan L#, Lu H, Li G, **Chen Y**, Engqvist MKM, Kerkhoven EJ*, Nielsen J (2022) Deep learning-based k_{cat} prediction enables improved enzyme-constrained model reconstruction. ***Nature Catalysis*** (https://doi.org/10.1038/s41929-022-00798-z)
17. Li F, **Chen Y**#, Qi Q#, Wang Y#, Yuan L, Huang M, Elsemman IE, Feizi A*, Kerkhoven EJ, Nielsen J* (2022) Improving recombinant protein production by yeast through genome-scale modeling using proteome constraints. ***Nature Communications*** (https://doi.org/10.1038/s41467-022-30689-7)
18. Xia J, Sánchez B, **Chen Y**, Campbell K, Kasvandik S, Nielsen J* (2022) Proteome allocations change linearly with the specific growth rate of *Saccharomyces cerevisiae* under glucose limitation. ***Nature Communications*** (https://doi.org/10.1038/s41467-022-30513-2)
19. Chen R, Gao J, Yu W, Chen X, Zhai X, **Chen Y**, Zhang L*, Zhou YJ* (2022) Engineering cofactor supply and recycling to drive phenolic acid biosynthesis in yeast. ***Nature Chemical Biology*** (https://doi.org/10.1038/s41589-022-01014-6)
20. Lu H#, Li F#, Yuan L#, Domenzain I, Yu R, Wang H, Li G, **Chen Y**, Ji B, Kerkhoven EJ, Nielsen J* (2021) Yeast metabolic innovations emerged via expanded metabolic network and gene positive selection. ***Molecular Systems Biology*** (https://doi.org/10.15252/msb.202110427)
21. Qin J, Krivoruchko A, Ji B, **Chen Y**, Kristensen M, Özdemir E, Keasling JD, Jensen MK, Nielsen J* (2021) Engineering yeast metabolism for the discovery and production of polyamines and polyamine analogues. ***Nature Catalysis*** (https://doi.org/10.1038/s41929-021-00631-z)
22. Zhang J#, Petersen SD#, Radivojevic T, Ramirez A, Pérez-Manríquez A, Abeliuk E, Sánchez BJ, Costello Z, **Chen Y**, Fero MJ, Martin HG, Nielsen J, Keasling JD, Jensen MK* (2020) Combining mechanistic and machine learning models for predictive engineering and optimization of tryptophan metabolism. ***Nature Communications*** (https://doi.org/10.1038/s41467-020-17910-1)
23. Liu Q, Yu T, Li X, **Chen Y**, Campbell K, Nielsen J, Chen Y* (2019) Rewiring carbon metabolism in yeast for high level production of aromatic chemicals. ***Nature Communications*** (https://doi.org/10.1038/s41467-019-12961-5)
24. Lv X, Yu B, Tian X, **Chen Y**, Wang Z, Zhuang Y, Wang Y* (2016) Effect of pH, glucoamylase, pullulanase and invertase addition on the degradation of residual sugar in L-lactic acid fermentation by *Bacillus coagulans* HL-5 with corn flour hydrolysate. ***Journal of the Taiwan Institute of Chemical Engineers*** (https://doi.org/10.1016/j.jtice.2016.01.007)

- Peer-reviewed reviews

1. **Chen Y**#*, Gustafsson J#, Yang J, Nielsen J, Kerkhoven EJ* (2024) Single-cell omics analysis with genome-scale metabolic modeling. ***Current Opinion in Biotechnology*** (https://doi.org/10.1016/j.copbio.2024.103078)
2. **Chen Y**, Li F, Nielsen J* (2022) Genome-scale modeling of yeast metabolism: retrospectives and perspectives. ***FEMS Yeast Research*** (https://doi.org/10.1093/femsyr/foac003)

3. **Chen Y**, Nielsen J* (2021) Mathematical modeling of proteome constraints within metabolism. ***Current Opinion in Systems Biology*** (https://doi.org/10.1016/j.coisb.2021.03.003)
4. **Chen Y**, Nielsen J* (2016) Flux control through protein phosphorylation in yeast. ***FEMS Yeast Research*** (https://doi.org/10.1093/femsyr/fow096)
5. Mao J#, Zhang H#, **Chen Y**, Wei L, Liu J, Nielsen J*, Chen Y*, Xu N* (2024) Relieving metabolic burden to improve robustness and bioproduction by industrial microorganisms. ***Biotechnology Advances*** (https://doi.org/10.1016/j.biotechadv.2024.108401)
6. Li F*, **Chen Y**, Gustafsson J, Wang H, Wang Y, Zhang C, Xing X (2023) Genome-scale metabolic models applied for human health and biopharmaceutical engineering. ***Quantitative Biology*** (https://doi.org/10.1002/qub2.21)

- Book chapters
  1. **Chen Y**, Nielsen J, Kerkhoven EJ (2021) Proteome Constraints in Genome-Scale Models. ***Metabolic Engineering: Concepts and Applications*** (https://doi.org/10.1002/9783527823468.ch4)
  2. **Chen Y**, Li G, Nielsen J (2019) Genome-scale metabolic modeling from yeast to human cell models of complex diseases: latest advances and challenges. ***Methods in Molecular Biology*** (https://doi.org/10.1007/978-1-4939-9736-7_19)
  3. Lu H, **Chen Y**, Nielsen J, Kerkhoven EJ (2021) Kinetic Models of Metabolism. ***Metabolic Engineering: Concepts and Applications*** (https://doi.org/10.1002/9783527823468.ch5)

- Commentaries
  1. **Chen Y***, Li F (2024) Metabolomes evolve faster than metabolic network structures. ***Proceedings of the National Academy of Sciences*** (https://doi.org/10.1073/pnas.2400519121)

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