

Jongoh Shin, Ph.D.

Systems Biology, Synthetic Biology, High-throughput Biology, Microbiome

CONTACT INFORMATION

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APPOINTMENT

2025.03. - **Assistant Professor**, Department of Biological Science, Chonnam National University, South Korea

EDUCATIONS & PREVIOUS APPOINTMENT

2012.03. - Department of Molecular Biology, Pusan National University, Busan, South Korea
2014.02. **B.S. in Molecular Biology**
2014.03. - Department of Biological Sciences, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, South Korea
2020.08. **Ph.D. in Biological Engineering**
(Advisor: Byung-Kwan Cho, Ph.D.)
2020.09. - Department of Biological Sciences, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, South Korea
2021.08 **Postdoctoral Researcher**
(Advisor: Byung-Kwan Cho, Ph.D.)
2021.09. - Systems Biology Research Group, UC San Diego, USA
2025.01 **Post-Doctoral Researcher**, Department of Bioengineering, UC San Diego
(Advisor: Bernhard O. Palsson, Ph.D.)

RESEARCH INTERSTS

- **Systems Biology**: Integrating experimental techniques (such as high-throughput screening and next-generation sequencing) with computational methods (including machine learning and mathematical modeling) to gain a comprehensive understanding of gene network dynamics and microbiome interactions.
- **Synthetic Biology**: Focusing on scalable, module-based biological system design. Developing and applying engineering principles to design, construct, and experimentally validate genetic circuits. This involves computationally guided design of dynamic gene circuits at the module level, followed by their implementation and testing in various bacterial systems.
- **Practical applications**: Harnessing microorganisms as biofactories and specialized biosystems for diverse applications, including healthcare (therapeutic microbes, microbiome engineering), environmental management (bioremediation, agricultural enhancements), and industrial processes (CO₂ utilization and biochemical production)

PUBLICATIONS

33 published papers (16 first- and 17 co-authored), * denotes co-first authorship.

Google scholar profile: <https://scholar.google.com/citations?hl=en&user=RjOgRplAAAAJ>

1. E.A. Catoi, J. Krishnan, G. Li, X.A. Lou, K. Rychel, Y. Yuan, H. Bajpe, A. Patel, D. Choe, **J. Shin**, J. Burrows, P.V. Phaneuf, D.C. Zielinski, B.O Palsson, Nucleic Acids Research, vol. 53, pp. D99-D106. January 2025. [JIF = 16.6]
2. **J. Shin**, D.C. Zielinski, B.O. Palsson, "Modulating Bacterial Function Utilizing A Knowledge Base of Transcriptional Regulatory Modules", Nucleic Acids Research, gkae742. August 2024. [JIF = 16.6]
3. **J. Shin**, D.C. Zielinski, B.O. Palsson, "Deciphering nutritional stress responses via knowledge-enriched transcriptomics for microbial engineering", Metabolic Engineering, vol. 84, pp. 34-47. July 2024. [JIF = 8.4]
4. **J. Shin**, K. Rychel, B.O. Palsson, "Systems biology of competency in bacteria is revealed by applying novel data analytics to the transcriptome", Cell Reports, vol. 42, 112619. June 2023. [JIF = 9.995]
5. A.T. Rahman*, **J. Shin***, C.H. Whang, W. Jung, D. Yoo, C. Seo, B.K. Cho, S. Jon, "Bilirubin Nanomedicine Rescues Intestinal Barrier Destruction and Restores Mucosal Immunity in Colitis", ACS Nano, vol. 17(11), pp. 10996-11013. May 2023. [JIF

= 18.027]

6. [J. Shin*](#), J. Bae*, H. Lee, S. Kang, S. Jin, Y. Song, S. Cho, B.K. Cho. "Genome-wide CRISPRi screen identifies enhanced autolithotrophic phenotypes in acetogenic bacterium *Eubacterium limosum*", *Proceedings of the National Academy of Sciences of the United States of America*, vol. 120, e2216244120, Feb 2023. [JIF = 12.779]
7. Y. Song, J. Bae, S. Jin, H. Lee, S. Kang, J. Lee, [J. Shin](#), S. Cho, B.K. Cho, "Development of highly characterized genetic bioparts for efficient gene expression in CO₂-fixing *Eubacterium limosum*", *Metabolic Engineering*, vol. 72, pp. 215-226, July 2022. [JIF = 8.829]
8. [J. Shin*](#), J.R. Noh*, D. Choe, N. Lee, Y. Song, S. Cho, E.J. Kang, M.J. Go, S.K. Ha, J.H. Kim, Y.H. Kim, K.S. Kim, B.C. Kim, C.H. Lee, B.K. Cho, "Comprehensive 16S rRNA and metagenomic data from the gut microbiome of aging and rejuvenation mouse models", *Scientific Data*, vol. 9, pp. 1-7, May 2022. [JIF = 8.501]
9. J. Bae, Y. Song, H. Lee, [J. Shin](#), S. Jin, S. Kang, B.K. Cho, "Valorization of C₁ gases to value-added chemicals using acetogenic biocatalysts", *Chemical Engineering Journal*, vol. 428, pp. 131325, Jan 2022. [JIF = 16.744]
10. [J. Shin*](#), J.R. Noh*, D. Choe, N. Lee, Y. Song, S. Cho, E.J. Kang, M.J. Go, S.K. Ha, D.H. Chang, J.H. Kim, Y.H. Kim, K.S. Kim, H. Jung, M.H. Kim, B.H. Sung, S.G. Lee, D.H. Lee, B.C. Kim, C.H. Lee, B.K. Cho, "Microbiome analysis of ageing and rejuvenation models reveals changes in key microbial communities associated with healthy ageing", *Microbiome*, vol. 9, pp. 240, Dec 2021. [JIF = 16.837]
11. [J. Shin](#), Y. Song, S. Kang, S. Jin, J.K. Lee, D.R. Kim, S.C. Kim, S. Cho, V. Müller, B.K. Cho, "Genome-scale analysis of *Acetobacterium woodii* identifies translational regulation of acetogenesis", *mSystems*, vol. 31, pp. e0069621, Aug 2021. [JIF = 6.496]
12. J. Sung, [J. Shin](#), K. Kim, B.K. Cho, "Microbial production of nematicidal agents for controlling plant-parasitic nematodes", *Process Biochemistry*, vol. 108, pp. 69-79, Sep 2021. [JIF = 3.757]
13. E. Yoo, D. Choe, [J. Shin](#), S. Cho, B.K. Cho, "Enzyme-based DNA synthesis and selective retrieval for data storage", *Computational and Structural Biotechnology Journal*, vol. 19, pp. 2468-2476, Apr 2021. [JIF = 7.271]
14. S. Jin, Y. Jeon, M.S., Jeon, [J. Shin](#), Y. Song, S. Kang, J. Bae, S. Cho, J.K. Lee, D.R. Kim, B.K. Cho, "Acetogenic bacteria utilize light-driven electrons as an energy source for autotrophic growth", *Proceedings of the National Academy of Sciences of the United States of America*, vol. 118, pp. e2020552118, Mar 2021. [JIF = 11.205]
15. Y. Song, J. Bae, [J. Shin](#), S. Jin, J.K. Lee, S.C. Kim, S. Cho, B.K. Cho, "Transcriptome and translome of CO₂ fixing acetogens under heterotrophic and autotrophic conditions", *Scientific Data*, vol. 8, 51, Feb 2021. [JIF = 6.444]
16. S. Jin, J. Bae, Y. Song, N. Percy, [J. Shin](#), S. Kang, N.P. Minton, P. Soucaille, B.K. Cho, "Synthetic biology on acetogenic bacteria for highly efficient conversion of C₁ gases to biochemicals", *International Journal of Molecular Sciences*, vol. 21, 7639, Oct 2020. [JIF = 4.556]
17. Y. Jeon, M.S. Jeon, [J. Shin](#), S. Jin, J. Yi, S. Kang, S.C. Kim, B.K. Cho, J.K. Lee, D.R. Kim, "3D printed bio-responsive devices with selective permeability inspired by eggshell membrane for effective biochemical conversion", *ACS Applied Materials & Interfaces*, vol. 12, pp. 30112-30119, June 2020. [JIF = 8.758]
18. Y. Song, J. Lee, [J. Shin](#), G.M. Lee, S. Jin, S. Kang, J.K. Lee, D.R. Kim, E.Y. Lee, S.C. Kim, S. Cho, D. Kim, B.K. Cho, "Functional cooperation of the glycine synthase-reductase and Wood- Ljungdahl pathways for autotrophic growth of *Clostridium drakei*", *Proceedings of the National Academy of Sciences of the United States of America*, vol. 117, pp. 7516-7523, Mar 2020. [JIF = 9.412]
19. S. Kang*, Y. Song*, S. Jin, [J. Shin](#), J. Bae, D.R. Kim, J.K. Lee, S.C. Kim, S. Cho, B.K. Cho, "Adaptive laboratory evolution of *Eubacterium limosum* ATCC 8486 on carbon monoxide", *Frontiers in Microbiology*, vol. 11, 402, Mar 2020. [JIF = 4.236]
20. D.H. Chang*, [J. Shin*](#), S. Lim, K.R. Park, M.S. Rhee, B.K. Cho, I.H. Chung, S.K. Lee, B.C. Kim, "Characterization of vaginal microbiota profiles in native Korean women related with high risk pregnancies", *Journal of Microbiology and Biotechnology*, vol. 30, pp. 248-258, Feb 2020. [JIF = 2.351]
21. [J. Shin*](#), S. Kang*, Y. Song, S. Jin, J. Lee, J.K. Lee, D.R. Kim, S.C. Kim, S. Cho, B.K. Cho, "Genome engineering of *Eubacterium limosum* using expended genetic tools and CRISPR-Cas9 system", *ACS Synthetic Biology*, vol. 8, pp. 2059-2068, Aug 2019. [JIF = 4.411]
22. [J. Shin*](#), J.R. Noh*, D.H. Chang, Y.H. Kim, M.H. Kim, E.S. Lee, S. Cho, B.J. Ku, M.S. Rhee, B.C. Kim, C.H. Lee, B.K. Cho. "Elucidation of *Akkermansia muciniphila* probiotic traits driven by mucin depletion", *Frontiers in Microbiology*, vol. 10, 1137, May 2019. [JIF = 4.236]
23. Y. Song, [J. Shin](#), S. Jin, J.K. Lee, D.R. Kim, S.C. Kim, S. Cho, B.K. Cho, "Genome-scale analysis of syngas fermenting acetogenic bacteria reveals the translational regulation for its autotrophic growth", *BMC Genomics*, vol. 19, 837, Nov

2018. [JIF = 3.501]
24. [J. Shin](#), Y. Song, S. Jin, J.K. Lee, D.R. Kim, S.C. Kim, S. Cho, B.K. Cho, "Genome-scale analysis of *Acetobacterium bakii* reveals the cold adaptation of psychrotolerant acetogens by post-transcriptional regulation", *RNA*, vol. 24, pp. 1839-1855, Sep 2018. [JIF = 3.949]
 25. S. Cho, [J. Shin](#), B.K. Cho, "Applications of CRISPR/Cas system to bacterial metabolic engineering", *International Journal of Molecular Sciences*, vol. 19, 1089, Apr 2018. [JIF = 4.183]
 26. M.S. Jeon, Y. Jeon, J.H. Hwang, C.S. Heu, S. Jin, [J. Shin](#), Y. Song, S.C. Kim, B.K. Cho, J.K. Lee, D.R. Kim, "Fabrication of three-dimensional porous carbon scaffolds with tunable pore sizes for effective cell confinement", *Carbon*, vol. 130, pp. 814-821, Apr 2018. [JIF = 7.466]
 27. H. Shin, E. Lee, [J. Shin](#), S.R. Ko, H.S. Oh, C.Y. Ahn, H.M. Oh, B.K. Cho, S. Cho, "Elucidation of the bacterial communities associated with the harmful microalgae *Alexandrium tamarense* and *Cochlodinium polykrikoides* using nanopore sequencing", *Scientific Reports*, vol. 8, 5323, Mar 2018. [JIF = 4.259]
 28. Y. Song, [J. Shin](#), Y. Jeong, S. Jin, J.K. Lee, D.R. Kim, S.C. Kim, S. Cho, B.K. Cho, "Determination of the genome and primary transcriptome of syngas fermenting *Eubacterium limosum* ATCC 8486", *Scientific Reports*, vol. 7, 13694, Oct 2017. [JIF = 4.019]
 29. [J. Shin](#), Y. Song, Y. Jeong, B.K. Cho, "Analysis of the core genome and pan-genome of autotrophic acetogenic bacteria", *Frontiers in Microbiology*, vol. 7, 1531, Sep 2016. [JIF = 4.076]
 30. [J. Shin*](#), S. Lee*, M.J. Go, S.Y. Lee, S.C. Kim, C.H. Lee, B.K. Cho, "Analysis of the mouse gut microbiome using full-length 16S rRNA amplicon sequencing", *Scientific Reports*, vol. 6, 29681, Jul 2016. [JIF = 4.259]
 31. N. Lee*, [J. Shin*](#), J. Park, G.M. Lee, S. Cho, B.K. Cho, "Targeted gene deletion using DNA-free RNA-guided Cas9 nuclease accelerates adaptation of CHO cells to suspension culture", *ACS Synthetic Biology*, vol. 5, pp. 1211-1219, Feb 2016. [JIF = 5.382]
 32. [J. Shin*](#), N. Lee*, Y. Song, J. Park, T.J. Kang, S.C. Kim, G.M. Lee, B.K. Cho, "Efficient CRISPR/Cas9-mediated multiplex genome editing in CHO cells via high-level sgRNA-Cas9 complex", *Biotechnology and Bioprocess Engineering*, vol. 20, pp. 825-833, Nov 2015. [JIF = 1.211]
 33. Y. Kang, Y.W. Kim, J. Yun, [J. Shin](#), A. Kim, "KLF1 stabilizes GATA-1 and TAL1 occupancy in the human β -globin locus", *Biochimica et Biophysica Acta*, vol. 1849, pp. 282-289, Mar 2015. [JIF = 5.373]

BOOK CHAPTER

1. Y. Song, J. Bae, [J. Shin](#), S. Jin, S. Kang, H. Lee, S. Cho, B.K. Cho, "Systems Biology on Acetogenic Bacteria for Utilizing C1 Feedstocks", In: Zeng, AP., Claassens, N.J. (eds) *One-Carbon Feedstocks for Sustainable Bioproduction*. Advances in Biochemical Engineering/Biotechnology, vol 180. Springer, Cham. 2022
2. [J. Shin](#), N. Lee, S. C. Kim, and B. K. Cho, "Targeted genome editing using DNA-Free RNA-guided Cas9 ribonucleoprotein for CHO cell engineering", *Synthetic Biology*, Humana Press, pp. 151-169, 2018.
3. [J. Shin](#), Y. Song, S. Jin, S. Cho, B.K. Cho, "Microbial conversion of carbon dioxide to electrofuels, Consequences of Microbial Interactions with Hydrocarbons, Oils, and Lipids: Production of Fuels and Chemicals, pp. 167-182, 2017.

PATENTS

1. [J. Shin](#), J. Sung, S.C. Kim, B.K. Cho, "A composition for prevent *Bursaphelenchus xylophilus* comprising Destruxin", Korea Patent Application 10-2020-0028397.
2. S. Kang, [J. Shin](#), Y. Song, S. Jin, B.K. Cho, "Microorganisms with enhanced carbon monoxide availability and use thereof", Korea Patent Application 10-2019-0132451, United States Patent Application 17/068,262.
3. N. Lee, [J. Shin](#), J.H. Park, G.M. Lee, B.K. Cho, "Exploring hotspot method for expression of recombinant protein in cell line using next-generation sequencing", Korea Patent Application 10-2016-0119851, Registered 10-1947869.
4. [J. Shin](#), N. Lee, B.K. Cho, "Method and domain information for exploring hotspot of expression of recombinant protein in cell line using lentivirus based next-generation sequencing", Korea Patent Application 10-2016-0135520.

HONOR & AWARDS

1. 2020.09 Best CJ Group Poster Presentation Award,
KMB 47th annual meeting and international symposium, e-conference.
2. 2019.06 Best Poster Presentation Award,
KMB 46th annual meeting and international symposium, Jeju, Republic of Korea.
3. 2018.06 Best Oral Presentation Award,
KMB 45th annual meeting and international symposium, Yeosu, Republic of Korea.
4. 2016.06 Best Oral Presentation Award,
KMB 43rd annual meeting and international symposium, Daejeon, Republic of Korea.
5. 2014.03-2020.08 National Full Scholarship of Republic of Korea.
6. 2012.03-2012.08 Foundation Scholarship, Republic of Korea.
7. 2012.03-2014.02 School Scholarship of Pusan National University, Republic of Korea.

ORAL & POSTER PRESENTATIONS

1. 2024.03 Vnat 2024 Virtual Conference, On-line,
Systems Biology of Competency in *Vibrio natriegens*
2. 2023.10 SNU Biosci Seminar, On-line,
Integrating Systems and Synthetic Biology to Decode and Design Microorganisms
3. 2023.05 SEED2023, Los Angeles, CA, USA,
Systems biology of competency in bacteria is revealed by applying novel data analytics to the transcriptome.
4. 2020.09 KMB 2020 47th Annual Meeting & Symposium, On-line,
Genome-scale analysis of *Acetobacterium woodii* identifies translational regulation of heterotrophic acetogenesis.
5. 2019.06 KMB 2019 46th Annual meeting and international symposium, Jeju, Republic of Korea,
Translational Regulation of Acetogenesis in *Acetobacterium woodii*.
6. 2019.06 KMB 2019 46th Annual meeting and international symposium, Jeju, Republic of Korea
Genome-Scale Analysis of *Acetobacterium bakii* Reveals the Cold Adaptation of Psychrotolerant Acetogen by Post-Transcriptional Regulation.
7. 2019.06 KMB 2019 46th Annual meeting and international symposium, Jeju, Republic of Korea,
Genome Engineering of *Eubacterium limosum* Using Expended Genetic Tools and CRISPR-Cas9 System.
8. 2019.03 30th Fungal Genetics Conference, Pacific Grove, CA, USA,
Comparative Genomics of Endoparasitic Fungi, *Esteya vermicola*.
9. 2019.01 KMB 2019 Winter Symposium, Yongpyong, Republic of Korea,
Genome-Scale Analysis of *Acetobacterium bakii* Reveals the Cold Adaptation of Psychrotolerant Acetogen by Post-Transcriptional Regulation.
10. 2018.10 2018 KSBB International Academia-Industry Joint Meeting, Seoul, Republic of Korea,
Genome-Scale Analysis of *Acetobacterium bakii* Reveals the Cold Adaptation of Psychrotolerant Acetogen by Post-Transcriptional Regulation.
11. 2018.08 GRC, Molecular Basis of Microbial One-Carbon Metabolism, Newry, ME, USA,
Translational Regulation of Acetogenesis in *Acetobacterium woodii*.
12. 2018.06 KMB 2018 45th Annual meeting and international symposium, Yeosu, Republic of Korea,
Genome-scale analysis of *Acetobacterium bakii* Reveals the Cold Adaptation of Psychrotolerant Acetogen by Post-Transcriptional Regulation.
13. 2017.08 SIMB 2017 Annual Meeting and Exhibition, Denver, CO, USA,
Genome-Scale Analysis of *Acetobacterium bakii* Reveals the Cold Adaptation of Psychrotolerant Acetogen by Post-Transcriptional Regulation.
14. 2017.06 KMB 44th annual meeting and international symposium, Busan, Republic of Korea,
Genome-Scale Analysis of *Acetobacterium bakii* Reveals the Cold Adaptation of Psychrotolerant Acetogen by Post-Transcriptional Regulation.
15. 2016.10 2016 KSBB Fall meeting and international symposium, Gwangju, Republic of Korea,
Mouse Gut Microbiome Analysis using Full-length 16S rRNA Amplicon Sequencing.
16. 2016.09 6th ASM conference on Beneficial Microbes, Seattle, WA, USA,
Analysis of the Mouse Gut Microbiome using Full-Length 16S rRNA Amplicon Sequencing.
17. 2016.09 APCIS for Microbial Electrochemistry and Technologies, Busan, Republic of Korea,
Comparative Genomics of Carbon Dioxide Utilizing Acetogenic Bacteria.
18. 2016.08 GRC, Molecular Basis of Microbial One-Carbon Metabolism, Waterville Valley, NH, USA,
Analysis of the Core Genome and Pan-Genome of Autotrophic Acetogenic Bacteria.
19. 2016.08 GRS, Molecular Basis of Microbial One-Carbon Metabolism, Waterville Valley, NH, USA,
Analysis of the Core Genome and Pan-Genome of Autotrophic Acetogenic Bacteria.

Curriculum vitae (2025.02.14)

- 20. 2016.06 KMB 43rd annual meeting and international symposium, Daejeon, Republic of Korea, Analysis of the Mouse Gut Microbiome using Full-Length 16S rRNA Amplicon Sequencing.
- 21. 2016.01 SLAS2016 5th annual international conference & exhibition, San Diego, CA, USA, Bacterial Community Analysis at the Species Level using MinION Nanopore Sequencer.
- 22. 2015.01 KEYSTONE SYMPOSIA, Precision Genome Engineering, Bozeman, MT, USA, Simple and Efficient CRISPR/Cas9-Mediated Genome Editing in CHO Cells using Multiple Transfection.
- 23. 2014.10 2014 KSBB Fall Meeting and International Symposium, Changwon, Republic of Korea, A Method of Exploring Hotspots in CHO Genome using Next-Generation Sequencing.

TEACHING

- Fall 2015 BS326 Biotechnology Experiments, Korea Advanced Institute of Science and Technology
Teaching assistant for Prof. Chankyu Park
- Fall 2016 BS232 Microbiology, Korea Advanced Institute of Science and Technology
Co-instructor with Prof. Byung-Kwan Cho

REFERENCES

Byung-Kwan Cho, Ph. D.

Professor of Biological Science
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and Technology*

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