Sung Sun Yim

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systems & synthetic biology, microbiome engineering, molecular recording

EDUCATION & EXPERIENCE

Jul 2022 – Present	**Assistant Professor** Department of Biological Sciences Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Korea
Apr 2023 – Present	**Adjunct Professor** Graduate School of Engineering Biology KAIST, Daejeon, Korea
Aug 2022 – Present	**Adjunct Professor** KAIST Institute for BioCentury, Daejeon, Korea
May 2023 – Present	**Adjunct Researcher** Korea Research Institute of Bioscience and Biotechnology, Daejeon, Korea
Oct 2021 – Jun 2022	**Associate Research Scientist**
Oct 2016 – Oct 2021	**Postdoctoral Research Scientist** Columbia University, New York, NY, USA Advisor: Prof. Harris H. Wang
Sep 2015 – Aug 2016	**Postdoctoral Fellow**
Sep 2011 – Aug 2015	**PhD, Chemical and Biomolecular Engineering** KAIST, Daejeon, Korea Advisor: Prof. Ki Jun Jeong
Mar 2007 – Aug 2011	**BS, Chemical and Biomolecular Engineering** KAIST, Daejeon, Korea

PUBLICATIONS

31 published papers (14 first/corresponding- and 17 co-authored), [+]co-first authorship, *corresponding authorship
Highlighted **#**s are key papers, google scholar profile: https://scholar.google.com/citations?user=TomSdzEAAAAJ

31. Toward DNA-based recording of biological processes.
Jang H, **Yim SS***
International Journal of Molecular Sciences **25,** 9233 (2024)

30. Emerging methylation-based approaches in microbiome engineering.
Won C, **Yim SS***
Biotechnology for Biofuels and Bioproducts **17,** 96 (2024)

29. Rapid combinatorial rewiring of metabolic networks for enhanced poly(3-hydroxybutyrate) production in *Corynebacterium glutamicum*.
Yim SS, Choi JW, Lee YJ, Jeong KJ
Microbial Cell Factories **22,** 29 (2023)

28. High-throughput transcriptional characterization of regulatory sequences from bacterial biosynthetic gene clusters.
Park J, **Yim SS**, Wang HH
ACS Synthetic Biology **10,** 1859-1873 (2021)

27. Exploiting interbacterial antagonism for microbiome engineering.
Yim SS, Wang HH
Current Opinion in Biomedical Engineering **19,** 100307 (2021)

26. Robust direct digital-to-biological data storage in living cells.
Yim SS, McBee RM, Song AM, Huang Y, Sheth RU, Wang HH
Nature Chemical Biology **17,** 246-253 (2021) - *Featured in Nature, Nature Chemical Biology, Science*

25. Protecting linear DNA templates in cell-free expression systems from diverse bacteria.
Yim SS, Johns NI, Noireaux V, Wang HH
ACS Synthetic Biology **9,** 2851-2855 (2020)

24. Metabolic engineering of *Corynebacterium glutamicum* for high-level ectoine production - design, combinatorial assembly, and implementation of a transcriptionally balanced heterologous ectoine pathway.
Gießelmann G, Dietrich D, Jungmann L, Kohlstedt M, Jeon EJ, **Yim SS**, Sommer F, Zimmer D, Mühlhaus T, Schroda M, Jeong KJ, Becker J, Wittmann C
Biotechnology Journal **20,** 1800417 (2019) - *Top 10% most downloaded in the journal*

23. Multiplex transcriptional characterizations across diverse bacterial species using cell-free systems.
Yim SS[+], Johns NI[+], Park J, Gomes ALC, McBee RM, Richardson M, Ronda C, Chen SP, Garenne D, Noireaux V, Wang HH
Molecular Systems Biology **15,** e8875 (2019) - *Featured in EMBO press*

22. Metagenomic mining of regulatory elements enables programmable species-selective gene expression.
Johns NI[+], Gomes ALC[+], **Yim SS**, Yang A, Blazejewski T, Smillie CS, Smith MB, Alm EJ, Kosuri S, Wang HH
Nature Methods **15,** 323-329 (2018) - *Featured in F1000Prime*

21. Development of a potential protein display platform in *Corynebacterium glutamicum* using mycolic acid layer protein, NCgl1337, as an anchoring motif.
Choi JW, **Yim SS**, Jeong KJ
Biotechnology Journal **13,** 1700509 (2018)

20. Development of a high-copy-number plasmid via adaptive laboratory evolution of *Corynebacterium glutamicum*.
Choi JW, **Yim SS**, Jeong KJ
Applied Microbiology and Biotechnology **102,** 873-883 (2018)

19. Multiplex recording of cellular events over time on CRISPR biological tape.
Sheth RU, **Yim SS**, Wu FL, Wang HH
Science **358**, 1457-1461 (2017) - *Featured in Nature Reviews in Genetics, F1000Prime*

18. Engineering of *Corynebacterium glutamicum* for consolidated conversion of hemicellulosic biomass into xylonic acid.
Yim SS[+], Choi JW[+], Lee SH, Jeon EJ, Chung WJ, Jeong KJ
Biotechnology Journal **12,** 1700040 (2017)

17. Enhanced secretion of recombinant proteins via signal recognition particle dependent pathway by deletion of *rrsE* in *Escherichia coli*.
Lee YJ, Lee RJ, Lee SH, **Yim SS**, Jeong KJ
Biotechnology and Bioengineering **113,** 2453-2461 (2016) - *Selected as Spotlight of the issue*

16. Development of a potential stationary-phase specific gene expression system by engineering of SigB-dependent *cg3141* promoter in *Corynebacterium glutamicum*.
Kim MJ, **Yim SS**, Choi JW, Jeong KJ
Applied Microbiology and Biotechnology **100,** 4473-4483 (2016)

15. Modular optimization of hemicellulose-utilizing pathway in *Corynebacterium glutamicum* for consolidated bioprocessing of hemicellulosic biomass.
Yim SS, Choi JW, Lee SH, Jeong KJ
ACS Synthetic Biology **5,** 334-343 (2016)

14. Development of high-affinity single chain Fv against Foot-and-Mouth Disease virus.
Jung JG, Jeong GM, **Yim SS**, Jeong KJ
Enzyme and Microbial Technology **84,** 50-55 (2016)

13. Development of a new platform for secretory production of recombinant proteins in *Corynebacterium glutamicum*.
Yim SS, Choi JW, Lee RJ, Lee YJ, Lee SH, Kim SY, Jeong KJ
Biotechnology and Bioengineering **113,** 163-172 (2016) - *Journal Cover Article*

12. Enhanced production of recombinant proteins with *Corynebacterium glutamicum* by deletion of insertion sequences (IS elements).
Choi JW, **Yim SS**, Kim MJ, Jeong KJ
Microbial Cell Factories **14,** 207 (2015)

11. Enhanced production of gamma-aminobutyrate (GABA) in recombinant *Corynebacterium glutamicum* by expressing glutamate decarboxylase active in expanded pH range.
Choi JW, **Yim SS**, Lee SH, Kang TJ, Park SJ, Jeong KJ
Microbial Cell Factories **14,** 21 (2015)

10. Rapid isolation of antibody from a synthetic human antibody library by repeated fluorescence-activated cell sorting (FACS).
Yim SS, Bang HB, Kim YH, Lee YJ, Jeong GM, Jeong KJ
PLOS One **9,** e108225 (2014)

9. Systemically programmed adaptive evolution revealed the potential role of carbon and nitrogen pathways during lipid accumulation in *Chlamydomonas reinhardtii*.
Velmurugan N, Sung M, **Yim SS**, Park MS, Yang JW, Jeong KJ
Biotechnology for Biofuels **7,** 117 (2014)

8. Study of cellular development and intracellular lipid bodies accumulation in the thraustochytrid *Aurantiochytrium* sp. KRS101.
Velmurugan N, Sathishkumar Y, **Yim SS**, Lee YS, Park MS, Yang JW, Jeong KJ
Bioresource Technology **161,** 149-154 (2014)

7. High-level secretory production of recombinant single chain variable fragment (scFv) in *Corynebacterium glutamicum*.
Yim SS, An SJ, Choi JW, Ryu AJ, Jeong KJ
Applied Microbiology and Biotechnology **98,** 273-284 (2014)

6. Surface display of recombinant proteins on *Escherichia coli* by BclA exosporium of *Bacillus anthracis*.
Park TJ, Heo NS, **Yim SS**, Park JH, Jeong KJ, Lee SY
Microbial Cell Factories **12,** 81 (2013)

5. Quantified high-throughput screening of *Escherichia coli* producing poly(3-hydrobutyrate) based on FACS.
Lee JH, Lee SH, **Yim SS**, Kang KH, Lee SY, Park SJ, Jeong KJ
Applied Biochemistry and Biotechnology **170,** 1767-1779 (2013)

4. Isolation of fully synthetic promoters for high-level gene expression in *Corynebacterium glutamicum*.
Yim SS, An SJ, Kang M, Lee J, Jeong KJ
Biotechnology and Bioengineering **110,** 2959-2971 (2013) - *Cited over 100 times*

3. Isolation of a potential anchoring motif based on proteome analysis of *Escherichia coli* and its use for cell surface display.
Yim SS^{+}, An SJ^{+}, Han MJ, Choi JW, Jeong KJ
Applied Biochemistry and Biotechnology **170,** 787-804 (2013)

2. Development of a secretion system for the production of heterologous proteins in *Corynebacterium glutamicum* using the porin B signal peptide.
An SJ, **Yim SS**, Jeong KJ
Protein Expression and Purification **89,** 251-257 (2013)

1. Evaluation of intracellular lipid bodies in *Chlamydomonas reinhardtii* strains by flow cytometry.
Velmurugan N, Sung M, **Yim SS**, Park MS, Yang JW, Jeong KJ
Bioresource Technology **138,** 30-37 (2013)

PATENTS

7. CRISPR-based methods for recording biological signals.
Wang HH, Sheth R, Munck C, **Yim SS**
International patent applied PCT/US2020/060973 (Nov 18, 2020)

6. Modified plasmid having enhanced copy number and uses thereof.
Jeong KJ, Choi JW, **Yim SS**
Korea patent applied 10-2017-0017474 (Feb 8, 2017), registered 10-1894983 (Aug 29, 2018)

5. *Corynebacterium* sp. having improved target protein producing ability and method for preparing the same.
Jeong KJ, Choi JW, **Yim SS**
Korea paten applied 10-2016-0152794 (Nov 16, 2016)

4. Auto-inducible synthetic promoter for *Corynebacteria*.
   Jeong KJ, Kim MJ, **Yim SS**, Choi JW
   Korea patent applied 10-2015-0129586 (Sep 14, 2015), registered 10-1750857 (Jun 20, 2017)

3. A novel promoter and use thereof.
   Bae JY, Chang JS, Kim SY, Jeong KJ, **Yim SS**, Choi JW
   Korea patent applied 10-2015-0060842 (Apr 29, 2015), registered 10-1673080 (Oct 31, 2016)

2. A novel expression cassette for secretion of protein.
   Bae JY, Chang JS, Kim SY, Jeong KJ, **Yim SS**, Choi JW
   Korea patent applied 10-2015-0060841 (Apr 29, 2015), registered 10-1671626 (Oct 26, 2016)

1. Synthetic promoter for expressing *Corynebacteria*.
   Jeong KJ, **Yim SS**, An SJ
   Korea patent applied 10-2013-0022691 (Mar 4, 2013), registered 10-1481142 (Jan 15, 2015)

SELECTED TALKS

Apr 2025	Center for Cognition and Sociality, Institute for Basic Science (IBS), Daejeon, Korea - *Invited talk*
Jan 2025	Asian Synthetic Biology Association (ASBA) Meeting, Singapore - *Invited talk*
Dec 2024	Dept. Chemical Engineering, Kyung Hee University, Seoul, Korea - *Invited talk*
Oct 2024	The Microbiological Society of Korea, Jeju, Korea - *Invited talk*
Oct 2024	Korea-US Synthetic Biology Symposium, Daejeon, Korea - *Invited talk*
Sep 2024	Korea Research Institute of Chemical Technology (KRICT), Ulsan, Korea - *Invited talk*
Jul 2024	The Korean Society of Food Science and Technology, Daegu, Korea - *Invited talk*
Jun 2024	School of Chemical and Biological Engineering, Seoul National University, Seoul, Korea - *Invited talk*
Dec 2023	SynBio Young Speaker Series (SynBYSS) - *Invited talk* [Online]
Nov 2023	Korea Institute of Science and Technology, Seoul, Korea. - *Invited talk*
Nov 2023	CJ Bio Research Institute, Suwon, Korea. - *Invited talk*
Oct 2023	Asian Congress on Biotechnology (ACB), Ho Chi Minh City, Vietnam. - *Invited talk*
Sep 2023	Daesung Haegang Microbes Forum, Seoul, Korea. - *Invited talk*
Aug 2023	Genofocus and GF Fermentech, Daejeon, Korea. - *Invited talk*
Jun 2023	Korean Society of Microbiology and Biotechnology (KMB), Gyeongju, Korea. - *Invited talk*
Feb 2023	Korea Research Institute of Bioscience and Biotechnology (KRIBB), Daejeon, Korea. - *Invited talk*
Feb 2023	The Symposium of Korea Genome Organization (KOGO), Hongchun, Korea. - *Invited talk*
Jan 2023	CSIR-North East Institute of Science and Technology, Jorhat, Assam, India. - *Invited talk* [Online]
Dec 2022	Young Asian Biochemical Engineers' Community (YABEC), Beijing, China. - *Invited talk* [Online]
Sep 2022	The Korean Society for Biotechnology and Bioengineering (KSBB), Jeju, Korea. - *Invited talk*
Jun 2021	Dept. Chemical and Biomolecular Engineering, KAIST, Daejeon, Korea. - *Invited talk*
Apr 2021	Genome Engineering Seminar Series, Harvard Medical School, Boston, MA, USA. - *Invited talk* [Online]
Apr 2021	KSEA Northeast Regional Conference, New York, NY, USA. - *Invited talk* [Online]
Oct 2018	SynBioBeta, San Francisco, CA, USA. - *Invited talk*

MENTORING

Graduate student

Spring 2025 – Present	Sunggyu Min (EB) | Current: Grad student in my lab, G1
Spring 2025 – Present	Thanakrit (Austin) Wongsatit (EB) | Current: Grad student in my lab, G1 • 2024-2025 POSCO Asia Fellowship (Master's, 2 years, Full tuition and stipend support)
Fall 2024 – Present	Sang-Hyun Chung (EB) | Current: Grad student in my lab, G1
Spring 2024 – Present	Hyorim Ryu (Bio) | Current: Grad student in my lab, G2 • 2024-2025 NRF Graduate Research Fellowship (Master's, 1 year)
Spring 2024 – Present	Sehyun Kim (Bio) | Current: Grad student in my lab, G2 • 2024-2025 NRF Graduate Research Fellowship (Master's, 1 year)
Spring 2024 – Present	Eun Seok Cho (Bio) | Current: Grad student in my lab, G2
Spring 2023 – Present	Geunhui Shin (Bio) | Current: Grad student in my lab, G3 • 2025 The Inseong Scholarship
Spring 2023 – Present	Hyeri Jang (Bio) | Current: Grad student in my lab, G3 • 2024 The Wooduk Foundation Scholarship • 2023 GreenBio URP Program Teaching Assistant, The Excellence Award
Fall 2022 – Present	Dongha Lee (Bio) | Current: Grad student in my lab, G3 • 2023 The Wooduk Foundation Scholarship
Fall 2022 – Present	Changhee Won (Bio) | Current: Grad student in my lab, G3 • 2024 KI Excellent Researcher Award • 2024 KAIST Graduate Student Venture Research Program • 2023 R&E Program Teaching Assistant, The Excellence Award • 2023 Spring KSBB, The Best Poster Presentation Award • 2022 The Wooduk Foundation Scholarship

Undergraduate student

Jan 2025 – Jan 2025	Seong Won Ok (BioURP) | Current: Grad student at KAIST
Jan 2025 – Jan 2025	Ah Won Lee (Individual research) | Current : Undergrad at KAIST
Sep 2024 – Dec 2024	Chae Yoon Kim (GreenURP) | Current : Undergrad at CNU (Chungnam)
Sep 2024 – Dec 2024	Yedam Seo (GreenURP) | Current : Undergrad at CNU (Chungnam)
Jun 2024 – Jul 2024	Hyeon Seok Seong (BioURP) | Current: Undergrad at Korea Univ.
Mar 2024 – Dec 2024	Jimin Ko (Individual research, GreenURP) | Current: Undergrad at KAIST (Bio)
Mar 2024 – Present	Minjoon Jeong (Individual research, GreenURP, Long-term URP) | Current: Undergrad in my lab (Bio) • 2024 Fall KAIST Dept. Biological Sciences Departmental Symposium, The Best Poster Award • 2024 GreenURP Program, Minister of Agriculture, Food, and Rural Affairs Award
Mar 2024 – Aug 2024	Soo-Yeon Lee (Individual research) | Current: Grad student at KAIST (Bio)
Jan 2024 – Aug 2024	Sang-Hyun Chung (BioURP) | Current Grad student in my lab at KAIST
Oct 2023 – Feb 2024	Eun Seok Cho (Undergrad internship) | Current: Grad student in my lab at KAIST
Sep 2023 – Dec 2023	Eun Seong Jang (GreenURP) | Current: Undergrad at CNU (Chungnam)
Sep 2023 – Dec 2023	Yebin Lee (GreenURP) | Current : Undergrad at CNU (Chungnam)
Sep 2023 – Dec 2023	Myung Eun Shin (GreenURP) | Current : Undergrad at KAIST (CBE)
Sep 2023 – Apr 2024	Chaemin Lee (Individual research) | Current: Undergrad at KAIST (Bio)
Aug 2023 – Sep 2023	Taehyun Kim (Summer intern) | Current: Undergrad at Imperial College London
Jul 2023 – Feb 2024	Sehyun Kim (Individual research) | Current: Grad student in my lab at KAIST

Jun 2023 – Aug 2023 Metta Sodian (KAI-X international summer intern) | Current: Grad student at KRIBB

Jun 2023 – Jul 2023 Hyorim Ryu (BioURP) | Current: Grad student in my lab at KAIST

Dec 2022 – Present Min-Hyeok Yang (Individual research, GreenURP, Long-term URP) | Current: Undergrad in my lab (Bio)

- 2024 Fall KAIST Dept. Biological Sciences Departmental Symposium, The Best Poster Award
- 2024 Long-term URP Program
- 2023 GreenURP Program, The Excellence Award
- 2023 Fall KAIST Dept. Biological Sciences Departmental Symposium, The Best Poster Award

High school student

Mar 2025 – Present Yelena Kim (HRP) | Current: Student at KSA of KAIST

Mar 2023 – Dec 2024 Jinyul Lee (R&E, HRP) | Current: Undergrad at Seoul National University

- 2023 R&E Program, The Excellence Award

Mar 2023 – Dec 2023 Taewoo Yoo (R&E) | Current: Undergrad at KAIST

- 2023 R&E Program, The Excellence Award, The Best Student Award

Mar 2023 – Dec 2023 Sihu Park (R&E) | Current: Undergrad at KAIST

- 2023 R&E Program, The Excellence Award

TEACHING

Spring 2025
General Biology (BS120F) | 41 students
Happy College Life (HSS090:6) | 29 students | Served as an advisor for 31 freshman students

Fall 2024
Microbiology (BS232) | 34 students
Happy College Life (HSS091:6) | 29 students | Served as an advisor for 29 freshman students

Spring 2024
General Biology (BS120C) | 64 students
Happy College Life (HSS090:6) | 31 students | Served as an advisor for 31 freshman students

Fall 2023
Microbiome Engineering (BS483B) | 24 students
Graduate Student Seminar (BS990) | 27 students | Hosted departmental student seminar series
Departmental Seminar (EB966,986) | 12 students | Hosted departmental seminar series
GreenBio URP (URP495:08.495) | 4 students | Mentored a team of undergrads from KAIST and CNU
Happy College Life (HSS091:6) | 28 students | Served as an advisor for 33 freshman students

Spring 2023
General Biology (BS120B) | 85 students
Departmental Seminar (BS496,966,986) | 115 students | Hosted departmental seminar series
Happy College Life (HSS090:6) | 35 students | Served as an advisor for 33 freshman students

Fall 2022
General Biology (BS120G) | 35 students

OTHERS

Sep 2022 – Present Editorial service

- Editorial Board for *Molecules and Cells*
- Editorial Board, Review editor in Systems Microbiology area for *Frontiers in Microbiology, Frontiers in Bioengineering and Biotechnology*
- Edited a special topic “Synthetic Biology for Non-model Microbes” in *Frontiers in Microbiology*
- Edited a special topic “Current Methods in Synthetic Biology” in *Journal of Visualized Experiments*

Mar 2018 – Present Reviewer service

- Reviewed manuscripts for *Advanced Materials, Biodesign Research, Biotechnology and Bioengineering, Biotechnology and Bioprocess Engineering, Biotechnology Journal, Computational and Structural Biotechnology Journal, Frontiers in Microbiology, Journal of Industrial Microbiology & Biotechnology, Journal of Microbiology, Microbial Biotechnology, Microbial Cell Factories, Nature Communications, and Plasmid*