Sung Sun Yim

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systems & synthetic biology, microbiome engineering, molecular recording

EDUCATION & EXPERIENCE

Jul 2022 – Present	**Assistant Professor**	Graduate School of Engineering Biology
	Affiliate Professor	Department of Biological Sciences
	Affiliate Professor	KAIST Institute for Bioinnovation
	Korea Advanced Institute for Science and Technology (KAIST), Daejeon, Korea	
May 2023 – Present	**Adjunct Researcher**	Synthetic Biology Research Center
	Korea Research Institute of Bioscience and Biotechnology (KRIBB), Daejeon, Korea	
Oct 2021 – Jun 2022	**Associate Research Scientist**	Department of Systems Biology
Oct 2016 – Oct 2021	**Postdoctoral Research Scientist**	Department of Systems Biology
	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	

HONORS & AWARDS

Awards

Dec 2023	KAIST Institute Convergence Research Award KAIST Institute, KAIST, Daejeon, Korea
Dec 2023	KAIST Institute Excellent Prototype Award KAIST Institute, KAIST, Daejeon, Korea

PUBLICATIONS

32 published papers (14 first/corresponding- and 18 co-authored), ⁺co-first authorship, *corresponding authorship
Highlighted **#**s are key papers, google scholar profile: https://scholar.google.com/citations?user=TomSdzEAAAAJ

32. Engineering modular enzyme assembly: Synthetic interface strategies for natural products biosynthesis applications.
Kim G, Lee D, Kim JH, Kim SD, Kim H, Kim JH, **Yim SS**, Yeom SJ, Keasling JD, Cho BK
Natural Products Reports, (2025) – doi:10.1039/d5np00027k

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 patent 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

Jun 2025	Imperial College London, London, UK.
Apr 2025	The Institute of Basic Science (IBS), Daejeon, Korea.
Apr 2025	The Korean Society for Biotechnology and Bioengineering (KSBB), Daejeon, Korea.
Jan 2025	Asian Synthetic Biology Association (ASBA) Meeting, Singapore.
Dec 2024	Dept. Chemical Engineering, Kyung Hee University, Seoul, Korea.
Oct 2024	Korea-US Synthetic Biology Symposium, Daejeon, Korea.
Sep 2024	Korea Research Institute of Chemical Technology (KRICT), Ulsan, Korea.
Jun 2024	School of Chemical and Biological Engineering, Seoul National University, Seoul, Korea.
Dec 2023	SynBio Young Speaker Series (SynBYSS). [Online]
Nov 2023	Korea Institute of Science and Technology, Seoul, Korea.
Nov 2023	CJ Bio Research Institute, Suwon, Korea.
Oct 2023	Asian Congress on Biotechnology (ACB), Ho Chi Minh City, Vietnam.
Sep 2023	Daesung Haegang Microbes Forum, Seoul, Korea.
Jun 2023	Korean Society of Microbiology and Biotechnology (KMB), Gyeongju, Korea.
Sep 2022	Dept. Biological Sciences, KAIST, Daejeon, Korea.
Jun 2021	Dept. Chemical and Biomolecular Engineering, KAIST, Daejeon, Korea.
Apr 2021	Genome Engineering Seminar Series, Harvard Medical School, Boston, MA, USA. [Online]
Oct 2018	SynBioBeta, San Francisco, CA, USA.

MENTORING

Graduate student

Spring 2025 – Present	Seong Won Ok (Bio) | Current: Grad student in my lab, G1
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) • 2024 GreenBio URP Program TA, Minister of Agriculture, Food, and Rural Affairs Award
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 TA, 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

Jul 2025 – Present	Dong Yun Jung (Individual research) | Current: Undergrad student at KAIST
Jul 2025 – Aug 2025	Jane Oh (Individual research) | Current: Undergrad student at KAIST
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) • 2025 KSBB, BB Jump Program, The Grand Prize • 2025 KAIST Long-term URP Program • 2024 KAIST Dept. Biological Sciences Departmental Symposium, The Best Poster Award • 2024 KAIST 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) • 2025 KSBB, BB Jump Program, The Grand Prize • 2024 KAIST Dept. Biological Sciences Departmental Symposium, The Best Poster Award • 2024 KAIST Long-term URP Program • 2023 KAIST GreenURP Program, The Excellence Award • 2023 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

Fall 2025	Microbiology (BS232) | 62 students Exciting College Life (HSS199:6) | 30 students | Served as an advisor for 30 freshman students
Spring 2025	General Biology (BS120F) | 41 students Happy College Life (HSS090:6) | 29 students | Served as an advisor for 29 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 28 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 35 freshman students
Fall 2022	General Biology (BS120G) | 35 students