

# Sung Sun Yim

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systems & synthetic biology, microbiome engineering, molecular recording

## EDUCATION & EXPERIENCE

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Jul 2022 – Present	<b>Assistant Professor</b> Department of Biological Sciences Korea Advanced Institute of Science and Technology (KAIST), Daejeon, South Korea
Oct 2021 – Jun 2022	<b>Associate Research Scientist</b>
Oct 2016 – Oct 2021	<b>Postdoctoral Research Scientist</b> Columbia University, New York, NY, USA Advisor: Prof. Harris H. Wang
Sep 2015 – Aug 2016	<b>Postdoctoral Fellow</b>
Sep 2011 – Aug 2015	<b>PhD, Chemical and Biomolecular Engineering</b> KAIST, Daejeon, South Korea Advisor: Prof. Ki Jun Jeong
Mar 2007 – Aug 2011	<b>BS, Chemical and Biomolecular Engineering</b> KAIST, Daejeon, South Korea

## HONORS & AWARDS

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### Postdoctoral Fellowships

Sep 2017 – Aug 2018	NRF Postdoctoral Fellowship National Research Foundation of Korea, Grant #: NRF-2017R1A6A3A03003401
Sep 2015 – Aug 2016	Brain Korea 21 Plus Postdoctoral Fellowship Dept. Chemical and Biomolecular Engineering, KAIST, Daejeon, South Korea

### Scholarships

Apr 2021	Andrew Kim Memorial Foundation Scholarship Korean American Scientists and Engineers Association (KSEA), New York, NY, USA
Nov 2014	Woodeok Youn Deok Byung Foundation Scholarship Korea Yakult Co., Ltd, Seoul, South Korea
Sep 2011 – Aug 2015	KAIST Scholarship KAIST, Daejeon, South Korea
Mar 2007 – Feb 2011	National Science and Engineering Scholarship Korea Student Aid Foundation (KOSAF), South Korea

### Presentation Awards

Jun 2015	The Best Speaker Award - <i>1<sup>st</sup> place</i> The Korean Society for Microbiology and Biotechnology (KMB) International Symposium
Apr 2015	The Best Speaker Award International Meeting of the Microbiological Society of Korea (MSK)
Apr 2014	The Best Poster Award The Korean Society for Biotechnology and Bioengineering (KSBB) Spring Meeting
Jun 2013	The Best Poster Award Engineering Conferences International (ECI) Biochemical and Molecular Engineering XVIII
Feb 2013	The Best Poster Award 1 <sup>st</sup> Advanced Biomass R&D Center (ABC) Workshop

## PUBLICATIONS

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28 published papers (11 first- and 17 co-authored), + denotes co-first authorship, highlighted #s are key papers  
google scholar profile: <https://scholar.google.com/citations?user=TomSdzEAAAAJ>

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**<sup>+</sup>, Johns NI<sup>+</sup>, 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<sup>+</sup>, Gomes ALC<sup>+</sup>, **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**<sup>+</sup>, Choi JW<sup>+</sup>, 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**<sup>†</sup>, An SJ<sup>†</sup>, 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

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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

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Dec 2021	Dept. Molecular Science and Technology, Ajou University, Suwon, South Korea. - <i>Invited talk</i>
Jun 2021	Dept. Chemical and Biomolecular Engineering, KAIST, Daejeon, South Korea. - <i>Invited talk</i>
Apr 2021	Genome Engineering Seminar Series, Harvard Medical School, Boston, MA, USA. - <i>Invited talk</i>
Apr 2021	KSEA Northeast Regional Conference, New York, NY, USA. - <i>Invited talk</i>
Oct 2018	SynBioBeta, San Francisco, CA, USA. - <i>Invited talk</i>
Jun 2015	The Korean Society for Microbiology and Biotechnology, Gyeongju, South Korea. - <i>Awarded</i>
Feb 2015	The 6 <sup>th</sup> Coryne studies (hosted by CJ Co.), Seoul, South Korea. - <i>Invited talk</i>

## SELECTED POSTERS

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Jun 2019	Synthetic Biology: Engineering, Evolution and Design (SEED), New York, NY, USA.
Nov 2018	International Conference on Microbiome Engineering (ICME), Boston, MA, USA.
Apr 2014	The Korean Society for Biotechnology and Bioengineering (KSBB), Gyeongju, South Korea. - <i>Awarded</i>
Jun 2013	ECl Biochemical and Molecular Engineering XVIII, Beijing, China. - <i>Awarded</i>

## OTHERS

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Mar 2018 – Present	Reviewer service - Reviewed manuscripts for <i>Frontiers in Microbiology</i> , <i>Computational and Structural Biotechnology Journal</i> , <i>Microbial Cell Factories</i> , <i>Biotechnology Journal</i> , <i>Journal of Industrial Microbiology &amp; Biotechnology</i> , and <i>Plasmid</i> .
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