

Department of Energy, Environmental and Chemical Engineering
 Division of Biology and Biomedical Sciences
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Positions and Employment

2012– Assistant Professor, Washington University in St. Louis, St. Louis, MO
 2011–12 Postdoctoral Associate, Massachusetts Institute of Technology, Cambridge, MA
 2010–11 Postdoctoral Scholar, University of California, San Francisco, San Francisco, CA
 2005–09 Research Assistant, Massachusetts Institute of Technology, Cambridge, MA
 2002–05 Manager & Research Scientist, LG Life Sciences, Ltd., Daejeon, Korea
 2001–02 Assistant Manager & Research Scientist, LG Chem Investment, Ltd., Daejeon, Korea
 2000–01 Researcher, LG Chem, Ltd., Daejeon, Korea
 1997–99 Research Assistant, Seoul National University, Seoul, Korea

Education

Chemical Engineering, MIT, Cambridge, MA, USA Feb. 2010
PhD (Minor: Biological Chemistry) GPA 4.7 / 5.0
 Chemical Technology, Seoul National University (SNU), Seoul, Korea Feb. 2000
MS GPA 4.24 / 4.30
 Chemical Technology, SNU, Seoul, Korea Feb. 1998
BS GPA 4.21 / 4.30 (summa cum laude)
Ranked No. 1 among 977 students in College of Engineering

Scholarships, Awards & Memberships

NSF CAREER Award Apr. 2014 to Mar. 2019
 Senior Investigator of CenSURF (NSF center) Since 2014
 Member of Washington Univ. Division of Biology and Biomedical Sciences Since 2013
 Affiliated Principal Investigator of SynBERC (NSF center) Since 2012
 30th Annual Department Conference Poster Competition (MIT, 2nd Prize) Oct. 2009
 Member (AIChE since 2007; SIMB, ACS & ASM in the past) Since 2007
ILJU Foundation Fellow Award Sep. 2005 to Aug. 2009
 John C. Sluder (1941) Fellowship Sep. 2005 to May. 2006
 LG Chemical Fellowship Mar. 1998 to Dec. 1999
The President Prize (No. 1 among 977 students) Feb. 1998
 SNU Honor Scholarship Sep. 1994 to Feb. 1998

Publications (23 total; 12 from WashU as the PI)

* Corresponding author. * Equal contribution. Undergraduate co-authors are identified (shaded).

Peer-Reviewed Research Journal Articles (at WashU as the PI)

- YJ Lee, A Hoynes-O'Connor, MC Leong and **TS Moon**^{*}. Programmable control of bacterial gene expression with the combined CRISPR and antisense RNA system. *Nucleic Acids Res.* Accepted. DOI: 10.1093/nar/gkw056 (2016)
- A Yoneda^{*}, WR Henson^{*}, NK Goldner, KJ Park, KJ Forsberg, SJ Kim, MW Pesesky, M Foston, G Dantas^{*} and **TS Moon**^{*}. Comparative transcriptomics elucidates adaptive phenol tolerance and utilization in lipid-accumulating *Rhodococcus opacus* PD630. *Nucleic Acids Res.* Accepted. DOI: 10.1093/nar/gkw055 (2016)

4. CM Immethun, KM Ng, DM DeLorenzo, B Waldron-Feinstein, YC Lee and **TS Moon**[†]. Oxygen-Responsive Genetic Circuits Constructed in *Synechocystis* sp. PCC 6803. ***Biotechnol. Bioeng.*** 113, 433-442 (2016)
3. WD Hollinshead*, WR Henson*, M Abernathy, **TS Moon**[†] and YJ Tang*. Rapid Metabolic Analysis of *Rhodococcus opacus* PD630 via parallel ¹³C-Metabolite Fingerprinting, ***Biotechnol. Bioeng.*** 113, 91-100 (2016)
2. T Shopera, WR Henson, A Ng, YJ Lee, K Ng and **TS Moon**[†]. Robust, tunable genetic memory from protein sequestration combined with positive feedback. ***Nucleic Acids Res.*** 43, 9086-9094 (2015)
1. A Hoynes-O'Connor, K Hinman, L Kirchner and **TS Moon**[†]. *De novo* design of heat-repressible RNA thermosensors in *E. coli*. ***Nucleic Acids Res.*** 43, 6166–6179 (2015)

Review Journal Articles, Peer-Reviewed (at WashU as the PI)

5. A Hoynes-O'Connor and **TS Moon**[†]. Programmable genetic circuits for pathway engineering. ***Curr. Opin. Biotechnol.*** 36, 115-121. **Invited Review** (2015)
4. B Thompson, **TS Moon** and D Nielsen. 'Hybrid' Processing Strategies for Expanding and Improving the Synthesis of Renewable Bioproducts. ***Curr. Opin. Biotechnol.*** 30, 17-23. (2014)
3. D Nielsen** and **TS Moon****†. From Promise to Practice: the Role of Synthetic Biology in Green Chemistry. ***EMBO Reports*** 14, 1034-1038. **Invited Review** (2013)
2. BM Berla, R Saha, CM Immethun, CD Maranas, **TS Moon** and H Pakrasi. Synthetic Biology of Cyanobacteria: Unique Challenges and Opportunities. ***Front. Microbiol.*** 4, 246 (2013)
1. CM Immethun, AG Hoynes-O'Connor, A Balassy and **TS Moon**[†]. Microbial Production of Isoprenoids Enabled by Synthetic Biology. ***Front. Microbiol.*** 4, 75. **Invited Review** (2013)

Book Chapter (at WashU as the PI)

1. CM Immethun, WR Henson, X Wang, D Nielsen and **TS Moon**[†]. Engineering Central Metabolism for Production of Higher Alcohol-based Biofuels, Chapter 1 in ***"Biotechnologies for Biofuel Production and Optimization"*** (CA Eckert & CT Trinh, Ed). Elsevier. **Invited Book Chapter** (2016)

Peer-Reviewed Research Journal Articles (before WashU)

11. K Solomon, **TS Moon**, B Ma, TM Sanders and KJ Prather. Tuning Primary Metabolism for Heterologous Pathway Productivity. ***ACS Synth. Biol.*** 2, 126-135 (2013)
10. **TS Moon**, C Lou, A Tamsir, BC Stanton and CA Voigt. Genetic Programs Constructed from Layered Logic Gates in Single Cells. ***Nature*** 491, 249-253 (2012)
9. **TS Moon**^{*}, D Nielsen* and KJ Prather. Sensitivity Analysis of a Proposed Model Mechanism for Newly Created Glucose 6-Oxidases. ***AIChE J.*** 58, 2303-2308 (2012)

8. **TS Moon**, EJ Clarke, ES Groban, A Tamsir, RM Clark, M Eames, T Kortemme and CA Voigt. Construction of a Genetic Multiplexer to Toggle between Chemosensory Pathways in *Escherichia coli*. **J. Mol. Biol.** 406, 215-227 (2011)
7. SM Lippow*, **TS Moon***, S Basu, S-H Yoon, X Li, B Chapman, K Robison, D Lipovšek and KJ Prather. Engineering Enzyme Specificity Using Computational Design of a Defined-Sequence Library. **Chem. Biol.** 17, 1306-1315 (2010). Selected as a "Recommended" paper by faculty of 1000.
6. **TS Moon**, JE Dueber, E Shiue and KJ Prather. Use of Modular, Synthetic Scaffolds for Improved Production of Glucaric Acid in Engineered *E. coli*. **Metab. Eng.** 12, 298-305 (2010)
5. JE Dueber, GC Wu, GR Malmirchegini, **TS Moon**, CJ Petzold, AV Ullal, KJ Prather and JD Keasling. Synthetic Protein Scaffolds Provide Modular Control over Metabolic Flux. **Nat. Biotechnol.** 27, 753-759 (2009)
4. **TS Moon**, S-H Yoon, M-J Tsang Mui Ching, A Lanza and KJ Prather. Enzymatic Assay of D-Glucuronate Using Uronate Dehydrogenase. **Anal. Biochem.** 392, 183-185 (2009)
3. S-H Yoon, **TS Moon**, P Iranpour, A Lanza and KJ Prather. Cloning and Characterization of Uronate Dehydrogenases from Two Pseudomonads and *Agrobacterium tumefaciens* str. C58. **J. Bacteriol.** 191, 1565-1573 (2009)
2. **TS Moon**, S-H Yoon, A Lanza, J Roy-Mayhew and KJ Prather. Production of Glucaric Acid from a Synthetic Pathway in Recombinant *Escherichia coli*. **Appl. Environ. Microbiol.** 75, 589-595 (2009)
1. SH Kim, K Hyun, **TS Moon**, T Mitsumata, JS Hong, KH Ahn and SJ Lee, Morphology–Rheology Relationship in Hyaluronate/Poly(vinyl alcohol)/Borax Polymer Blends. **Polymer** 46, 7156-7163 (2005)

Patents (7 total; 2 Licensed to US companies; 4 Products launched)

7. C Lou, **TS Moon**, V Rhodius, B Stanton, A Tamsir, K Temme and CA Voigt, Synthetic Biology Tools, US 20130005590 A1 (2011). The patent was licensed to Life Technologies Corporation.
6. K Solomon, **TS Moon** and KJ Prather, Glucose Valve and Other Metabolite Valves, US patent US8,835,138 B2 (2010). The patent was converted to a PCT application in 2011.
5. **TS Moon**, S-H Yoon and KJ Prather, Cellular Production of Glucaric Acid, US patent US8,835,147 B2 (2008). The patent, licensed to Kalion, was converted to a PCT application in 2009 and applied for in EP (European Union), etc. in 2010.
4. **TS Moon**, JH Kim, JY Lee, BH Min and KY Cho, Hyaluronic Acid Derivative Gel and Method for Preparing the Same, *PCT Int. Appl.* WO04/011503 (2004). The patent was applied for in US, EP, JP (Japan), CN (China), KR (Republic of Korea), etc.
3. KY Cho, JH Kim, JY Lee, **TS Moon** and BH Min, Microbeads of Natural Polysaccharide and Hyaluronic Acid and Processes for Preparing the Same, *PCT Int. Appl.* WO04/020473 (2004)

2. KY Cho, JH Kim, JY Lee, **TS Moon** and BH Min, Hyaluronic Acid Derivatives and Processes for Preparing the Same, *PCT Int. Appl.* WO04/022603 (2004)
1. **TS Moon**, JY Lee, JH Kim and KB Han, Crosslinked Amide Derivatives of Hyaluronic Acid and Manufacturing Method Thereof, *PCT Int. Appl.* WO02/030990 (2002). The patent was applied for in EP, JP, CN, etc. and registered in US and KR.

Invited Seminars & Lectures (24)

Invited Session Speaker of AIChE Annual Meeting, Salt Lake City, UT, Nov. 8-13, 2015

Invited Speaker of Biomed. Eng. Dept Seminar Series, WashU, St. Louis, MO, Oct. 1, 2015

Invited Session Speaker of AIChE Annual Meeting, Atlanta, GA, Nov. 16-21, 2014

Invited Speaker of Indo-US Workshop on Synthetic & Systems Biology (full travel support from NSF), New Delhi, India, Nov. 9-12, 2014

Invited Speaker of SynBERC Fall Meeting at MIT (full travel support), Cambridge, MA, Sep. 27-29, 2014

Invited Speaker of SIMB Annual Meeting (full support of registration), St. Louis, MO, Jul. 20-24, 2014

Invited Speaker of Medical Scientist Training Program Seminar, WashU, St. Louis, MO, Jun. 16, 2014

Invited Speaker of ASM Biodefense & Emerging Diseases Research Meeting (full travel support), Washington, D.C. Jan. 27-29, 2014

Invited Speaker of Plant & Microbial Biosciences Seminar, WashU, St. Louis, MO, Oct. 29, 2013

Invited Lecture, BioE Dept. MIT, Cambridge, MA, May 2, 2012

Six Invited Seminars at Universities including UBC (Canada, Feb. 26-28), NUS (Singapore, Feb. 14-17), and WashU (St. Louis, USA, Jan. 15-18), January and February, 2012

Six Invited Seminars at Universities in Korea including SNU (Seoul), Postech (Pohang), and KAIST (Daejeon), Nov. 14-22, 2011

Invited Speaker of Synthetic Biology Seminar, MIT, Cambridge, MA, Oct. 24, 2011

Distinguished Young Scientists Seminar Series, ChemE Dept. Univ. of Washington, Seattle, WA, Jul. 10-12, 2011. Received "the highest recommendation" among 90 applications.

Conference Proceedings (59 total: 35 Oral; 23 Poster; 1 Webinar): not listed

18 conference proceedings with 13 undergraduate students as coauthors

Poster presentation awards to two graduate students in the Moon lab

Honorable mention (oral presentation) to one graduate student in the Moon lab

Research - Completed Projects

Grand Challenges Explorations Round 10, Gates Foundation (PI)

Programmed Killing of Parasite Eggs by Probiotic Organisms (5/1/2013 - 10/31/2014)

I-CARES, Washington University I-CARES (PI)

Hybrid Conversion of Lignin: Trees to Fat (5/1/2013 - 4/30/2014)

Research - Current Projects

NITROGEN, National Science Foundation (Co-PI; Himadri Pakrasi, PI)

Designing Nitrogen Fixing Ability in Oxygenic Photosynthetic Cells (9/1/2013 - 8/31/2016)

CAREER, National Science Foundation (PI)

Engineering Biological Robustness through Synthetic Control (4/15/2014 - 3/31/2019)

BER, Department of Energy (Co-PI; Gautam Dantas, PI)

Systems Biology of *Rhodococcus opacus* to Enable Production of Fuels and Chemicals from Lignocellulose (9/1/2014 - 8/31/2017)

Teaching and Advising

Advisor at Washington University in St. Louis

Seven Graduate and 21 Undergraduate Student Projects Since Jul. 2012

5 publications with 8 undergrad students (3 students now in grad schools)

10 publications and 30 conference proceedings with 7 grad students

20 Graduate Rotation Projects Since Sep. 2012

International Genetically Engineered Machine Competition Teams Since 2013

Instructor at Washington University in St. Louis

Metabolic Engineering & Synthetic Biology (EECE 551) Fall semester

ChE Capstone (EECE 402) Spring semester

Service

Technical Program Committee - ACM NanoCom Conference, New York City, NY, Sep. 2016

Poster Session Judge - ICBE, Fort Lauderdale, FL, Jan. 2013

Poster Session Judge - Global Health & Infectious Disease Conference, St. Louis, MO, Apr. 2015

Conference Session Chair - 11th Workshop on Cyanobacteria, St. Louis, MO, Aug. 2013

AIChE Session Chair (2 sessions) - Annual Meeting, San Francisco, CA, Nov. 2013

AIChE Session Chair (1 session) - Annual Meeting, Atlanta, GA, Nov. 2014

AIChE Session Chair (1 session) - Annual Meeting, Salt Lake City, UT, Nov. 2015

AIChE Session Chair (1 session) - Annual Meeting, San Francisco, CA, Nov. 2016

ACS Session Chair (1 session) - National Meeting, San Diego, CA, Mar. 2016

Paper Reviewer (31 papers) - Chem. Eng. Sci. (2 papers); Front. Microbiol. (2); Front. Bioeng. Biotechnol. (1); ACS Synth. Biol. (6); PLoS One (1); Bioproc. Biosyst. Eng. (1); Biochem. Eng. J. (2); EMCBMM (1); KJCE (1); **Nature Biotechnol.** (1); Biotechnol. Bioeng. (5); J. Biol. Eng. (1); PLoS Comput. Biol. (1); J. Mol. Biol. (1); Curr. Opin. Biotechnol. (1); Biotechnol. J. (2); **Nature Commun.** (1); ACS Catalysis (1); Since 2012

Proposal Panel - National Science Foundation (three times); 2012, 2013, and 2015

Proposal Reviewer - BBSRC, UK (once); 2014

Reviewer - HHMI Summer Undergraduate Research Fellowship (SURF); 2013 and 2014

Reviewer - I-CARES proposals (twice); 2014 and 2015