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EDUCATION

2001-2006	Ph.D., Chemistry, Stanford University, Stanford, CA Advisor: Professor Chaitan Khosla Dissertation title: *Synthetic and Biosynthetic Studies Toward Novel Aromatic Polyketides*
1998-1999	Masters program participant at Seoul National University. *Organic Chemistry*, Seoul National University, Seoul, Korea Advisor: Professor Junghun Suh and Professor Myunghyun Paik Suh
1994-1998	B.S. (*summa cum laude*), Chemistry, Seoul National University, Seoul, Korea

EXPERIENCE

2016-current	Staff Scientist, Biological Systems and Engineering (BSE) Division, Lawrence Berkeley National Laboratory (LBNL), Director of Pathway and Metabolic Engineering, Biofuels and Bioproducts Division, Joint BioEnergy Institute (JBEI), Emeryville, CA
2016-2018	Deputy Vice President, Fuels Synthesis Division, Joint BioEnergy Institute (JBEI), Emeryville, CA
2012-2016	Research Scientist, Physical Biosciences Division, LBNL Director of Metabolic Engineering, Fuels Synthesis Division, JBEI
2009-2012	Project Scientist, Physical Biosciences Division, LBNL Director of Metabolic Engineering, Fuels Synthesis Division, JBEI
2008-2009	Project Scientist, Physical Biosciences Division, LBNL Deputy Director of Metabolic Engineering, Fuels Synthesis Division, JBEI
2008-2008	Postdoctoral researcher, Physical Biosciences Division, LBNL, JBEI
2006-2007	Postdoctoral researcher, University of California, Berkeley, CA
2002-2006	Research assistant, Stanford University, Stanford, CA
2001-2002	Teaching assistant, Stanford University, Stanford, CA
1999-2001	Military service as Korean Augmentation to the US Army (KATUSA)
1998-1999	Teaching assistant, Seoul National University, Seoul, Korea
1997-1998	Undergraduate research assistant with Professor Junghun Suh, Seoul National University, Seoul, Korea

AWARD

2013	JBEI Industry Relationship Award
2003-2004	Boehringer Ingelheim Graduate Fellowship

PUBLICATIONS

1. Baral N.R., Yang M., Harvey B.G., Simmons B.A., Mukhopadhyay A., **Lee T.S.**, Scown C.D., Production Cost and Carbon Footprint of Biomass-Derived Dimethylcyclooctane as a High-Performance Jet Fuel Blendstock, *ACS Sustainable*

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2. Liu, C-L, Xue, K., Yang, Y., Liu, X., Li, Y., **Lee, T.S.**, Bai, Z., Tan, T., Metabolic engineering strategies for sesquiterpene production in microorganism, *Crit. Rev. Biotechnol*. **2021**, (doi:10.1080/07388551.2021.1924112)
3. Keasling, J.D., Garcia Martin, H., **Lee, T.S.**, Mukhopadhyay, A., Singer, S.W., Sundstrom, E., Microbial production of advanced biofuels, *Nature Review Microbiology,* **2021**,
4. Kim, J., Baidoo, E.E.K, Amer, B., Mukhopadhyay, A., Adams, P.D., Simmons, B.A., **Lee, T.S.**, Engineering *Saccharomyces cerevisiae* for isoprenol production, *Metabol. Eng*. **2021**, 64, 154-166 (doi: 10.1016/j.ymben.2021.02.002)
5. Wang, X., Pereira, J.H., Tsutakawa, S., Fang, X., Adams, P.D., Mukhopadhyay, A., **Lee, T.S.**, Efficient production of oxidized terpenoids via engineering fusion proteins of terpene synthase and cytochrome P450, *Metabol. Eng*. **2021**, 64, 41-51 (doi: 10.1016/j.ymben.2021.01.004)
6. Geiselman, G.M., Kirby, J., Landera, A., Otoupal, P., Papa, G., Barcelos, C., Sundstrom, E.R., Das, L., Magurudeniya, H.D., Wehrs, M., Rodriguez, A., Simmons, B.A., Magnuson, J.K., Mukhopadhyay, A., **Lee, T.S.**, George, A., Gladden, J.M., Conversion of poplar biomass into high-energy density tricyclic sesquiterpene jet fuel blendstocks, *Microb Cell Fact.* **2020,** 19:208 (doi:10.1186/s12934-020-01456-4)
7. Garabedian, B.M., Meadows, C.W., Mingardon, F., Guenther, J.M., de Rond, T., Abourjeily, R., **Lee, T.S.**, An automated workflow to screen alkene reductases using high-throughput thin layer chromatography, *Biotechnology for Biofuels* **2020** (doi: 10.1186/s13068-020-01821-w)
8. Eiben, C.B., Tian, T., Thompson, M.G., Mendez-Perez, D., Kaplan,N., Goyal, G., Chiniquy, J., Hillson, N.J., **Lee, T.S.**, Keasling, J.D., Adenosine triphosphate and carbon efficient route to second generation biofuel isopentanol, *ACS Synth Biol.* **2020**, 9, 468-474, (doi: 10.1021/acssynbio.9b00402)
9. Kang, A., Mendez-Perez, D., Goh, E.B., Baidoo, E., Benites, V., Beller, H.R., Keasling, J.D., Adams, P.A., Mukhopadhyay, A., **Lee, T.S.**, Optimization of the IPP-bypass mevalonate pathway and fed-batch fermentation for the production of isoprenol in *Escherichia coli*, *Metabol. Eng*. **2019**, (doi: 10.1016/j.ymben.2019.09.003)
10. Baral, N., Kavvada, O., Mendez Perez, D., Mukhopadhyay, A., **Lee, T.S.**, Simmons, B.A., Scown, C., Greenhouse gas footprint, water-intensity, and production cost of bio-based isopentenol as a renewable transportation fuel, *ACS Sustainable Chem. Eng.* **2019**, (doi: 10.1021/acssuschemeng.9b02928)
11. Baral, N., Kavvada, O., Mendez Perez, D., Mukhopadhyay, A., **Lee, T.S.**, Simmons, B.A., Scown, C., Techno-economic analysis and life-cycle greenhouse gas mitigation cost of five routes to bio-jet fuel blendstocks. *Energy and Environmental Science*, **2019**, (doi: 10.1039/C8EE03266A)
12. Tian, T., Kang, J.W., Kang, A., **Lee, T.S.**, Redirecting metabolic flux via combinatorial multiplex CRISPRi-mediated repression for isopentenol production in *E. coli*. *ACS Synth Biol.* **2019**, (doi: 10.1021/acssynbio.8b00429)
13. Meadows, C.W., Mingardon, F., Garabedian, B.M., Baidoo, E., Benites, V.T., Rodrigues, A.V., Abourjeily, R., Chanal, A., **Lee, T.S.**, Discovery of novel geranylgeranyl reductases and characterization of their substrate promiscuity, *Biotechnology for Biofuels* **2018**, 11:340(doi: 10.1186/s13068-018-1342-2)
14. Liu, C-L, Tian, T., Alonso-Gutierrez, J., Garabedian, B., Wang, S., Baidoo, E.E., Benites, V., Chen, Y., Petzold, C.J., Adams, P.D., Keasling, J.D., Tan, T., **Lee, T.S.**, Renewable production of high density jet fuel precursor sesquiterpenes from *Escherichia coli*, *Biotechnology for Biofuels* **2018** (doi: 10.1186/s13068-018-1272-z)
15. Wang, S., Cheng, G., Dong, J., Tian, T., **Lee, T.S.**, Mukhopadhyay, A., Simmons, B.A., Yuan, Q., Singer, S.W., Tolerance Characterization and Isoprenol Production of Adapted Escherichia coli in the Presence of Ionic Liquids. *ACS Sustainable Chem.*

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16. Goyal, G., Costello, Z., Gutierrez, J. A., Kang, A., **Lee, T. S.**, Martin, H. G., Hillson, N. J., Parallel Integration and Chromosomal Expansion of Metabolic Pathways. *ACS Synth Biol.* **2018**, (doi: 10.1021/acssynbio.8b00243)
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18. Wang, S., Zhao, W., **Lee, T.S.**, Singer, S.W., Simmons, B.A., Singh, S., Yuan, Q., Cheng, G., Dimethyl Sulfoxide Assisted Ionic Liquid Pretreatment of Switchgrass for Isoprenol Production. *ACS Sustainable Chem. Eng.* **2018**, (doi: 10.1021/acssuschemeng.7b04908)
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20. Kim, E.M., Woo, H.M., Tian, T., Yilmaz, S., Javidpour, P., Keasling, J.D., **Lee, T.S.**, Autonomous control of metabolic state by a quorum sensing (QS)-mediated regulator for bisabolene production in engineered *E. coli*, *Metabol. Eng*. **2017**, *44*, 325-336 (doi: 10.1016/j.ymben.2017.11.004)
21. Meadows, C.W., Kang, A., **Lee, T.S.**, Metabolic engineering for advanced biofuels production and recent advances towards commercialization, *Biotech. J*. **2018**, *13*, 1600433 (doi:10.1002/biot.201600433)
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PATENTS

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2. Yoshida, E., **Lee, T.S.**, Host Cells and Methods for Producing Hydroxytyrosol, WO 2017/223569 A1
3. **Lee, T.S.**, Kang, A., Novel Host Cells and Methods for Producing Isopentenol from Mevalonate, U.S. Patent Application Ser. No: 15/682,325
4. **Lee, T.S.**, Satoh, Y., Keasling, J.D., Host cells and methods for oxidizing aromatic amino acids, US2014/0134689 A1

5. **Lee, T.S.**, Peralta-Yahya, P. Keasling, J.D., Isoprenoid based alternative diesel fuel, US 9,109,175 B2
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BOOKCHAPTERS

1. Woo, H.M., **Lee, T.S**., Chapter 6. Isoprene-derived biofuels from engineered microbes, *Biofuels: From Microbes to Molecules*, Caister Academic Press (2014),
2. Kang, A., **Lee, T.S.**, Chapter 2. Secondary metabolism for isoprenoid-based biofuels, *Biotechnologies for Biofuel Production and Optimization*, Elsevier (2016), doi: 10.1016/B978-0-444-63475-7.00002-9
3. Tian, T., **Lee, T.S.**, Advanced biodiesel and biojet fuels from lignocellulosic biomass, *Consequences of Microbial Interactions with Hydrocarbons, Oils, and Lipids: Production of Fuels and Chemicals*, Handbook of Hydrocarbon and Lipid Microbiology, Springer (2017), doi: 10.1007/978-3-319-31421-1_372-1

PRESENTATIONS

1. Lee, T.S. Metabolic engineering of isoprenol production in *E. coli*, Terpnet 2019, Halle, Germany, August 26-30, 2019 (invited talk)
2. Lee, T.S. Biological design and engineering of biofuels producing microbial system. 1st Synthetic Biology World Forum, Nanjing, September 20-21, 2018 (invited talk)
3. Lee, T.S. Design and Engineering of Biofuels and Bioproducts Producing Microbial Syst ems at Joint BioEnergy Institute (JBEI), GenScript, Nanjing, China, March 6, 2018 (invited talk)
4. Lee, T.S. Biological design and engineering of biofuels and biochemicals producing microbial system. KOLIS (Korean Life Scientist in the SF Bay Area) Winter Conference, Berkeley, CA, December 10, 2016. (invited plenary talk)
5. Lee, T.S. Isopentenyl diphosphate (IPP)-bypass mevalonate pathways for C5 alcohol production, 13th International Symposium on the Genetics of Industrial Microorganisms (GIM2016), Wuhan, China, October 16-20, 2016. (invited)
6. Lee, T.S. Microbial engineering for the production of advanced biofuels and bioproducts. National University of Singapore, Biochemistry Department Seminar, Singapore, June 1, 2016. (invited)
7. Lee, T.S. Microbial production of advanced biofuels. Divisional Seminar, Biological Systems and Engineering Division, Lawrence Berkeley Lab. Apr 1, 2016. (invited)
8. Lee, T.S. Isopentenyl diphosphate (IPP)-bypass mevalonate pathways for C5 alcohol production. 251st ACS National Meeting & Exposition, San Diego, CA, March 13-17, 2016. (oral presentation)
9. Goyal, G., Alonso-Gutierrez, J., Lee, T.S., Hillson, N. Advanced pathways for microbial production of branched C5 alcohols. 251st ACS National Meeting & Exposition, San Diego, CA, March 13-17, 2016. (oral presentation)
10. Brunk, E., George, K., Keasling, J.D., Palsson, B.O., Lee, T.S. A multi-omics based workflow to characterize strain variation in engineered *E. coli*. 251st ACS National Meeting & Exposition, San Diego, CA, March 13-17, 2016. (oral presentation)
11. Lee, T.S., Kang, A. et al. Advanced pathways for microbial production of branched C_5 alcohols. Terpnet 2015, Vancouver, Canada, Jun 1-5, 2015. (poster)
12. Lee, T.S. Microbial production of advanced biofuels. Seoul National University, Chemistry Department Seminar, Seoul, Korea, May 14, 2015. (invited)
13. Lee, T.S. Microbial production of advanced biofuels. Kunkuk University, Bioscience and Biotechnology Department Seminar, Seoul, Korea, May 11, 2015. (invited)
14. Lee, T.S. Microbial production of advanced biofuels. National University of Singapore, Biochemistry Department Seminar, Singapore, May 6, 2015. (invited)
15. Lee, T.S. Advanced pathways for microbial production of branched C5 alcohols. 249th

ACS National Meeting & Exposition, Denver, CO, March 22-26, 2015. (oral presentation)

16. Lee, T.S. Microbial production of advanced biofuels. UC Davis Chemistry Department Seminar, Davis, CA, February 10, 2015. (invited)
17. Lee, T.S. Joint Efforts for Biomass to Biofuel Researches - the Joint BioEnergy Institute (JBEI). KOLIS (Korean Life Scientist in the SF Bay Area) Winter Conference, San Francisco, CA, December 6, 2014. (invited plenary talk)
18. Lee, T.S. Joint Efforts for Biomass to Biofuel Researches - the Joint BioEnergy Institute (JBEI). US-Korea Conference (UKC), San Francisco, CA, August 7-9, 2014. (invited talk)
19. Lee, T.S. Balancing heterologous pathway - dynamic regulation of the pathway and Proteomics/Production analysis. Society for Industrial Microbiology Annual Meeting, St. Louis, MO, July 20-24, 2014. (invited talk)
20. Lee, T.S. Sesquiterpene (C15) biofuel production: From synthetic biology to scale-up. 247th ACS National Meeting & Exposition, Dallas, TX, March 16-20, 2014. (oral presentation)
21. Lee, T.S. Proteomics-aided correlation analysis of the isoprenoid pathway for C5 alcohol production in *E. coli*. Society for Industrial Microbiology Annual Meeting, San Diego, CA, 2013 (invited talk).
22. Lee, T.S. Microbial production of advanced biofuels – C5 alcohols. 245th ACS National Meeting & Exposition, New Orleans, LA, April 7-11, 2013. (oral presentation)
23. Lee, T.S. Microbial production of a terpene-based advanced biofuels. 243rd ACS National Meeting & Exposition, San Diego, CA, March 25-29, 2012. (oral presentation)
24. Lee, T.S. Biocatalysis - Microbial engineering for advanced biofuel production, 5th GCOE International Symposium, Hokkaido University, Japan, Feb 21-22, 2012 (invited talk)
25. Lee, T.S. Microbial production of isoprenoid-based biofuel. Society for Industrial Microbiology Annual Meeting, New Orleans, LA, 2011 (invited talk).
26. Lee, T.S., Satoh, Y., Keasling, J.D., Engineered biosynthesis of hydroxytyrosol, a potent antioxidant from olive, 241st ACS National Meeting & Exposition, Anaheim, CA, March 27-31, 2011. (oral presentation)
27. Lee, T.S., Johanson, A., Ma, S., Friedland, G., Haliburton, J., Chan, R., Batth, T., Mckee, A., Chivian, D., Keasling, J.D., Petzold, C., and Chhabra, S.R. Evaluation of HMG-CoA Reductase variants for improved isoprenoid production in Escherichia coli, 241st ACS National Meeting & Exposition, Anaheim, CA, March 27-31, 2011. (oral presentation)
28. Lee, T.S. “JBEI Fuels Synthesis - Metabolic Engineering of Isoprenoid Biofuel Pathway”, AIChE Annual Meeting, Salt Lake City, UT, November 12, 2010 (invited talk).
29. Lee, T.S. Synthetic biology toward metabolic engineering of mevalonate pathway. Society for Industrial Microbiology Annual Meeting, San Francisco, CA, 2010 (invited talk).
30. Lee, T.S., Krupa, Hajimorad, Prasad, Lee, Keasling. "Biobrick vectors and datasheets; a synthetic biology platform for metabolic engineering" (poster) ACS National Meeting, San Francisco., March 21-25, 2010
31. Lee, T.S., Chan, Keasling. "Metabolic engineering of mevalonate pathway" (poster) ACS National Meeting, San Francisco., March 21-25, 2010
32. Lee, T.S., Lee, S.K., Keasling, J.D. Studies for the production of benzylisoquinoline alkaloids in metabolically engineered *Escherichia coli* strains. Society for Industrial Microbiology Annual Meeting, San Diego, CA, 2008 (invited talk)