

Eun Joong Oh

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EDUCATION

- 2011-2015 **University of Illinois**, Urbana-Champaign, IL
 Ph.D., Food Science and Human Nutrition (FSHN), GPA 4.00/4.00
 Advisor: Yong-Su Jin, Ph.D.
 Thesis: Engineering yeast strains for producing fuels and value-added chemicals from cellulosic biomass
- 2006-2008 **Seoul National University**, Seoul, Korea
 M.S., Food Science and Biotechnology, GPA 3.44/4.30
 Advisor: Jin-Ho Seo, Ph.D.
 Thesis: Effects of NADPH regeneration on xylitol production in recombinant *Saccharomyces cerevisiae* containing xylose reductase
- 2000-2004 **Seoul National University**, Seoul, Korea
 B.S., *cum laude*, Food Science and Biotechnology, GPA 3.74/4.30

RESEARCH EXPERIENCE

- Present **Assistant Professor**
 Department of Food Science, Purdue University
- 2016-2020 **Postdoctoral Researcher**
 Renewable and Sustainable Energy Institute (RASEI), University of Colorado
 Advisor: Ryan Gill, Ph.D.
- Multiplex evolution of antibody fragments utilizing a yeast surface display platform
 - Precise and efficient epitope mapping of anti-epidermal growth factor Receptor antibodies using trackable deep mutational scanning
 - Map essentiality for all residues in all essential proteins in *E. coli*
 - Develop new chassis for the production of mevalonolactone in an acid-tolerant yeast
- 2011-2015 **Graduate Student Research Assistant**
 Carl R. Woese Institute for Genomic Biology, University of Illinois
- Constructed an efficient cellobiose metabolic pathway in yeast
 - Discovered ways to apply the simultaneous co-utilization of a sugar mixture derived from cellulosic biomass
 - Integrated multiple substrate consumption pathways in a synergistic way for enhanced bioconversion
 - Engineered cellodextrin transporters to improve cellobiose fermentation under acidic conditions
 - Identified novel gene targets for enhancing sugar fermentation in the

presence of acetic acid through an inverse metabolic engineering approach

- 2006-2008 **Graduate Student Research Assistant**
 Department of Food Science and Biotechnology, Seoul National University
 • Engineered redox metabolism to increase reducing power for producing xylitol in yeast

TEACHING EXPERIENCE

- 2013 **Teaching Assistant**
 Department of Food Science and Human Nutrition, University of Illinois
 Course: Techniques in Applied Microbiology (MCB312)
- 2007 **Teaching Assistant**
 Department of Food Science and Biotechnology, Seoul National University
 Course: Physical Chemistry

AWARDS AND HONORS

- 2015 Kathryn VanAken Burns Memorial Fund Merit Award, College of ACES, UIUC
- 2014 Henry D. and Donna E. Strunk Merit Award, College of ACES, UIUC
- 2014 Conference Travel Grant Award, Energy Biosciences Institute
- 2013 Kathryn VanAken Burns Memorial Fund Merit Award, College of ACES, UIUC
- 2012 Alice and Charlotte Biester Merit Award, College of ACES, UIUC
- 2011 Conference Travel Grant Award, Graduate College, UIUC
- 2002 Dr. Chung Scholarship, Dr. Chung's Food Co., Ltd.

PEER-REVIEWED PUBLICATIONS

1. Jeong, D., Park, H., Jang, B. K., Ju, Y., Shin, M. H., **Oh, E. J.**, Lee, E. J., and Kim, S. R. 2021. Recent advances in the biological valorization of citrus peel waste into fuels and chemicals. *Bioresource Technology* 323, 124603.
2. Lacerda, M. P., **Oh, E. J.**, and Eckert, C. 2020. The model system *Saccharomyces cerevisiae* versus emerging non-model yeasts for the production of biofuels. *Life* 10(11), 299.
3. Jeong, D*, **Oh, E. J.***, Ko, J. K., Nam, J. O., Park, H. S., Jin, Y. S., Lee, E. J., and Kim, S. R. 2020. Metabolic engineering considerations for the heterologous expression of xylose-catabolic pathways in *Saccharomyces cerevisiae*. *PLoS ONE* 15(7), e0236294. (*equal contribution)
4. **Oh, E. J.**, Liu, R., Liang, L., Freed, E. F., Eckert, C. A., and Gill, R. T. 2020. Multiplex evolution of antibody fragments utilizing a yeast surface display platform. *ACS Synthetic Biology* 9(8), 2197-2202.
5. Choudhury, A., Fankhauser, R. G., Freed, E. F., **Oh, E. J.**, Morgenthaler, A. B., Bassalo, M. C., Copley, S. D., Kaar, J. L., and Gill, R. T. 2020. Determinants for efficient editing with Cas9-mediated recombineering in *Escherichia coli*. *ACS Synthetic Biology* 9(5), 1083-1099.
6. Park, H., Jeong, D., Shin, M. H., Kwak, S., **Oh, E. J.**, Ko, J. K., and Kim, S. R. 2020.

- Xylose utilization in *Saccharomyces cerevisiae* during conversion of hydrothermally pretreated lignocellulosic biomass to ethanol. *Applied Microbiology and Biotechnology* 104, 3245-3252.
7. **Oh, E. J.** and Jin, Y. S. 2020. Engineering of *Saccharomyces cerevisiae* for efficient fermentation of cellulose. *FEMS Yeast Research* 20 (1), foz089.
 8. Liu, R.M., Liang, L., Freed, E., **Oh, E. J.**, Liu, Z. Y., Garst, A., and Gill, R. T. 2019. Synthetic chimeric nucleases function for efficient genome editing. *Nature Communications* 10, 5524.
 9. Kwak, S., Yun, E. J., Lane, S., **Oh, E. J.**, Kim, K. H., and Jin, Y. S. 2019. Redirection of the glycolytic flux to enhance isoprenoid production in *Saccharomyces cerevisiae*. *Biotechnology Journal* 1900173.
 10. Liu, J. J., Zhang, G. C., Kwak, S., **Oh, E. J.**, Yun, E. J., Chomvong, K., Cate, J. H. D., and Jin, Y. S. 2019. Overcoming the thermodynamic equilibrium of an isomerization reaction through oxidoreductive reactions for biotransformation. *Nature Communications* 10, 1356.
 11. **Oh, E. J.**^{*}, Wei, N.^{*}, Kwak, S., Kim, H., and Jin, Y. S. 2019. Overexpression of *RCK1* improves acetic acid tolerance in *Saccharomyces cerevisiae*. *Journal of Biotechnology* 292, 1-4. (* equal contribution)
 12. Liu, R., Liang, L., Choudhury, A., Garst, A. D., Eckert, C., **Oh, E. J.**, Winkler, J., and Gill, R. T. 2019. Multiplex navigation of global regulatory networks (MINR) in yeast for improved ethanol tolerance and production. *Metabolic Engineering* 51, 50-58.
 13. Pines, G., **Oh, E. J.**, Bassalo, M. C., Choudhury, A., Garst, A. D., and Gill, R. T. 2018. Genomic deoxyxylulose phosphate reductoisomerase (DXR) mutations conferring resistance to the antimalarial drug fosmidomycin in *Escherichia coli*. *ACS Synthetic Biology* 7, 2824-2832.
 14. Bassalo, M. C., Garst, A. D., Choudhury, A., Grau, W. C., **Oh, E. J.**, Spindler, E., Lipscomb, T., and Gill, R. T. 2018. Deep scanning lysine metabolism in *Escherichia coli*. *Molecular Systems Biology* 14, e8371.
 15. Jayakody, L. N., Liu, J. J., Yun, E. J., Turner, T. L., **Oh, E. J.**, and Jin, Y. S. 2018. Direct conversion of cellulose into ethanol and ethyl- β -D-glucoside via engineered *Saccharomyces cerevisiae*. *Biotechnology and Bioengineering* 115, 2859-2868.
 16. Tarasava, K., **Oh, E. J.**, Eckert, C. A., and Gill, R. T. 2018. CRISPR-enabled tools for engineering microbial genomes and phenotypes. *Biotechnology Journal* 13, 1700586.
 17. Yun, E. J., **Oh, E. J.**, Liu, J. J., Yu, S., Kim, D. H., Kwak, S., Kim, K. H., and Jin, Y. S. 2018. Promiscuous activities of heterologous enzymes leading to unintended metabolic rerouting in *Saccharomyces cerevisiae* engineered to assimilate various sugars from renewable biomass. *Biotechnology for Biofuels* 11:140.
 18. Kim, H., **Oh, E. J.**, Lane, S., Lee, W. H., Cate, J. H. D., and Jin, Y. S. 2018. Enhanced cellobiose fermentation by engineered *Saccharomyces cerevisiae* expressing a mutant cellodextrin facilitator and cellobiose phosphorylase. *Journal of Biotechnology* 275, 53-59.
 19. Lane, S., Xu, H., **Oh, E. J.**, Kim, H., Lesmana, A., Jeong, D., Zhang, G., Tsai, C. S., Jin, Y. S., and Kim, S. R. 2018. Glucose repression can be alleviated by reducing glucose phosphorylation rate in *Saccharomyces cerevisiae*. *Scientific Reports* 8, 2613
 20. **Oh, E. J.**, Kwak, S., Kim, H., and Jin, Y. S. 2017. Transporter engineering for cellobiose fermentation under lower pH conditions by engineered *Saccharomyces*

- cerevisiae*. *Bioresource Technology* 245, 1469-1475.
21. Liu, J. J., Zhang, G. C., **Oh, E. J.**, Pathanibul, P., Turner, T. L., and Jin, Y. S. 2016. Lactose fermentation by engineered *Saccharomyces cerevisiae* capable of fermenting cellobiose. *Journal of Biotechnology* 234, 99-104.
 22. **Oh, E. J.**, Skerker, J. M., Kim, S. R., Wei, N., Turner, T. L., Maurer, M., Arkin, A. P., and Jin, Y. S. 2016. Gene amplification on demand accelerates cellobiose utilization in engineered *Saccharomyces cerevisiae*. *Applied and Environmental Microbiology* 82, 3631-3639.
 23. Kim, J. S., Cho, D. H., Heo, P., Jung, S. C., Park, M., **Oh, E. J.**, Sung, J., Kim, P. J., Lee, S., Lee, D. H., Lee, S., Lee, C. H., Shin, D., Jin, Y. S., and Kweon, D. H. 2016. Fumarate-mediated persistence of *Escherichia coli* against antibiotics. *Antimicrobial Agents and Chemotherapy* 60, 2232-2240.
 24. Xu, H., Kim, S., Sorek, H., Lee, Y., Jeong, D., Kim, J. Y., **Oh, E. J.**, Yun, E. J., Wemmer, D.E., Kim, K. H., Jin, Y. S., and Kim, S. R. 2016. *PHO13* deletion-induced transcriptional activation prevents sedoheptulose accumulation during xylose metabolism in engineered *Saccharomyces cerevisiae*. *Metabolic Engineering* 34, 88-96.
 25. Park, Y. C. *, **Oh, E. J.** *, Jo, J. H., Jin, Y. S., and Seo, J. H. 2016. Recent advances in biological production of sugar alcohols. *Current Opinion in Biotechnology* 37, 105-113 (*equal contribution).
 26. Turner, T. L., Zhang, G. C., **Oh, E. J.**, Subramaniam, V., Adiputra, A., Subramaniam, V., Skory, C. D., Jang, J. Y., Yu, B. J., Park, I., and Jin, Y. S. 2015. Lactic acid production from cellobiose and xylose by engineered *Saccharomyces cerevisiae*. *Biotechnology and Bioengineering* 113, 1075-1083.
 27. Wei, N. *, **Oh, E. J.** *, Million, G., Cate, J. H. D., and Jin, Y. S. 2015. Simultaneous utilization of cellobiose, xylose, and acetic acid from lignocellulosic biomass for biofuel production by an engineered yeast platform. *ACS Synthetic Biology* 4, 707-713 (*equal contribution).
 28. Kim, S. R., Xu, H., Lesmana, A., Kuzmanovic, U., Au, M., Florencia, C., **Oh, E. J.**, Zhang, G., Kim, K. H., and Jin, Y. S. 2015. Deletion of *PHO13* encoding HAD type IIA phosphatase results in upregulation of the pentose phosphate pathway in yeast. *Applied and Environmental Microbiology* 81(5), 1601-1609.
 29. Kim, T. Y., **Oh, E. J.**, Jin, Y. S., and Oh, M. K. 2014. Improved resistance against oxidative stress of engineered cellobiose-fermenting *Saccharomyces cerevisiae* revealed by metabolite profiling. *Biotechnology and Bioengineering* 19 (6), 951-957.
 30. Chomvong, K., Kordic, V., Li, X., Bauer, S., Gillespie, A. E., Ha, S. J., **Oh, E. J.**, Galazka, J. M., Jin, Y.S., and Cate, J. H. D. 2014. Overcoming inefficient cellobiose fermentation by cellobiose phosphorylase in the presence of xylose. *Biotechnology for Biofuels* 7, 85.
 31. Hong, N., Seo, S. O., **Oh, E. J.**, Seo, J. H., Cate, J. H. D., and Jin, Y. S. 2014. 2, 3-Butanediol production from cellobiose by engineered *Saccharomyces cerevisiae*. *Applied Microbiology and Biotechnology* 98, 5757-5764.
 32. Ha, S. J., Galazka, J. M., **Oh, E. J.**, Kordic, V., Kim, H., Jin, Y. S., and Cate, J. H. D. 2013. Energetic benefits and rapid cellobiose fermentation by *Saccharomyces cerevisiae* expressing cellobiose phosphorylase and mutant cellodextrin transporters. *Metabolic Engineering* 15, 134-143.
 33. **Oh, E. J.**, Ha, S. J., Kim, S. R., Lee, W. H., Galazka, J. M., Cate, J. H. D., and Jin, Y. S.

2013. Enhanced xylitol production through simultaneous co-utilization of cellobiose and xylose by engineered *Saccharomyces cerevisiae*. *Metabolic Engineering* 15, 226-234.
34. Kim, S. R., Ha, S. J., Wei, N., **Oh, E. J.**, and Jin, Y. S. 2012. Simultaneous co-fermentation of mixed sugars: a promising strategy for producing cellulosic ethanol. *Trends in Biotechnology* 30, 274-282.
35. **Oh, E. J.**, Bae, Y. H., Kim, K. H., Park, Y. C., and Seo, J. H. 2012. Effects of overexpression of acetaldehyde dehydrogenase 6 and acetyl-CoA synthetase 1 on xylitol production in recombinant *Saccharomyces cerevisiae*. *Biocatalysis and Agricultural Biotechnology* 1, 15-19.
36. Oh, Y. J., Lee, T. H., Lee, S. H., **Oh, E. J.**, Ryu, Y. W., Kim, M. D., and Seo, J. H. 2007. Dual modulation of glucose 6-phosphate metabolism to increase NADPH-dependent xylitol production in recombinant *Saccharomyces cerevisiae*. *Journal of Molecular Catalysis B: Enzymatic* 47, 37-42.

CHAPTERS IN BOOKS

1. **Oh, E. J.**, Jin, Y. S., Seo, J. H. 2018. Microbial metabolic engineering for production of food ingredients; Book chapter in *Advanced Biotechnology Series: Emerging Areas in Bioengineering*; Editor: Chang, H. N.; Wiley-VCH.

PATENTS

1. Jin, Y. S., Ha, S. J., **Oh, E. J.**, Kim, S. R., Lee, W. H., Cate, J. H. D., and Galazka, J. M. 2013. Xylitol Production from Cellulosic Biomass. US Patent WO2013059326 A1

WORK EXPERIENCE

- 2008-2010 **Researcher**
 Product Development Research, LG Household & Health Care Research
 Institute, Korea
- 2004-2006 **First Lieutenant**
 7th Infantry Division, Korea

JOURNAL REVIEWER

- 2016-present PLoS ONE
 2017-present Journal of Biotechnology
 2018-present Fungal Biology
 2018-present Process Biochemistry
 2019-present Green Chemistry
 2020-present Critical Reviews in Biotechnology

ORAL/POSTER PRESENTATIONS

1. **Oh, E. J.**, Liu, R., Liang, L., Freed, E., Eckert, C., Gill, R. 2019. CRISPR-based trackable protein engineering. DOE Genomic Sciences Program Annual PI Meeting, Washington, DC, February 24-27 (poster presentation).
2. **Oh, E. J.**, Choudhury, A., Liang, L., Liu, R., Gill, R. 2017. Enhanced CRISPR-based

- trackable protein engineering using modeling. DOE Genomic Sciences Program Annual PI Meeting, Washington, DC, February 5-8 (poster presentation).
3. **Oh, E. J.**, Wei, N., Kim, S. R., Skerker, J. M., Maurer, M., Arkin, A. P., Jin, Y. S. 2014. Massive gene duplication on demand accelerates cellobiose utilization in engineered *Saccharomyces cerevisiae*. Society for Industrial Microbiology and Biotechnology Annual Meeting, St. Louis, MO, July 20-24 (poster presentation).
 4. **Oh, E. J.**, Kim, H., Jin, Y. S. 2014. Optimal yeast strains for producing cellulosic biofuel. Energy Biosciences Institute Review Meeting, Berkeley, CA, April 7 (oral presentation).
 5. **Oh, E. J.**, Jin, Y. S., 2013. Expansion of cellobiose fermentation by engineered *Saccharomyces cerevisiae*. Energy Biosciences Institute Internal Seminar, Urbana, IL, November 7 (oral presentation).
 6. **Oh, E. J.**, Ha, S. J., Kim, S. R., Galazka, J. M., Cate, J. H. D., Jin, Y. S. 2011. Enhanced xylitol production through simultaneous co-consumption of cellobiose and xylose by an engineered *Saccharomyces cerevisiae*. American Institute of Chemical Engineers (AIChE) Annual Meeting, Minneapolis, MN, October 16-21 (oral presentation).