Eunice Kwon, Ph.D.

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Related technical skills

Assay Development, *In vitro* Assay, Analytical Instruments, Separation, Analytical Chemistry, Molecular Biology, Capillary Electrophoresis (CE), Thin-Layer Chromatography, Mass Spectrometry (MALDI-TOF), LC-MS (ESI-Ion Trap), UV/Vis Spectrophotometer, Tissue-Cell Culturing, Immunoassays, HPLC, ELISA, Lateral Flow Immunoassays, Zeta Potential Analyzer, Fourier Transform Infrared Spectroscopy, Microscopy (Transmission Electron Microscope, Scanning Electron Microscope, Confocal Microscope), Fermentation, Microorganism Culture, Bioreactor at the GMP Certified Facility, Metabolic Engineering, Polymerase Chain Reaction (PCR), Gel Electrophoresis, Plasmid Construction, Yeast's Gene-Related Work (Gene Cloning, Transformation, Cre/*loxp* recombination, DNA Isolation)

Education

Washington State University (WSU) – Pullman, WA, U.S. *May* 2022

Ph.D. in Chemical Engineering (GPA: 3.87 / 4.0)

Title of thesis: Development of rapid and effective nanoparticle-amplified immunoassays to detect target analytes

Seoul National University (SNU) – Seoul, Korea *February* 2016

M.S. in Chemical and Biological Engineering (GPA: 3.52 / 4.3)

Title of thesis: Adaptive evolution for efficient production of D-lactic acid in *Saccharomyces cerevisiae*

Seoul Women's University (SWU) – Seoul, Korea *February* 2014

B.S. in Bio & Environmental Technology (GPA: 3.85 / 4.5)

B.S. in Chemistry (2nd major)

Research Experience

University of Washington – Seattle, WA, U.S. *February* 2022 – *Present*

Postdoctoral researcher

One related publication in preparation and one presentation

- Directed a high-impact project focused on quantifying protein kinase B activity in pancreatic cancer single cells, employing advanced molecular and cellular biology techniques, unveiling critical insights for developing targeted therapies in precision oncology
- Refined protocols and conditions of assays to perform the assays including in vitro kinase assay and BCA assay in the current lab environment, resulting in a 20% increase in reproducibility
- Managed and conducted analytical experiments with mass spectrometry (MALDI-TOF), LC-MS (ESI-Ion Trap), and capillary electrophoresis (CE), illustrating expertise in utilizing and troubleshooting advanced analytical instrumentation
- Formulated and implemented a rigorous experimental plan to optimize analytical experiment parameters, separating target analytes, fluorescein tagged-peptides through thin-layer chromatography, microfluidic thin-layer chromatographic-like chip, and CE with a laser-induced fluorescent detection method

Washington State University – Pullman, WA, U.S. *May* 2018 – *January 2022*

Graduate Research Assistant

Four related publications (two 1st author publications and one 1st co-author publication), two related publications in preparation, and seven presentations

- Led projects focusing on assay development, specifically nanoparticle-amplified immunoassays, resulting in 3 1st-author published papers and 7 1st-author presentations; enhanced industry knowledge and advanced scientific understanding through impactful contributions
- Spearheaded the development of two innovative immunoassay approaches, quantifying small molecules to large molecules, leading to the publication of 3 1st-author manuscripts, showcasing collaborative leadership in research projects
- Presented 7 research projects at the conferences, earning the Honorable Mentioned Student Award in the Environmental Sensors Session of the American Institute of Chemical Engineers (AIChE) 2020 annual meeting, showcasing expertise in innovative sensor technologies and chemical engineering advancements

The Garden of NaturalSolution – Osan, Korea *August* 2016 – *March* 2018

Research Scientist

Two related Korean patents

- Developed unique fermentation processes for natural ingredients, leading to a 20 – 30% boost in product potency and a 10 – 15% improvement in customer satisfaction for cosmetic companies seeking enhanced skincare solutions
- Orchestrated cross-departmental collaboration between marketing and manufacturing teams to execute dissertation projects, developing and launching over 50 innovative fermented products, diversifying the company's product portfolio, and increasing market share
- Performed simple human clinical product tests, creating 50+ comprehensive reports for clients, empowering data-driven decision-making, and improving customer confidence in product efficacy and safety
- Developed novel fermented products in microbiology research, resulting in the launch of two new products that increased company revenue
- Revised and updated SDSs, SOPs, and quality control (QC) guidelines for fermented products by leading cross-functional research projects to collaborate with various teams including QC and manufacturing teams, ensuring compliance with industry standards and regulations, contributing to the first export to overseas customers
- Completed the generation of 50+ reports outlining microorganism assay results for clients, securing 2 Korean patents; pivotal in facilitating strategic decision-making and driving intellectual property advancement in the industry landscape

Seoul National University – Seoul, Korea *January* 2014 – *February* 2016

Master's Student

Three related publications, one presentation, and three related Korean patents

- Researched the adaptive evolution strategy, elevating D-lactic acid levels in media, culminating in a 40% boost in D-lactic acid production levels, a significant 30% increase in glucose consumption levels, and a meaningful 50% decrease in ethanol (byproduct) production levels in *Saccharomyces cerevisiae*
- Engineered a novel genetic modification strategy integrating the D-lactic acid dehydrogenase gene with *Leuconostoc mensenteroides* and eliminating by-product genes in *S. cerevisiae*, resulting in enhancing production efficiency up to 0.97 g/(L·h) productivity

Publications Former Korean name: Yoonjung Kwon

- **Kwon, E. Y.,** Yao, M., Kim, J., Wang, Y., Lawrence, D.S, and Allbritton, N. L. (2024) A Picoliter Thin-layer Chromatography Platform to Separate a Lipid-conjugated Peptides in a Single

Pancreatic Cancer Cell (In Preparation to submit to *Analytical Chemistry*)

- **Kwon, E. Y.**, Abusharkh, H., Ruan, X., Du, D., Hammond-Pereira, E., and Van Wie, B. J. (2023) Pd@Pt Nanoparticle-Linked Immunosorbent Assay for the Quantification of Collagen Type II, *Analytica Chimica Acta,* 1266: 341265
- Ruan, X., **Kwon, E. Y.**, Wang, Y., Wang, L., Cheng, N., Niu, X., Van Wie, B. J., Du, D., and Lin, Y., (2024) 3D printed windmill-like multiplexed immunosensor coupled with mesoporous Pd@Pt nanoparticles for electrochemical quantitative measurement of peptides residues (In preparation to submit to *Biosensors and Bioelectronics*)
- Yu, F., **Kwon, E. Y.,** Ruan, X., Lin, Y., Du, D., Van Wie., B. J., and Wu, Y., (2024) Immunoassay Technologies for the Simultaneous Analysis of Multiple Pesticide Residues in Food and Water (In preparation to submit to *Analytica Chimica Acta*)
- **Kwon, E. Y.***, Ruan, X.*, Yu, F., Lin, Y., Du, D., and Van Wie, B. J., (2023) Simultaneous Detection of Two Herbicides in Fruits and Vegetables with Nanoparticle-Linked Immunosorbent and Lateral Flow Immunoassays, *Food Chemistry,* 399: 133955 *Equally contributing to the work.
- Ruan, X., Wang, Y., **Kwon, E. Y.**, Wang, L. Cheng, N., Niu, X., Van Wie, B. J., Du, D., and Lin, Y., (2021) Nanomaterial-enhanced 3D-printed Sensor Platform for Simultaneous Detection of Atrazine and Acetochlor, *Biosensors and Bioelectronics,* 184: 113238
- **Kwon, E. Y.**, Ruan, X., Wang, L., Lin, Y., Du, D., and Van Wie, B. J., (2020) Mesoporous Pd@Pt Nanoparticle-linked Immunosorbent Assay for Detection of Atrazine, *Analytica Chimica Acta*, 1116: 36-44
- Baek, S., **Kwon, E.Y.**, Bae, S., Cho, B., and Hahn, J., (2017) Improvement of D-Lactic Acid Production in Saccharomyces cerevisiae Under Acidic Conditions by Evolutionary and Rational Metabolic Engineering, *Biotechnology Journal*, 12: 1700015
- Baek, S., **Kwon, E.Y.**, Kim, S., and Hahn, J., (2016) GSF2 Deletion Increase Lactic Acid Production by Alleviating Glucose Repression in *Saccharomyces cerevisiae*, *Scientific Report*, 6: 34812
- Baek, S., **Kwon, E. Y.**, Kim, Y. H., and Hahn, J. (2015) Metabolic Engineering and Adaptive Evolution for Efficient Production of D-lactic acid in *Saccharomyces cerevisiae*, *Applied Microbiology and Biotechnology*, 100(6):2737-48
- Lee, J., Srinivasan, S., Lim, S., Joe, M., Lee, S. H., Kwon, S. A., **Kwon, Y. J.**, Lee, J., Choi, J. J., Lee, H. M., Auh, Y. K., and Kim, M. K. (2014) *Hymenobacter swuensis* sp. *nov.*, a Gamma-Radiation-Resistant Bacteria Isolated from Mountain Soil, *Current Microbiology* 68: 305-310

Presentations

- **Kwon, E. Y.,** Kim, J., Lawrence, D.S, and Allbritton, N. L. **"**Development of a lipid-conjugated substrate to measure the activity of protein kinase B in single cells by capillary electrophoresis," Poster Presentation at Biomedical Engineering Society (BMES) (Seattle, WA, U.S., October 2023)
- **Kwon, E. Y.**, Abusharkh, H., and Van Wie, B. J. "Collagen Type II Quantification with Pd@Pt Nanoparticle-Linked Immunosorbent Assay," Oral Presentation at American Institute of Chemical Engineers (AIChE) (Boston, MA, U.S., November 2021)
- **Kwon, E. Y.**, Abusharkh, H., and Van Wie, B. J. "Pd@Pt Nanoparticle-linked Immunosorbent Assay for Collagen Type II Quantitative Detection," Poster presentation at 2021 GPSA Research Exposition of WSU (Virtual, March 2021)
- **Kwon, E. Y.**, Ruan, X., Yu, F., Lin, Y., Du, D., and Van Wie, B. J. "Simultaneous Detection of Harmful Herbicides with Lateral Flow Immunoassay Catalyzed by Palladium@Platinum Nanoparticles," Oral presentation at American Institute of Chemical Engineers (AIChE) (Virtual, November 2020) **(Honourable mentioned student awardee)**
- **Kwon, E. Y.**, Ruan, X., Yu, F., Wang, L., Lin, Y., Du, D., and Van Wie, B. J. "Herbicide Detection with Nanoparticle-Amplified Immunoassays," Poster presentation at 2020 academic showcase of WSU (Pullman, WA., U.S., March 2020)

- **Kwon, E. Y.**, Ruan, X., Yu, F., Wang, L., Lin, Y., Du, D., and Van Wie, B. J. "Pd@Pt Nanoparticle-Amplified Immunoassay for Rapid Detection of Harmful Herbicides," Poster presentation at AIChE (Orlando, FL, U.S., November 2019)
- **Kwon, E. Y.**, Ruan, X., Wang, L., Lin, Y., Du, D., and Van Wie, B. J. "Rapid Mesoporous Pd@Pt nanoparticle-linked immunosorbent assay (NLISA) for detecting atrazine," Poster presentation at Institute of Electrical and Electronics Engineers (IEEE) Women-In-Engineering (WIE) International Leadership Summit (Richland, WA., U.S., July 2019)
- **Kwon, E. Y.**, Ruan, X., Wang, L., Lin, Y., Du, D., and Van Wie, B. J. "Pd@Pt nanoparticle-linked immunosorbent assay (NLISA) for detection of atrazine," Poster presentation at 2019 academic showcase of WSU (Pullman, WA., U.S., March 2019)
- **Kwon, E. Y.**, Baek, S., and Hahn, J. "Adaptive Evolution for Efficient Production of D-Lactic Acid in *Saccharomyces cerevisiae*," Poster presentation at the 30th-anniversary meeting and international symposium of The Korean Society for Biotechnology and Bioengineering (KSBB) (Songdo, Korea, October 2015) **(Best Poster Awards)**

Korean Patents *translated from Korean to English by Google Patents, Former Korean name: Yoonjung Kwon*

- KR101914344B1, "A moisturizing and anti-wrinkle cosmetic composition comprising fermented barley, fermented pear juice, fermented soybeans and fermented pomegranate extract and the method preparation of thereof," one of the inventors
- KR101989684B1, "Anti-acne cosmetic composition and preparation method of the same comprising the mixed extract of Sophorolipid, Withania Somnifera Root, Coriandrum Sativum and Propolis," one of the inventors
- KR102076764B1, "Recombinant SUR1 gene involved in increasing productivity of lactic acid and microorganism transformed with the same," one of the inventors
- KR101759673B1, "Genetically engineered yeast cell having enhanced growth rate and method of producing target materials using the same," one of the inventors
- KR102078715B1, "Transformed microorganism with enhanced productivity of lactic acid," one of the inventors

Teaching Experiences

- Teaching Assistant
  CHE 201 Chemical Process Principles and Calculations — *Fall* 2021
  Teach weekly recitation class for 77 students
  CHE 527 Chemical Thermodynamics (Grader) — *Spring* 2021
- Mentoring
  An undergraduate student of the NSF/WSU Research Experience for Undergraduates (REU) program — *Summer* 2019

Volunteer & Leadership experiences

- **Peer Mentor** Program of International Program at WSU — April 2019 – December 2021
  Assist new international students during their transition to WSU and the US by connecting them to useful resources.
- **Tutor** for math and science for elementary students at the local children's center — May 2011 – January 2012
- Conducted and helped with programs for children & adolescents at the youth training center in Korea — September – December 2009, March – June 2011
- **Team leader** of Eco campus activity in SWU — *Spring* and *Fall* 2011
  Activities to create a green campus that protects the earth's environment and encourages small actions that students can put into practice.
- **Manager** of the student council of Bio & Environmental Technology at SWU. — *Spring* and *Fall* 2010

Awards

- Honourable mentioned the student award at the Student Competition in Environmental Sensors Session of the AIChE 2020 annual meeting
- Women in Chemical Engineering (WIC) Travel Award at the AIChE (2020)
- Best poster awards at the KSBB (2015)

Scholarships

- Melvin and Ruth Smith Scholarship (*Spring* and *Fall* 2021)
- NASA Space Grant Fellowship in Science and Engineering (*Spring* 2019)
- Harold P. Curtis Scholarship (*Fall* 2018 – *Spring* 2020)
- Global Scholarship (*Spring* and *Fall* 2015)
- Academic Achievement Grant (*Fall* 2014)
- Scholarship for Excelling in Foreign Language (*Fall* 2010)
- Academic Achievement Grant *(Fall* 2009 and 2010)

Certificates

- Introduction to R: Basic R syntax (December 2023) https://coursera.org/verify/9VS4NFFESU97
- Getting Started with R studio (December 2023) https://coursera.org/verify/YK23U3M4UA8Q
- Getting Started with R (December 2023) https://coursera.org/verify/7P9JPVB8XRGT
- Introduction to Python Programming (December 2023) https://coursera.org/verify/7C3ALW398437
- Microsoft Office Specialist Expert for Office Excel® 2016 Expert (October 2017)
- Digital Information Ability Test for Microsoft Word and Spreadsheet by accredited private qualification in Korea (2009)