THIEN-KIM LE

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RESEARCH EXPERIENCE

From June 2023 To present

Department of Food Safety and Quality Management, Faculty of Food Science and Technology, Vietnam National University of Agriculture, Trau Quy, Gia Lam, Ha Noi

Lecturer/Assistant professor

- Taught several courses related to microorganisms.
- Researched on the topic related to food microorganisms and quality management.

From April 2022 To April 2023

Convergence Technology Division, Vietnam – Korea Institute of science and technology, Hoa Lac High-tech Park, Hanoi

Researcher

- Developed Au-based nanoparticle labels to enhance the sensitivity of lateral flow immunochromatographic strip for rapid detection of *E. Coli* (*Escherichia Coli*) bacteria causing nosocomial bacterial infection.
- Developed biosensors detect bacteria and viruses in the air based on Lateral Flow Immunoassay (LFIA) and Reverse Transcription–Polymerase Chain Reaction (RT-PCR) by using low-dimensional nanostructured materials.
- Researched and fabricated magnetic-based lateral flow immunoassay strip and magnetic field- measuring devices using trans-tunnel reluctance sensors for rapid quantitative analysis of biomarkers CA 15-3 and CEA.
- Integrated bioaerosol sampling platform and immunochromatographic techniques for rapid detection of several microbial pathogens of nosocomial infections.
- Supported to develop cold plasma technology to coat functional materials on skin-on-biochips for health monitoring applications.

From Mar 2020 To Dec 2021

School of biological sciences and biotechnology, Chonnam National University, Gwangju, South of Korea

Postdoctoral researcher at Synthetic biology lab

- Constructed libraries of random mutants by using a Diversify® PCR.
- Random Mutagenesis Kit for screening hydroxylation activity of enzyme with several chemicals.
- Designed primer and performed DNA cloning technique in bacteria.
- Performed statistical analysis on data sets using Snapgene.
- Purified proteins by His-tag column and analyzed by spectrometer or microplate reader (Victor Nivo).
- Analyzed the metabolites and chemicals by HPLC, LC/MS, GC-FID and GC/MS.
- Performed statistical analysis on data sets using Excel and Prism Graphpad.
- Developed protocol for, mentored, and trained 7 graduate students.

From Mar 2015 To Feb 2020

Graduate researcher at Functional Proteomics Lab

- Developed an enzymatic synthesis of 5’-OH tenatoprazole, a major human metabolite of tenatoprazole, by using mutants of CYP102A1 from *Bacillus megaterium* as a biocatalyst and tenatoprazole as a substrate.
- Developed a New Platform Technology for Light-induced Cytochrome P450 Catalysis.
- Catalyzed regioselective hydroxylation of polydatin at the C-3’ position to generate an astringin, a piceatannol glucoside, by a set of CYP102A1 mutants from *Bacillus megaterium*.

- Expressed and purified Cytochrome (BM3 and human) P450 enzyme.
- Analyzed characteristics of Cytochrome P450 enzyme by using spectrometer.
- Screened P450 libraries to show hydroxylation activity by several substrates.
- Analyzed the hydroxylation product of substrates and chemicals by HPLC, LC/MS, and GC/MS.
- Performed statistical analysis on data sets using Excel and Prism Graphpad.
- Managed and negotiated ordering for lab consumables, equipment, and services.
- Mentored and trained 2 undergraduate students and 2 Master graduate students.
- Collaborated with graduate students from other labs in Chonnam National University; and Korea Advanced Institute of Science and Technology (KAIST).

From April 2014 To Feb 2015

National Institute of Hygiene and Epidemiology (NIHE), Hanoi, Vietnam

Project engineer

- Analyzed actual bactericidal efficiency of silver nanoparticles against nosocomial bacterial pathogens.
- Determined the Minimal inhibitory concentration (MIC) of silver nanoparticles to *Escherichia coli* and *Staphylococcus aureus* by using modified microplate technique.

From Feb 2012 To June 2014

School of Biotechnology and Food Technology, Hanoi University of Science and Technology, Hanoi, Vietnam

Undergraduate researcher

- Isolated bacterial strains are available in fermented products in different areas on the culture medium using Xylose that is capable of lactic acid.
- Selected strains which showed the highest activity.
- Optimized the factors (temperature, pH, incubator time) affecting bacterial strains capable of fermentation produce lactic acid.

From Jun 2013 To Jul 2013

VAN GIANG Agricultural Biology Limited Company, Agricultural Genetics institute (AGI), Hanoi, Vietnam

Inter

- Evaluated the effect of temperature and humidity on *Ganoderma Lucidum* growth.
- Performed *Ganoderma Lucidum* cultivation and harvesting.

Education

From Mar 2017 To Feb 2020

Chonnam National University, Gwangju, Korea

Ph.D. in School of Biological Sciences and Biotechnology

Dissertation: Development of a New Platform Technology for Light-induced Cytochrome P450 Catalysis

GPA: 4.30/4.50

- GlobalPlus Scholarship for graduate student
- Brain Korea 21 program scholarship

From Mar 2015 To Feb 2017

Chonnam National University, Gwangju, Korea

M.S. in School of Biological Sciences and Biotechnology

Dissertation: Highly regioselective hydroxylation of polydatin, a resveratrol glucoside, for one step synthesis of astringin, a piceatannol glucoside, by P450 BM3

- Global Scholarship for graduate student
- Brain Korea 21 program scholarship

From Sep 2009 To Jul 2014

Hanoi university of science and technology, Hanoi, Vietnam

Engineer in School of Biotechnology and Food technology

- Merit certification for second prize of the Competition of "The Student Research Conference 2014"

Publication

Staining-Enhanced Peroxidase-Mimicking Gold Nanoparticles in Nano-ELISA for Highly Sensitive Detection of *Klebsiella pneumoniae*

ACS Omega. 2023; 8(51): 49211–49217

TT Pham, **TK Le**, NTT Huyen, N Luyen Van, TP Nguy, DL Tran, L Truong TN

Roles of Human Liver Cytochrome P450 Enzymes in Tenatoprazole Metabolism

Pharmaceutics. 2023; 15(1): 23

TK Le,YJ Park, GS Cha, FARH Oktavia, DH Kim and CH Yun

P450-driven plastic degrading synthetic bacteria

Trends in Biotechnology. 2022; 40(2): 166-179

SJ Yeom, **TK Le** and CH Yun

Methanol Dehydrogenases as a Key Biocatalysts for Synthetic Methylotrophy

Frontiers in Bioengineering and Biotechnology. 2021; 9: 787791

TK Le, YJ Lee, GH Han and SJ Yeom

Biodegradation of polystyrene by bacteria from the soil in common environments

Journal of Hazardous Materials. 2021; 416(15): 126239

HW Kim, JH Jo, YB Kim, **TK Le**, CW Cho, CH Yun, WS Chi and SJ Yeom

Solar-Powered Whole-Cell P450 Catalytic Platform for C-Hydroxylation Reactions

ChemSusChem. 2021; 14(15): 3054-3058

TK Le, J Kim, NA Nguyen, THH Nguyen, EG Sun, SM Yee, HS Kang, SJ Yeom, CB Park and CH Yun

Regioselective Hydroxylation of Oleanolic Acid Catalyzed by Human CYP3A4 to Produce Hederagenenin, a Chiral Metabolite

Catalysts. 2021; 11(2): 267

NT Cao, NA Nguyen, **TK Le**, GS Cha, KD Park and CH Yun

Biosensor-Based Directed Evolution of Methanol Dehydrogenase from *Lysinibacillus xylanilyticus*

International Journal of Molecular Sciences. 2021; 22(3): 1471

TK Le, SB Ju, HW Lee, JY Lee, SH Oh, KK Kwon, BH Sung, SG Lee and SJ Yeom

Regioselective Hydroxylation of Phloretin, a Bioactive Compound from Apples, by Human Cytochrome P450 Enzymes

Pharmaceuticals. 2020; 13(11): 330

NA Nguyen, NT Cao, THH Nguyen, **TK Le**, GS Cha, SK Choi, JG Pan, SJ Yeom, HS Kang and CH Yun

Biocatalytic Production of a Potent Inhibitor of Adipocyte Differentiation from Phloretin Using Engineered CYP102A1

Journal of Agricultural and food chemistry. 2020; 68: 6683-6691

NA Nguyen, J Jang, **TK Le**, THH Nguyen, SM Woo, SK Yoo, YJ Lee, KD Park, SJ Yeom, GJ Kim, HS Kang and CH Yun

Regioselective hydroxylation pathway of tenatoprazole to produce human metabolites by *Bacillus megaterium* CYP102A1

Process Biochemistry. 2019; 87: 95-104

TK Le, GS Cha, HH Jang, THH Nguyen, TTM Doan, YJ Lee, KD Park, Y Shin, DH Kim and CH Yun

Solar-driven biocatalytic C-hydroxylation through direct transfer of photoinduced electrons

Green Chemistry. 2019; 21: 515-525

TK Le, JH Park, DS Choi, GY Lee, WS Choi, KJ Jeong, CB Park and CH Yun

Peroxide-dependent oxidation reactions catalyzed by CYP191A1 from *Mycobacterium smegmatis*

Biotechnology Letters. August 2017; 39(8): 1245–1252

HY Jo, SH Park, **TK Le**, SH Ma, D Kim, T Ahn, YH Joung, CH Yun

Characterization of a Biflaviolin Synthase CYP158A3 from *Streptomyces avermitilis* and Its Role in the Biosynthesis of Secondary Metabolites.

Biomolecules & Therapeutics. March 2017; 25(2): 171-176

YR Lim, S Han, JH Kim, HG Park, GY Lee, **TK Le**, CH Yun and D Kim

Highly regioselective hydroxylation of polydatin, a resveratrol glucoside, for one-step synthesis of astringin, a piceatannol glucoside, by P450 BM3

Enzyme and Microbial Technology. February 2017; 97: 34-42

TK Le, HH Jang, HTH Nguyen, TTM Doan, GY Lee, KD Park, T Ahn, YH Joung, HS Kang and CH Yun

Regioselective C-H hydroxylation of omeprazole sulfide by *Bacillus megaterium* CYP102A1 to produce a human metabolite.

Biotechnology Letters. January 2017; 39(1): 105-112

HH Jang, SH Ryu, **TK Le**, TTM Doan, THH Nguyen, KD Park, DE Yim, DH Kim, CK Kang, T Ahn, HS Kang and CH Yun

Determination of minimum inhibitory concentration (MIC) of silver nanoparticles against pathogenic bacteria using modified microplate technique.

Journal of Preventive Medicine (Vietnam). April 2015; 3(163): 31-36

Le Thien Kim, Pham Van Chung, Nguyen Thanh Thuy, Tran Huy Hoang, Nguyen Binh Minh, Tran Thi Van Phuong, Nguyen Hiep Le Yen, Dao Tri Thuc, Phan Thi Canh, Nguyen Thanh Bang, Tran Quang Huy

Research Project

Integrate bioaerosol sampling platform and immunochromatographic techniques for rapid detection of several microbial pathogens of nosocomial infections

Research Group: IT-BT convergence technology
Project Period: 2023 - 2025
Research Sponsors: Ministry of Science and Technology
Project Supervisor: Prof. Truong Thi Ngoc Lien

Application of low-dimensional nanomaterials to develop biosensors for detecting bacteria and viruses in the air based on lateral flow immunochromatography and reverse transcriptase gene amplification technologies

Research Group: IT-BT convergence technology
Project Period: 2023 - 2026
Research Sponsors: VinIF
Project Supervisor: Prof. Truong Thi Ngoc Lien

Development of cold plasma technology to coat functional materials on skin-on-biochips for health monitoring applications

Research Group: IT-BT convergence technology
Project Period: 2022 - 2024
Research Sponsors: Ministry of Science and Technology
Project Supervisor: Prof. Truong Thi Ngoc Lien

Signal amplification using Lateral Flow Immunoassay (LFIA) and catalysis for avian affluenza virus (AIV) detection

Research Group: IT-BT convergence technology
Project Period: 2022
Research Sponsors: Korea Institute of Science and Technology
Project Supervisor: Prof. Truong Thi Ngoc Lien

Development of Au-based nanoparticle labels to enhance the sensitivity of lateral flow immunochromatographic strip for rapid detection of *E. Coli* (*Escherichia Coli*) bacteria causing nosocomial bacterial infection

Research Group: IT-BT convergence technology
Project Period: 2022
Research Sponsors: Korea government
Project Supervisor: Prof. Truong Thi Ngoc Lien

Development of C-C bond forming biocatalysts for metabolization of C1 carbon
Research Group: Synthetic Biology Lab
Project Period: 2021 - 2023
Research Sponsors: National Research Foundation of Korea
Project Supervisor: Prof. Soo-Jin Yeom

Development of plastic degradable artificial enzyme systems based on synthetic biology
Research Group: Synthetic Biology Lab
Project Period: 2021 - 2023
Research Sponsors: National Research Foundation of Korea
Project Supervisor: Prof. Soo-Jin Yeom

Development of *Bacillus* system redesign technology for whole cell bioconversion
Research Group: P450 Lab
Project Period: 2018 - 2022
Research Sponsors: National Research Foundation of Korea
Project Supervisor: Prof. Chul-Ho Yun

CYP limit-overcoming research lab
Research Group: P450 Lab
Project Period: 2018 - 2021
Research Sponsors: National Research Foundation of Korea
Project Supervisor: Prof. Chul-Ho Yun

Cytochrome P450 Based Development of Bioactive Materials from Phytochemicals
Research Group: P450 Lab
Project Period: 2018 - 2020
Research Sponsors: Rural Development Administration, Republic of Korea
Project Supervisor: Prof. Chul-Ho Yun

Cytochrome P450 Cell Factory for Metabolite Synthesis using Biobrick Assembly
Research Group: P450 Lab
Project Period: 2016 - 2019
Research Sponsors: National Research Foundation of Korea
Project Supervisor: Prof. Chul-Ho Yun