

Pusan National University

Environmental Engineering

Environmental Engineering





Environmental Water Resource Lab.

Prof. Sanghyun Kim

Office : +82-51-510-2479

E-mail : kimsangh@pusan.ac.kr

• EDUCATION

- 1996 Ph.D. Purdue University, Department of Civil & Environmental Engineering
- 1992 M.S. Kyungpook National University, Department of Civil Engineering
- 1989 B.S. Kyungpook National University, Department of Civil Engineering

• CAREER

- 2007~present Professor, Pusan National University
- 2003~2007 Associate Professor, Pusan National University
- 1997~2003 Assistant Professor, Pusan National University
- 1996~1997 Research Associate, University of Illinois Urbana-Champaign
- 1994~1996 Research Associate, Purdue University

• PROJECTS

- Research on the Development of Monitoring and Prediction Technologies for Disinfection By-products in Water Supply Networks and Reduction Methods (2026-2027)
- Research Service for Establishing a Plan to Construct a Digital Twin for Busan's Water Supply Network (2024-2025)
- Intelligent Metaverse Urban Environment Safety Laboratory (2022-2025)
- Expansion and Analysis of Monitoring Systems for Hillslope Hydrological Environments under Extreme Climate Conditions (2016-2026)

• CONFERENCE

- Chair of the Water and Wastewater Committee, Korea Water Resources Association (KWRA)
- Member of the International Scientific Committee, Water System Design and Analysis (WSDA)
- Subject Editor, Korean Society of Agricultural and Forest Meteorology (KSAFM)
- Topic Editor, Energies (MDPI)

• PUBLICATIONS

- 96 papers in major international journals, 5 registered domestic/international patents, and 1 patent application
- Modeling Urban Temperature Using Measurements from Mobile and Stationary Monitoring Stations, 2024
- Generalized characterization of pipeline systems with air chamber through development of the dimensionless impedance response, 2024
- Identification of the Representative Point for Soil Moisture Storage Using a Precipitation History Model, 2023

• RESEARCH FIELD

Development of Monitoring and Prediction Technology for Disinfection By-products in Water Distribution Networks and Study on Reduction Measures

- We are conducting research to identify the formation mechanisms of disinfection by-products occurring in the supply and distribution networks after water treatment and to develop optimal reduction technologies. We analyze the spatiotemporal correlations between factors within the pipe network and DBP formation. In particular, we precisely predict non-linear water quality fluctuations in complex water systems through a hybrid prediction model that combines a physical model (EPANET-MSX) with AI. Based on this, we establish field-oriented reduction guidelines, such as optimizing re-chlorination during normal times and high-temperature emergencies, and focus on building a water management system for safe water supply to consumer terminals.

Stable Securing and Management of Water Resources Based on Digital Twin

- We conduct research to advance the operation of water distribution networks and improve trust in tap water through Digital Twin technology, which replicates physical water systems in a virtual world. We model pipe deterioration and breakage risks using real-time measurement data. Additionally, we are building a decision-making system that determines the optimal location and specifications of surge protection devices by analyzing transient flow and utilizing optimization algorithms. Through this, we realize a scientific data-driven management system that proactively predicts abnormal phenomena, responds quickly to accidents, reduces leakage, and cuts social costs.



Environmental Remediation Laboratory

Pf. Inseong Hwang

Office. +82-51-510-3523

E-mail. ihwang@pusan.ac.kr

Homepage. <https://remediate.pusan.ac.kr>

Research areas

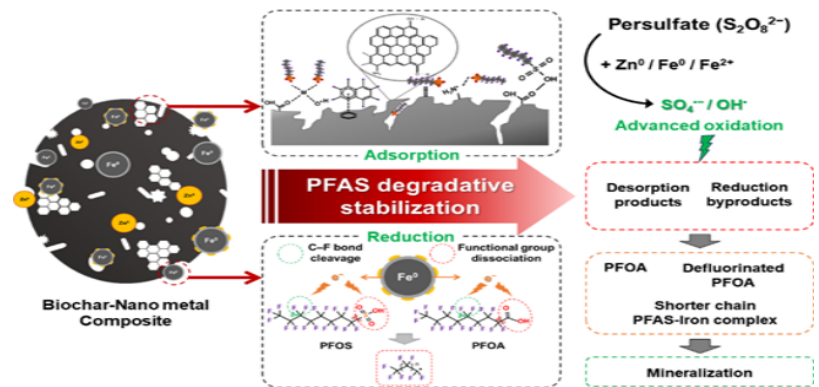
Simultaneous adsorption–degradation of PFAS using biochar–nanometal composites
Evaluation and control of the behavior of MP-DOM

Education

Ph.D. | Texas A&M Univ.
M.S. | Seoul National Univ.
B.S. | Seoul National Univ.

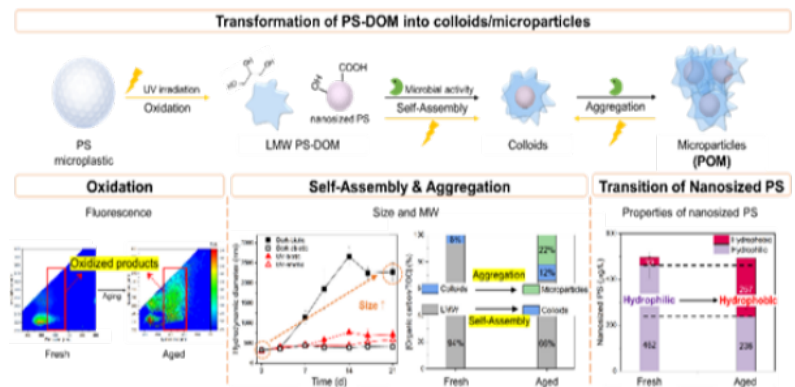
• Simultaneous adsorption–degradation of PFAS using biochar–nanometal composites

- Removing PFAS using biochar-supported nanometal composites composed of zero-valent iron (Fe) and zinc (Zn), and developing a hybrid treatment process integrating adsorption with oxidation–reduction reactions.
- Investigating the mechanisms of PFAS stabilization, degradation, and defluorination by composites, and evaluating their applicability and stability in environmental media.



• Evaluation and control of the behavior of MP-DOM

- Investigating the formation and behavioral characteristics of microplastic-derived dissolved organic matter (MP-DOM) under various conditions, including UV irradiation, microbial activity, and plastic type, as well as their environmental impacts.
- Examining the influence of MP-DOM on the formation and behavior of other contaminants, such as disinfection by-products.



• WORKING EXPERIENCES

- 2013-present Prof., Environmental Eng., Pusan National Univ. (PNU)
- 2008-2013 Associate Prof., Environmental Eng., PNU
- 2004-2008 Assistant Prof., Environmental Eng., PNU
- 2025-present Korean Society of Soil and Groundwater Environment, President

• PUBLICATIONS

- Enhancement of persulfate/Fe²⁺ oxidation process by water-extractable organic matter in sediment. *Journal of Hazardous Materials*, 2025
- Silica-coating-mediated depassivation of nanosized zero-valent iron by Fe (II) at circumneutral pH. *Water Research*, 2025
- Roles of silica coating on nanosized zero-valent iron in sequential reduction–oxidation process in a system containing persulfate. *Journal of Hazardous Materials*, 2024
- Stabilization of hydrophobic organic compounds in sediment using alkali-activated rice husk biochar: Enhancement of sorption by dissolved organic matter. *Chemical Engineering Journal* 2023.

• PROFESSIONAL MEMBERSHIP

- President, Korean Society of Soil and Groundwater Environment
- Vice President, Korean Society of Sediment Environment and Dredging
- Chair, Busan–Ulsan–Gyeongnam Regional Chapter, Korean Society of Water and Wastewater
- Member, American Chemical Society (ACS)

• PROJECTS

- Development of simultaneous PFAS adsorption–degradation technology using biochar–nanometal composites, National Research Foundation of Korea (NRF), 2025–2028
- Field demonstration of in situ remediation technology for subsurface organic contaminants: Advancement of oxidation–reduction reactive zones and permeable reactive barrier systems, Korea Environmental Industry & Technology Institute (KEITI), 2023–2025
- Development of in situ remediation technology for contaminated sediments using eco-friendly high-efficiency stabilizer injection and ecological functions of benthic organisms, Korea Environmental Industry & Technology Institute (KEITI), 2021–2025



Environmental Chemistry and Health Lab.

Prof. Jeong-eun Oh

Office. +82-51-510-3513

E-mail. jeoh@pusan.ac.kr

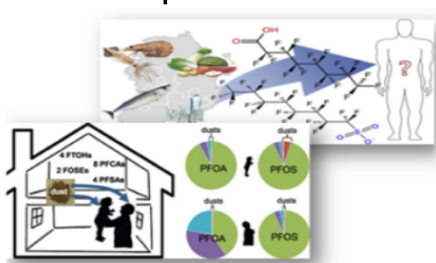
• EDUCATION

- 2001 Ph.D. POSTECH, The Division of Environmental Science and Engineering
- 1996 M.S. Seoul National University, Graduated School of Environmental Studies
- 1994 B.S. Ewha University, Department of Chemistry

Environmental fate



Human Exposure Assessment



• RESEARCH FIELD

1. Establishment of Analytical Methods for Trace Contaminants in Environmental and Biological Matrices
 - Our research focuses on developing analytical methods for various new harmful substances in environmental and human samples. These substances include per- and polyfluoroalkyl substances (PFASs), which are a recent social issue, as well as persistent organic pollutants (POPs), pesticides, and chlorinated paraffins (CPs)
2. Monitoring and Bioaccumulation Study on Environmental Micropollutants
 - We monitor trace pollutants in various environmental media such as water, soil, organisms, and air. Through this monitoring, we identify the current pollution levels.
 - Furthermore, we study the environmental behavior of pollutants and evaluate the extent to which they accumulate in aquatic organisms.
3. Environmental and Human Health Risk Assessment
 - Based on the results of environmental and human monitoring, we perform exposure pathway modeling and risk assessments.
4. Identification of Unknown Substances through Suspect/Non-Target Screening (SNTS)
 - We develop SNTS methods that use high-resolution mass spectrometry (HRMS) to identify unknown substances.
5. Estimation of Psychotropic Pharmaceuticals and Substance Abuse Consumption through Wastewater-Based Epidemiology (WBE)
 - We estimate community-level consumption patterns of psychotropic drugs and substances of abuse based on wastewater analysis.
 - We also monitor drug use within specific communities, such as military bases.

• PROJECTS

- NIER, Study on the Environmental Behavior of Potential Candidate Substances in Response to the Stockholm Convention (2024–Present)
- NIER, Study on Biomagnification and Monitoring of Contaminants of Emerging Concern (2024–Present)
- KEITI, Development of Predictive Technology for Transformation of Perfluoroalkyl Substances (PFAS) and Their Precursors in Drinking Water Treatment Processes (2026–Present)
- KEITI, Development and Monitoring of an Analysis Method for Priority Substances Based on Bioaccumulation in Multiple Media (2025–Present)
- NRF, Development and Application of Techniques for Assessing Human Exposure to Chemicals and Health in Local Communities ; A Wastewater-Based Epidemiology and Machine Learning Approach (2024–2027)
- MND, Feasibility Study on the Application of Illicit Drug Testing Based on Military Wastewater Systems (2025–Present)

• PUBLICATIONS

- Publications
 - ↳ Over 45 SCI-indexed papers have been published within the last five years. (SCOPUS, 2026.03)
 - ↳ Total Document: 192, Total Citation: 9659
 - ↳ H-index : 57, i10-index : 123
- Books
 - ↳ Emerging Halogenated Flame Retardants (Elsevier, 2020)

• ACADEMIC ACTIVITIES

- Associated Editor, Water Research, Environmental Advance (Elsevier)
- Editor-in-Chief, Journal of Environmental Analysis
- Editorial Board Member, Environmental Nanotechnology, Monitoring and Management (Elsevier Journal), Emerging Contaminants (Journal)
- Guest Editor, Science of The Total Environment (STOTEN), Chemosphere, Environmental International
- Editor, Environmental Engineering Research (EER), Official Journal of the Korean Society of Environmental Engineers (KSEE)



Lab. For Environmental Microbiology & Energy

Prof. Taeho Lee

Office. +82-51-2465 | Lab. +82-51-510-1708
E-mail. leeth55@pusan.ac.kr
Homepage. <https://leme.pusan.ac.kr>

RESEARCH FIELD

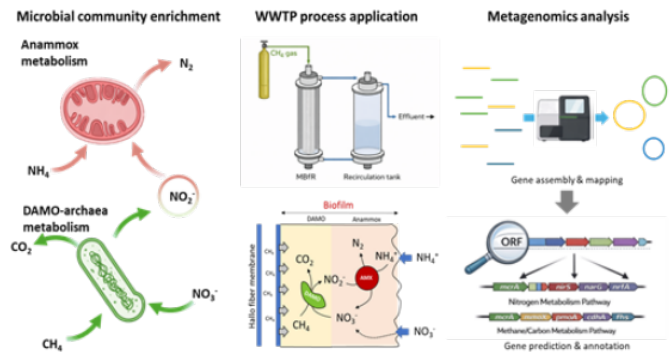
Anammox-based carbon-neutral WWTP
Microalgae-based resource-circulating biorefinery

EDUCATION

1999, PhD, Osaka Univ., Japan, Env. Eng.
1995, MS, Pusan Natl. Univ., Korea, Env. Eng.
1993, BS, Pusan Natl. Univ., Korea, Env. Eng.

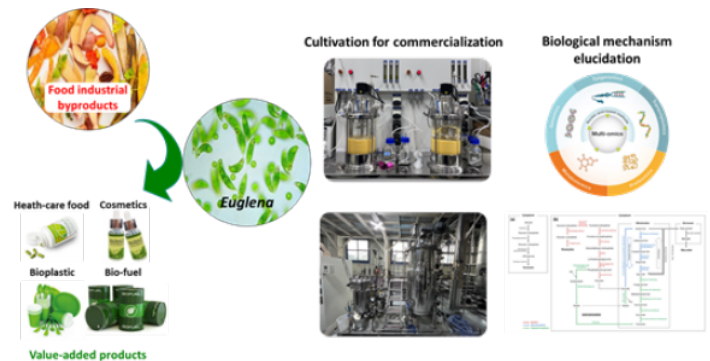
• Anammox-based Carbon-neutral Nitrogen Removal Process

- Enrichment of anaerobic methane/ammonia-co-oxidizing culture
- Development of single-stage partial nitritation/anammox (PN/A) process
- Scale-up operation of an MBfR-based process for energy-efficient N removal and greenhouse gas mitigation
- Metagenomics to analyze microbial community dynamics and nitrogen removal mechanisms



• Microalgae-Based Resource-Circulating Biorefinery

- Pilot-scale demonstration of Euglena fermentation for functional food and cosmetic ingredient production
- Valorization food industry byproducts to produce precursors of bioplastic and sustainable aviation fuel from Euglena mutant
- Multi-omics technologies to monitor and control intracellular carbon flux in Euglena under different cultivation conditions



• CAREER

- 2000~2003 Researcher, National Institute of Advanced Industrial Science and Technology (AIST), Japan
- 2005~2007 Professor, Andong National University
- 2007~Present Professor, Pusan National University
- 2012~2021 Adjunct Professor, Kyushu University, Japan

• RESEARCH ACHIEVEMENTS

- Published more than 100 SCI papers, 20 patents
- Iron (III)-EDTA Driven Acceleration of DAMO Archaea-Anammox Bacteria
- Enrichment Toward Energy-efficient Nitrogen Removal and CH₄ Mitigation (Yoon et al., 2026, Chemical Engineering Journal)
- Carbon flux engineering in Euglena gracilis: CO₂ and glucose-driven enhancement of wax ester production for sustainable aviation fuel (Kim et al., 2026, Biomass & Bioenergy)

• CONFERENCE

- Vice-president, Korean Society of Environmental Engineers (2018-present)
- Board member, International Society of Microbial Electrochemical Technology (2017-2021)
- Associate Editor, Algal Research (2023-Present)

• PROJECTS

- Sustainable aviation fuel (Wax ester) production from Euglena sp. by recycling CO₂ and food industrial byproducts (2026-2029, National Research Foundation of Korea)
- Standardization of Process Technology for Large-Scale Beta-Glucan Production (2022-2026, Korea Institute of Marine Science & Technology Promotion)
- Development of the DAMO/Anammox-MBfR Biofilm Process for Mainstream Anammox Technology (2023-2025, SAMSUNG E&A)



Particle Lab.

Prof. Kuk Cho

Office : +82-51-510-2418
E-mail : kukcho@pusan.ac.kr

• EDUCATION

- 2005 Sc.D. Washington University in St. Louis, Environmental Engineering
- 2002 M.S. University of Florida, Environmental Engineering
- 1996 B.S. Korea University, Department of Environmental Engineering

• CAREER

- 2011~present Professor, Pusan National University
- 2006~2011 Senior Researcher, Korea Institute of Geoscience and Mineral Resources
- 2005~2006 Postdoctoral Researcher, University of Maryland, College Park, USA

• PROJECTS

- Development of technologies for integrated management of fine particles in southeast Korea, National Research Foundation of Korea, 2020-2029
- MOFs functionalized with ferrocyanide/ion-imprinting polymer and their implementation structures for selective capturing for cesium, National Research Foundation of Korea, 2019-2022

• PROFESSIONAL SOCIETY

- Korean Society of Environmental Engineering (KSEE)
- Korean Society for Atmospheric Environment (KOSAE)

• PUBLICATIONS

- Source-resolved PM_{2.5} oxidative potential predicts global mortality burden: A machine learning approach, Journal of Environmental Management, 2026
- Selective Co²⁺ recovery using MgNa₃H(PO₄)₂ adsorbent from water, Chemical Engineering Journal, 2024
- Caesium adsorption on a zeolitic imidazolate framework (ZIF-8) functionalized by ferrocyanide, Journal of Colloid and Interface Science, 2021

• RESEARCH FIELD

Air Pollutants and Their Health Effects

- Collection of particulate matter, followed by detailed quantification of organic and inorganic components, including health-relevant properties such as oxidative potential (OP).
- Data-driven investigation of atmospheric aging, metal-catalyzed reactions, and secondary formation processes that modify pollutant composition and enhance OP and other toxic components.
- Integration of statistical and machine learning models to associate exposures and source contributions with health outcomes and premature mortality.

Water Remediation & Resource Recovery

- Designing and synthesis of functionalized particles for water treatment applications.
- Efficient removal of persistent organic pollutants (e.g., PFAS) and toxic metal contaminants (e.g., Cs) from contaminated water.
- Recovery of critical and strategic metals (e.g., rare earth elements (REEs), Li, and Co) from aqueous matrices and electronic wastes.
- Development of integrated treatment platforms that simultaneously enable pollutant removal, resource recovery, and environmental restoration, supporting sustainable water management and circular economy principles.



Photon Energy Upconversion Lab.

Prof. Jae-Hyuk Kim

Office : +82-51-510-2312

E-mail : jaehyuk.kim@pusan.ac.kr

• EDUCATION

- 2009 Ph.D. Seoul National University, Department of Chemical and Biological Engineering
- 2002 B.S. Seoul National University, Department of Chemical and Biological Engineering

• CAREER

- 2014~present Professor, Environmental Engineering, Pusan National University, Korea
- 2013 – 2014 Postdoctoral associate, Department of Chemical and Environmental Engineering, Yale University, US
- 2010 – 2013 Postdoctoral researcher, School of Civil and Environmental Engineering, Georgia Institute of Technology, US
- 2009 – 2010 Postdoctoral researcher, School of Chemical and Biological Engineering, Seoul National University, Korea

• PROJECTS

- Development of Magnetic Hollow Mesoporous Silica Micro-Extractors for Lithium Recovery, National Research Foundation (NRF), 2026~2029
- Development of hollow mesoporous silica rod based on raphide and its application as a new skin care material, Commercializations Promotion Agency for R&D Outcomes (COMPA), 2025~2026
- Development of rapid multiplex kit for detection of infectious diseases based on high efficiency upconversion nanophotonic material, National Research Foundation (NRF), 2021~2024
- Development and Application of Organic Upconversion Nano/micro Materials based on Triplet-fusion, National Research Foundation (NRF), 2021~2024

• CONFERENCE

- The Korean Society of Industrial and Engineering Chemistry

• PUBLICATIONS

- 47 publications in major Korean and international academic journals
- Structurally engineered yolk-shell mesoporous silica rods with liquid and nanoparticle cargo, Materials Horizons, 2026
- Yolk-shell nanoparticle-loaded multifunctional membrane with photothermal and advanced oxidation properties, Chemical Engineering Journal, 2025
- Photothermal cancer treatment with laser-activated yolk-shell nanoparticles and synergistic combination of chemotherapy, Chemical Engineering Journal, 2025

• RESEARCH FIELD

Upconversion

- Our research group is currently focusing on exploring the unconventional photochemical phenomenon, called upconversion (UC). UC refers to a process that achieves photon-frequency amplification or anti-Stokes shift via sequential absorption of two or more photons with lower energy and subsequent emission of one higher energy photon. Our research group is specialized in making highly efficient and photochemically stable TTA-UC materials with various configuration, that includes nano- or microcapsule, thin film, micro-patterned film, or freely-designed shapes.

Silica-based nano- and micro-materials

- We are also engaged in the precise design of the morphology and structure of silica-based nano- and micro-materials and in extending these materials toward a broad range of functional applications. By developing versatile particle platforms for optics, catalysis, membranes, and sensors, and by systematically elucidating structure-property-performance relationships, we aim to expand the design principles and application potential of noble silica-based functional materials.



Nanoparticle/Aerosol Research Lab.

Prof. Changhyuk Kim

Office : +82-51-510-2417

E-mail : changhyuk.kim@pusan.ac.kr

• EDUCATION

- 2016 Ph.D. University of Minnesota, Mechanical Engineering
- 2007 M.S. Seoul National University, Mechanical and Aerospace Engineering
- 2005 B.S. Seoul National University, Mechanical and Aerospace Engineering

CAREER AND AWARDS

- 2018 – present Professor, Department of Environmental Engineering, Pusan National University
- 2016 – 2018 Postdoctoral Researcher, California Institute of Technology (Caltech)
- 2010 – 2011 Researcher, Institute of Advanced Machinery and Design, Seoul National University
- 2007 – 2010 Researcher, Samsung SDI Central Research Institute
- 2026 Korea Air Cleaning Association, Chairman Award
- 2018 American Carbon Society, Outstanding Reviewer Award
- 2015 American Filtration Society Fellowship Award

• PROJECTS

- GLOCAL Lab. – Research Center of Energy Convergence Technology. 2025~2034
- Outstanding Young Researcher Grant – Development of a model to estimate the quantity of condensable particulate matter based on the formation mechanism. 2022~2027
- Development of buffer functional materials and active utilization system for urban climate change. 2023~2027
- Investigation and application of physical properties of PM_{2.5} in Northeast Asia. 2020~2025

• SOCIETY SERVICES AND MEMBERSHIPS

- Korean Association for Particle and Aerosol Research (KAPAR), Director
- The Korean Society of Mechanical Engineers (KSME), Thermal Engineering Division, Director
- Korean Society for Atmospheric Environment (KOSAE), Director
- Korea Air Cleaning Association (KACA), Certification and Evaluation Committee
- Nakdong River Basin Environmental Office – Reviewer for Green Company Evaluation

• PUBLICATIONS

- 70+ papers in major domestic and international journals, 25+ registered patents in Korea and abroad
- Development of optimized conical diffuser inlet continuous-flow reactor for investigation of aerosol formation and growth mechanism, 2026, Process Safety and Environmental Protection
- Physicochemical characteristics and health impacts of ultrafine particles emitted from small home appliances equipped with heating coils and brushed motors, 2025, Journal of Hazardous Materials
- New particle formation characteristics and mechanisms of secondary PM_{2.5} in Seoul and Seosan in the Republic of Korea during 2020-2022, 2025, Urban Climate
- Real-time detection of vehicle-originated condensable particulate matter through thermodenuder integrated aerosol measurement method at tailpipes, 2022, Environmental Research

• RESEARCH FIELD

Measurement/Control of Air Pollutants

- We have investigated the physicochemical properties of PM_{2.5} and gaseous pollutants (SO_x, NO_x, VOCs) as well as their effects on the climate change and human health. In addition, technologies and systems for reducing air pollutants have been developed, which contribute to the related air cleaning industries.

Formation and Growth of Ultrafine Particles

- We have studied the mechanisms for condensable particulate matter (primary) and ultrafine secondary aerosol particles through rapid condensation and photochemical reactions, respectively. Technologies for forecast and prediction also have been developed based on the mechanism study to estimate air pollution evolution, dispersion, and extinction.

Synthesis of Functional Nanoparticles

- We also have synthesized functional nanoparticles by deploying low-carbon eco-friendly technologies. These novel materials have been applied to high-efficiency environmental remediation and carbon capture for mitigating the climate change as well as materials/modules/systems for the nano-energy and human health.

Life Cycle Assessment

- We have conducted quantitative evaluation of environmental impacts across the full life cycle of products and processes from raw material extraction to disposal for achieving carbon neutrality and sustainable industrial transition.



Water Treatment and Reuse Lab

Prof. Sanghyun Jeong

Office : +82-51-510-2895

E-mail : sh.jeong@pusan.ac.kr

• EDUCATION

- 2013 Ph.D. Univ. of Technology Sydney, Environmental Engineering
- 2009 M.S. Univ. of Sci. & Tech, Civil and Environmental Engineering
- 2005 B.S. Hong-ik Univ, Chemical Engineering

• CAREER

- 2019~present Professor, Pusan National University
- 2017~2019 Research Professor, Sungkyunkwan University
- 2015~2017 Post-doc, King Abdullah University of Science and Technology
- 2013~2014 Research Associate, University of Technology, Sydney

• PROJECTS

- 2025~2035 Integrated Water Treatment Technology for Carbon Neutral 2050 (Set-One Net-Zero Project) (NRF)
- 2024~2028 Development of Environmental Nanomaterial-based Ceramic Membranes for Public Safety and Resource Recovery from Emerging Industrial Wastewater (Nano & Material Technology Development Program, NRF)
- 2022~2026 Development of High Technology Materials Processing from Electronic Wastes by Utilizing Natural Resources (KETEP)
- 2022~2025 Development of Complex Water Treatment and Oil Removal Facility for Produced Water Systems (KAIA)

• ASSOCIATIONS

- Associate Editor (2025–Present), Process Safety and Environmental Protection
- Executive Director of Finance (2024–2025), Korean Society of Environmental Engineers
- Branch Manager(BUG) (2024–2025)/ Academic Chair (2026), The Membrane Society of Korea
- Senior Vice Chair of Academic Committee (2025–2026), Korea Society of Waste Management
- Editorial Board Member, Korean Society of Water Environment (2024–Present)
- Review Board, National Strategic R&D Programs Headquarters (NRF) (2025–Present)

• PUBLICATIONS

- Research Metrics: Over 165 SCIE papers, 15+ Patents, H-index: 53
- Recognition: Named in World's Top 2% Scientists (2024, 2025)
 - ↳ Self-cleaning pH-responsive polyvinyl alcohol/chitosan hydrogel membrane for reusable and efficient dye removal, Chemical Engineering Journal, 2025
 - ↳ Effective removal of Micro- and nanoplastics from water using Iron oxide nanoparticles: Mechanisms and optimization, Chemical Engineering Journal, 2025

• RESEARCH FIELD

Smart Water Treatment for Smart Water Cycle and Supply

- Our research develops next-generation, energy-efficient water treatment technologies that enable the sustainable circulation of water, energy, and valuable resources from diverse sources while controlling emerging contaminants such as PFAS and microplastics. We focus on resource-recovery-based water management systems that enhance both economic viability and environmental sustainability for future water-resilient cities.

Advanced Membrane Technologies and Pollutant Control

- By integrating advanced materials with innovative process design, we develop next-generation membrane technologies based on precise characterization of membrane fouling mechanisms using advanced monitoring and analytical techniques. Our research focuses on active fouling control strategies that improve the stability and operational efficiency of membrane systems across diverse water treatment applications.

Sustainable Industrial Wastewater Reuse and Resource Recovery

- As water resources become increasingly limited, the importance of zero liquid discharge (ZLD) systems and industrial wastewater reuse is rapidly growing in the industrial sector. Our research develops environmentally friendly treatment processes that enable water reuse from diverse industrial wastewaters while minimizing environmental impacts through high-efficiency, low-energy process optimization.



Environmental Intelligence Lab.

Prof. JongCheol Pyo

Office : +82-51-510-2392

E-mail : seongheon.cho@pusan.ac.kr

Homepage: <https://eilab.creatorlink.net/>

• EDUCATION

- 2020 Ph.D. Ulsan National Institute of Science and Technology, Department of Environmental Engineering
- 2015 B.S. Ulsan National Institute of Science and Technology, Department of Chemical Engineering

• CAREER

- 2022~present Assistant Professor, Pusan National University
- 2021~2022 Senior Researcher, Center for Environmental Data Strategy
- 2020~2021 Post-doctoral researcher, Environmental Engineering, Ulsan National Institute of Science and Technology

• PROJECTS

- Development of a Real-Time Detection and Demonstration System for harmful algal bloom Using Low-Power Embedded AI Technology, National Research Foundation of Korea (2026-2031)
- Development of integrated water environment technology using remote sensing and artificial intelligence, National Research Foundation of Korea (2021-2026)
- Artificial Intelligence-based Sustainable Water Resources Management in the Philippines, National Research Foundation of Korea (2024-2027)

• CONFERENCE

- Korean Society of Environmental Engineering(KSEE)
- Korean Society on Water Environment (KSWE)
- American Geophysical Union (AGU)
- European Geophysical Union (EGU)

• PUBLICATIONS

- 43 SCI papers have been published (2021-2026)
- Development of deep learning quantization framework for remote sensing edge device to estimate inland water quality in South Korea, Water Research, 2025
- Development of deep neural network for improving algal pigment prediction with impact of weir retention time, Ecological Informatics, 2025

• RESEARCH FIELD

Research on artificial intelligence technology development for water environment

- We are conducting research to improve and verify the accuracy of deep learning models that can analyze and predict nutrients, harmful algae, fecal coliforms, organic carbon, flowrate, and salinity in time and space, which determine the health of aquatic ecosystems in freshwater and brackish water environments.

Research on Physical AI development for demonstrating AI model to edge device

- We are conducting validation research to apply the developed deep learning model to actual water environment problems. We are researching the development of AI embedding technology. Through the stages of deep learning model quantization, AI chip design and synthesis, AI chip inference acceleration, and Edge AI performance verification, we are researching the development of a pipeline that analyzes the spatiotemporal status of water environments in real time based on low power consumption.

Research on fusion of remote sensing, physical-based modeling and AI

- To overcome the limitations of long-term prediction performance in AI models, we are conducting research that processes and analyzes remote sensing data such as drones and satellites (Sentinel, Landsat), and integrates it with physical modeling such as hydrological models (SWAT) and water quality models (CE-QUAL-W2, EFDC).



Waste Valorization Lab.

Prof. Seong-Heon Cho

Office : +82-51-510-2403

E-mail : seongheon.cho@pusan.ac.kr

• EDUCATION

- 2020 Ph.D. Hanyang University, Department of Earth Resources and Environmental Engineering
- 2015 M.S. Sejong University, Department of Energy and Environment
- 2015 B.S. Sejong University, Department of Energy and Environment

• CAREER

- 2024~present Assistant Professor, Pusan National University
- 2023~2024 Postdoctoral Associate, Institute for Chemicals and Fuels from Alternative Resources (ICFAR), Western University, Canada

• PROJECTS

- Valorization of Plastic Wastes based on the CO₂-assisted Thermo-chemical Process)

• CONFERENCE

- Korean Society of Environmental Engineering(KSEE)
- Korean Society of Waste Management (KSWM)
- Korea Society of Clean Technology

• PUBLICATIONS

- 24 SCI papers have been published (2021-2026)
- Bioalcohol production from acidogenic products via a two-step process: A case study of butyric acid to butanol, Applied Energy, 2019
- Virtuous utilization of carbon dioxide in pyrolysis of polylactic acid, Chemical Engineering Journal, 2023
- Valorization of cattle manure via a thermo-chemical process, Chemical Engineering Journal, 2024

• RESEARCH FIELD

Waste Valorization through Thermo-chemical Process

- We are conducting research to achieve carbon neutrality and respond to energy demand by converting various wastes, including biomass and plastics, into synthetic gas (H₂ and CO) and value-added chemicals through thermo-chemical processes (Pyrolysis and Gasification).

CO₂ utilization in Thermo-chemical Process

- Our laboratory conducts research on utilization of CO₂ in thermo-chemical process to make more environmentally-benign and efficient process. The use CO₂ (greenhouse gas) in the thermo-chemical process can enhance productivity of synthetic gas and carbon efficiency. Additionally, we are also conducting research on the fabrication and application of catalysts to promote the reactivity of CO₂.

Production of Value-added Chemicals from Biomass

- We are conducting research on techniques to convert various useful compounds in waste biomass into biofuels or platform chemicals for chemical synthesis. Additionally, our lab is investigating the recycling of by-products from the bio-refinery process through thermo-chemical processes. Integrating the bio-refinery platform with thermo-chemical processes can enhance overall carbon efficiency.