



Jung Rae Kim, Ph.D.

Professor, School of Chemical Engineering

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Short Bio

Dr. Jung Rae KIM is Professor of School of Chemical Engineering at the Pusan National University (PNU), Korea. He received his BS and MS degree in Chemical Engineering at Pusan National University, Korea, and Ph.D. in Environmental Engineering at Pennsylvania State University, USA in 2006 with the thesis of microbial fuel cell. Then he moved into Sustainable Environment Research Centre (SERC), Faculty of Advanced Technology in University of South Wales, United Kingdom. He conducted UK National EPSRC Supergen Biological fuel cell project as senior research fellow in 2006-2012. In September 2012, He joined the School of Chemical Engineering as a faculty member, and opened Bioenergy and Bioprocess Engineering Lab at PNU. His main research aim is to develop sustainable bioelectrochemical system for bioenergy and useful chemical production. Recently, he has carried out several national and industrial research projects of valorization of C1 gases (CO₂/CO/CH₄), and e-biorefinery for platform chemical productions using bioelectrochemical concept as well as microbial fuel cell. He has published 100 SCI(E) research papers with citing more than 7000 (h-index: 39).

Research Specialties and Interests

- Bioenergy production: biogas and bioelectricity, and synthesis of platform chemicals
- Metabolic engineering for electrochemically active microorganism
- C1 biorefinery for bioenergy and platform chemicals
- Environmental biotechnology and biochemical engineering
- Bioelectrochemical system: Enzyme and whole cell based biosensor
- Bacterial redox sensor
- Biodegradation of bioplastic and polymer
- Design of environmentally sustainable system and bioprocess

Academic History

2006 Ph.D. Environmental Engineering, The Pennsylvania State University, USA (Advisor: Prof. Bruce E. Logan)

Dissertation: "Development of Microbial Fuel Cells using Efficient Acclimation and Various Substrates"

2000 M.S. Chemical Engineering, Pusan National University, Korea

(Advisor: Prof. Sunghoon Park)

Dissertation: "Hydrogen Production by Biological Water-Gas Shift Reaction with a New Chemoheterotrophic Bactrium *Citrobacter* sp. Y19"

1998 B.S. Chemical Engineering, Pusan National University, Korea.

Professional Experiences

- Associate Dean of Graduate School of Industry and Environment (March. 2020 – Feb. 2022)
- Head of School of Chemical and Biomolecular Engineering (August 2020 – August 2021)
- Visiting Scholar, Washington State University, USA (September 2018 – August 2019)
- Head of School of Chemical and Biomolecular Engineering, Pusan National University (Feb. 2017- Feb. 2018)
- Director of Audit of Pusan National University (Sep. 2016 – August 2018)
- Senior Research Fellow, Faculty of Advanced Technology and Sustainable Environment Research Center (SERC), University of Glamorgan (present University of South Wales), UK (Feb. 2006- Aug. 2012) (Permanent Post)
- Research Assistant, Pennsylvania State University (Sep. 2002 – Sep. 2006)

Research Projects

- Bioelectrochemical system for Power to Product CO₂ Valorization. PI. Mid-career Researcher Program. National Research Foundation of Korea (NRF). Mar. 2021 – Feb. 2025.
- Biogas upgrading to CH₄ from CO₂ using bioelectrochemical system. PI. GS E&C. Dec. 2020 – Nov. 2021.
- Bio-Electrosynthetic CO₂ valorization for value-added chemical production. PI. Korea-Sweden International Project (STINT), National Research Foundation of Korea (NRF). April. 2021 – Mar. 2024
- Isolation of strain of bioelectrochemical system based CO₂ conversion and Genome based *in silico* metabolic model. Co-PI. Korea Institute of Energy Research (KIER). Mar. 2017 – Feb. 2022
- C1 Gas Refinery Program: Bioelectrochemical system based novel biological CO conversion and biorefinery process. National Research Foundation of Korea (NRF), Ministry of Science, ICT & Future Planning. April, 2018 – Mar. 2021.
- Mid-career Researcher Program: Bioelectrochemical regulation of bacterial redox state and transcription for active control of metabolic pathway. National Research Foundation of Korea (NRF). Mar. 2018 – Feb. 2021.
- C1 Gas Refinery Program: Development of novel screening method of CO conversion strains and biorefinery process using Bioelectrochemical system and Raman spectroscopy, National Research Foundation of Korea (NRF), Ministry of Science, ICT & Future Planning. May, 2016-Dec. 2017.
- Mid-career Researcher Program: Bioenergy production using algal biomass, the National Research Foundation of Korea (NRF). Dec. 2013 – Nov. 2016.
- Analysis of electrochemically active strain using SPM, Korea Institute of Materials Science. Jan. 2014 – Dec. 2015.
- Leaders Industry-university Cooperation Project: Biodegradability test and its application to develop PLA polymer composite, the Ministry of Education (MOE), May. 2014- Jan. 2015.
- MFC Research and Business Development center (R&BD): Electrical Control Strategy for Scaled-up Microbial Fuel Cell System, K-water, Hanhwa E&C and Taeyoung E&C, July 2014-Jun. 2015.
- UK Global Partnership Funding (GPF), Development of Bioelectrochemical System for the biosynthesis of platform chemicals, Department of Business, Innovation and Skills (BIS), UK. April, 2011 – March, 2013.
- Quorum sensing MFC, The Feasibility Study for Korea-UK Joint R&D Project, Korea Institute of Advancement of Technology (KIAT), August. 2010 – Nov. 2010.
- The Supergen4 Biological Fuel Cells Consortium (renewal) EP/H019480/1, Engineering and Physical Science Research Council (EPSRC), UK, May. 2010 - present.

- The Supergen Sustainable Hydrogen Energy Consortium (SHEC), EP/E040071/1, Engineering and Physical Science Research Council (EPSRC), UK Oct. 2008- present.
- The Supergen5 Biological Fuel Cells Consortium EP/D047943/1, Engineering and Physical Science Research Council (EPSRC), UK, Oct. 2006- April. 2010.

Activities (Editorial board member)

- Editor of Journal of Industrial Chemistry and Engineering (Aug. 2020 – present)
- Editorial board member of Biotechnology and Bioprocess Engineering (Aug. 2017 – present)
- Editorial board member of Energies (Jan. 2014 – present)
- Editor of Clean Technology (Aug. 2015-present)

Activities (Academic society)

- General Affairs of The Korean Society of Clean Technology (Jan. 2021 – Dec. 2021)
- Director of Education & Cultural Committee of The Korean Society for Biotechnology and Bioengineering (Jan. 2021 – Dec. 2021)
- Director of public relations committee of The Korean Society for Biotechnology and Bioengineering (Jan. 2014 – Dec. 2017)
- General Affairs of The Busan-Gyeongnam Branch of The Korean Institute of Chemical Engineers (Jan. 2014 – Dec. 2015)
- General Affairs of The Busan-Ulsan-Gyeongnam Branch of The Korean Society of Industrial and Engineering Chemistry (Jan. 2016 – Dec. 2017)

Activities

- **Membership:** Korean Society of Biotechnology and Bioengineering (Sep. 2012-present), Member of Royal Society of Chemistry (MRSC) (Feb. 2011- present), and Member of Cardiff Scientific Society (Sep. 2009 - present), Deputy leader, SIG-E (Special Interest Group-Energy and Environment), Korea Science and Engineering Association in UK (KSEAUK). (Sep. 2009-present).
- **Consultant:** Information Provider (IP), DICER, (March. 2010- present) and KOSEN (Korean Scientists and Engineers Network, KISTI) (Sep. 2007 – present)
- **Editorial Board Member:** Environmental Sciences, Journal of Environment, and Journal of Wastewater Treatment & Analysis (June. 2010 - present)
- **Conference Organizer:** Network Event at 3rd International MFC Conference supported by Global Partnership Fund from UK Department of Business, Innovation and Skill (BIS). Leeuwarden, Netherland (June 06th – 08th 2011), and Organizing Committee member for 2nd Microbial Fuel Cell International Symposium, GIST, Kwangju, June 10-12 (2009)
- **Journal Reviewer:** Environmental Science and Technology, Applied Environmental Microbiology, Applied Microbiology and Biotechnology, Biotechnology and Bioengineering, Bioresource Technology, and Energy & Environmental Science, Water Research, International Journal of Hydrogen Energy, Lap on a Chip, Biotechnology and Bioprocess Engineering, Journal of Environmental Monitoring, Energy and Environmental Science (Mar. 2006 – present)
- **Grant Reviewer:** Natural Sciences and Engineering Research Council (NSERC), Canada; Engineering and Physical Sciences Research Council (EPSRC), United Kingdom.
- Secretary of Korean Student Club in Environmental Engineering Division of Penn State University. (Aug. 2003 – Nov. 2005)
- Student Member of Korea Institute of Chemical Engineers (KICChE) and Korean Society of Biotechnology and Bioengineering (KSBB). (April. 1998 – Feb. 2000)
- Manager of Graduate Student Council of Chemical Engineering of Pusan National University. (Mar. 1998 – Feb.1999)

- Member of Pusan East Rotaract (volunteer club for social service), Rotary International District 3660 (Mar. 1991 – Feb. 1998), Manager for General Affair (1994)

Journal Papers (Selected recent paper)

120 SCI(E) papers, Total citation of 7000, h-index 39

Papers and citation link: <http://scholar.google.co.uk/citations?user=fKpBuFYAAAAJ&hl=en>

Patent

Book Chapters

TAEHO LEE, AKIHIRO OKAMOTO, SOKHEE JUNG, RYUHEI NAKAMURA, JUNG RAE KIM, KAZUYAWATANABE, AND KAZUHITO HASHIMOTO. 2016. Microbial Electrochemical Technologies Producing Electricity and Valuable Chemicals from Biodegradation of Waste Organic Matters. MANUAL OF ENVIRONMENTAL MICROBIOLOGY, 4th Edition. ASM Press

Hawkes, F.R., Kim, J.R., Kyazze, G., Premier G.C. 2009. Feedstocks for BES conversion. In: Rabaey K. et al (Eds.) Bio-electrochemical Systems. From Extracellular Electron Transfer to Biotechnological Application. IWA Publishing, London. Publication Date: 15 Nov 2009, ISBN: 9781843392330

Articles and Proceedings

1. Premier, G.C., J.R. Kim, I. Michie, A. Popov, H. Boghani, K. Fradler, Richard M. Dinsdale, A.J. Guwy. 2012. Issues of scale in microbial fuel cell and bioelectrochemical systems. Submitted for publication
2. A Kaur, KR Fradler, HC Boghani, JR Kim, I Michie, RM Dinsdale, AJ Guwy, GC Premier. Operating strategies to improve performance and coulombic efficiency by selecting electrogens over methanogens in microbial fuel cells. 13th World Congress of Anaerobic Digestion Proceedings. June 25-28. Santiago de Compostela, Spain
3. Thanapalan, K, J. R. Kim, Carr, S., Zhang, F., Premier, G.C. 2011. Progress in the Development of Renewable Hydrogen Vehicles, Storage, Infrastructure in the UK: Hydrogen Centre in its early years of Operation. The 2nd International Conference on Intelligent Control and Information Processing.
4. Kim, J. R., 2010. Application of bioelectrochemical process for electricity generation and sustainable wastewater treatment. EKC2009. EKC 2009 Proceedings of the EU-Korea Conference on Science and TechnologySpringer Proceedings in Physics, 2010, Volume 135, 17-23, DOI: 10.1007/978-3-642-13624-5_2 Springer.
5. Premier, G. C., J. R. Kim, J. Massanet-Nicolau, G. Kyazze, S. Esteves, B. KV Penumathsa, J. Rodríguez, J. Maddy, R. M. Dinsdale, A. J. Guwy. 2010. Integration of biohydrogen, biomethane and bioelectrochemical systems, World Renewable Energy Congress XI. 25-30 September 2010, Abu Dhabi, United Arab Emirates
6. Logan, B.E., B. Min, J.R. Kim, J. Heilmann, S.E. Oh, H. Liu. 2005. Microbial power: Electricity generation from domestic and agricultural wastewaters using microbial fuel cells. Proceedings of the Water Environment Federation, WEFTEC 2005: Session 1, pp. 93-99.

Technical Reports

1. Sustainable Waste Reuse, Technical Report for Policy and Technology Implementation for Eco-city in Europe, Korea Institute of Science and Technology Information (KISTI). Feb 2011.
2. The Status of Disposal and Energy recovery of Municipal Solid Waste: Commercialization of Anaerobic Digestion Technology in Europe, Digital Information Centre for Environment Research (DICER), May 2010.

3. Sustainable Biorefinery Technology in EU, Technical Report for EU Energy and Environment Policy and Technology Development, Korea Institute of Science and Technology Information (KISTI). March 2010.
4. Bioenergy Policy and R&D in EU, Technical Report for EU Energy and Environment Policy and Technology Development, Korea Institute of Science and Technology Information (KISTI), March 2009.
5. Report for Energy and Environment Technical Committee of Korean Scientist and Engineers Association in UK, SK Energy, June 2009.
6. Supergen Project Theme: Supergen5 Biological fuel cell, Technical Report for EU Energy and Environment Policy and Technology Development, Korea Institute of Science and Technology Information (KISTI), December 2008.

Translation

1. Microbial fuel cell (in Korean). Jung Rae Kim, Booki Min, Sokhee Jung, Jeong-Dong Choi. Dong-Hwa Technology Publishing Co. (The Original: Microbial fuel cell, Bruce E. Logan, Wiley-Interscience 2008).

Bioenergy & Bioprocess Engineering Lab Homepage: <http://bioenergy.pusan.ac.kr/>

School of Chemical and Biomolecular Engineering Homepage: <https://chemeng.pusan.ac.kr/>

Pusan National University Homepage: <http://www.pusan.ac.kr>