Boram Gu

Associate Professor

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EDUCATION

Apr 2013–Mar 2017	**PhD in Chemical Engineering** **Imperial College London, London, United Kingdom**
· Thesis Title	Modelling of Reverse Osmosis Membrane Process and Transport Phenomena: from Feed Spacers to Large-Scale Plants
· Thesis Supervisors	Professor Xiao Yun Xu & Professor Claire S. Adjiman
Sep 2009–Aug 2011	**MSc in Chemical & Biological Engineering** **Korea University, Seoul, South Korea**
· Thesis Title	Forward Osmosis Desalination Process: Modelling and Simulation
· Thesis Supervisor	Professor Dae Ryook Yang
Mar 2004–Aug 2008	**BSc in Chemical & Biological Engineering** **Korea University, Seoul, South Korea**
· Thesis Title	Modelling of Physical Absorption into a Falling Liquid Film on a Vertical and Inclined Plate
· Thesis Supervisor	Professor Dae Ryook Yang

WORK EXPERIENCE

· **Sep 2020–present**	**Assistant Professor, Associate Professor** School of Chemical Engineering, Chonnam National University
· **Mar 2020–Jul 2020**	**Postdoctoral Researcher** Department of Chemical and Biomolecular Engineering, KAIST
· **Apr 2017–Nov 2019**	**Research Associate** Department of Chemical Engineering, Imperial College London
· **Sep 2011–Aug 2012**	**Research Assistant** Department of Chemical and Biological Engineering, Korea University

PUBLICATION

[†] co-first author, *corresponding author

Accepted or Published

· Jingyeong Im, Yu Zhu, Xiao Yun Xu, In Seok Jeong, **Boram Gu***, "Hemodynamic and oxygen transport analysis during VA-ECMO using single phase and multiphase CFD simulations", *accepted at Medical & Biological Engineering & Computing*.

· Jiun Yun, Kyung Hwan Ryu, **Boram Gu***, "Towards sustainable blue hydrogen: Integrating membrane-

based carbon capture and oxygen-enriched combustion", *Chemical Engineering Journal*, 525 (2025) 169850. https://doi.org/10.1016/j.cej.2025.169850

- Farshad Moradi Kashkooli, Ajay Bhandari, **Boram Gu**, Michael C Kolios, Mohammad Kohandel, Wenbo Zhan*, "Multiphysics modelling enhanced by imaging and artificial intelligence for personalised cancer nanomedicine: Foundations for clinical digital twins", *Journal of Controlled Release*, 386 (2025) 114138. https://doi.org/10.1016/j.jconrel.2025.114138

- Sunyoung Oh, Woo Hyung Park, Ik-Jong Choi, Jina Lee, Chanhun Park, Jun-Woo Kim, **Boram Gu***, "Recovery of Ammonia and Acetic Acid from Amino Acid Byproduct Using an Integrated RO and Evaporation System: Process Simulation, Energy Analysis, and Optimisation", *Separation and Purification Technology*, 362(2) (2025) 131751. https://doi.org/10.1016/j.seppur.2025.131751

- Seongeom Jeong, **Boram Gu***, Gyeong Hwan Choi, Chae Bin Kim, Sanghyun Jeong*, "CNT spacer-induced cooling crystallisation: a novel approach to mitigate membrane scaling in membrane distillation without chemicals", *npj Clean Water* 8 (2025) 62. https://doi.org/10.1038/s41545-025-00493-z

- Jingyeong Im†, Taeho Kwon†, Seungho Lee†, Donghan Kim, Seungho Lee, Hyungtae Cho, Wangyun Won*, **Boram Gu***, "Unveiling the impact of internal structure on boil-off gas generation in moving liquid hydrogen (LH2) transport trailer", *Renewable and Sustainable Energy Reviews*, 216 (2025) 115634. https://doi.org/10.1016/j.rser.2025.115634

- Ariyan Zare Ghadi, Jaeseok An, Taeho Kim, Jeongho Ko, Choongkyun Yeom, **Boram Gu***, "3D CFD Analysis of Geometrical Design Impact on Hydrodynamic Performance in Hollow Fiber Membrane Contactors", *Korean Journal of Chemical Engineering*, 42(2) (2025) 271-289. https://doi.org/10.1007/s11814-024-00345-5

- Seongeom Jeong, Hyeonseok Jeong, Chaebeen Park, **Boram Gu**, Sanghyun Jeong*, "Effective lithium recovery from battery wastewater via nanofiltration and membrane distillation crystallization with carbon nanotube spacer", *Chemical Engineering Journal*, 503 (2025) 158315. https://doi.org/10.1016/j.cej.2024.158315

- Nahyeon An, **Boram Gu**, Junghwan Kim*, Seongbin Ga*, "Advancing green hydrogen purification: Multiscale evaluation of membrane processes using novel software, pySembrane", *Renewable and Sustainable Energy Reviews*, 208 (2025) 114998. https://doi.org/10.1016/j.rser.2024.114998

- Soo-Won Son, **Boram Gu***, "Multiphysics Simulations of Dry Reforming of Methane in a Fixed Bed Reactor with Different Catalyst Types", *Applied Chemistry for Engineering*, 35(5) (2024) 429-437. https://doi.org/10.14478/ace.2024.1042

- Hyuk Cha, **Boram Gu***, Sanghyun Jeong*, "Enhancing ammonia selectivity in membrane distillation: the role of membrane structural characteristics", *Desalination*, 592 (2024) 118059. https://doi.org/10.1016/j.desal.2024.118059

- Jihee Lee, Jueun Han, Yejin Song, **Boram Gu***, Eunjung Kim*, "Design and Optimization of Isothermal Gene Amplification for Generation of High-Gain Oligonucleotide Products by MicroRNAs", *ACS*

Measurement Science Au, 4(6) (2024) 737-750.
https://doi.org/10.1021/acsmeasuresciau.4c00063

- Ariyan Zare Ghadi, **Boram Gu***, Hankwon Lim*, "CFD Analysis on the Effect of Ammonia Addition on Oxyfuel Coal Combustion in a Swirl Burner", *Energy & Fuels*, 38 (2024) 19798-19813. https://doi.org/10.1021/acs.energyfuels.4c03256

- Jiaxin Guo, Mengnan Jiang, Xiaolu Li, Muhammad Usman Farid, Bhaskar Jyoti Deka, Baoping Zhang, Jiawei Sun, Zuankai Wang, Chunhai Yi, Pak Wai Wong, Sanghyun Jeong, **Boram Gu**, Alicia Kyoungjin An*, "Springtail-inspired omniphobic slippery membrane with nano-concave re-entrant structures for membrane distillation", *Nature Communications*, 15(1) (2024) 7750. https://doi.org/10.1038/s41467-024-52108-9

- Ariyan Zare Ghadi, Ahmad Syauqi, **Boram Gu**, Hankwon Lim*, "Highly accurate heat release rate marker detection in NH3–CH4 cofiring through machine learning and domain knowledge-based selection integration", *International Journal of Hydrogen Energy*, 80 (2024) 1223-1233. https://doi.org/10.1016/j.ijhydene.2024.07.243

- Seongeom Jeong, Yu-hyeok Jeong, **Boram Gu***, Sanghyun Jeong*, "Improving Performance in Membrane Distillation through 3D Printing Technology: A Comparison of Patterned Membrane, Membrane Spacer, and Patterned Module", *Chemical Engineering Journal,* 493 (2024) 152470. https://doi.org/10.1016/j.cej.2024.152470

- Yu-hyeok Jeong, Seongeom Jeong, Sanghyun Jeong*, **Boram Gu***, "Helical strip-type spacers for enhanced multi-directional mixing and mitigation of temperature polarisation in membrane distillation–a numerical and experimental investigation", *Journal of Membrane Science,* 707 (2024) 122987. https://doi.org/10.1016/j.memsci.2024.122987

- Ajay Bhandari, **Boram Gu**, Farshad Moradi Kashkooli, Wenbo Zhan, "Image-based predictive modelling frameworks for personalised drug delivery in cancer therapy", *Journal of Controlled Release,* 370 (2024) 721-746. https://doi.org/10.1016/j.jconrel.2024.05.004

- Yilin Yang, **Boram Gu**, Xiao Yun Xu*, "In silico study of combination thrombolytic therapy with alteplase and mutant pro-urokinase for fibrinolysis in ischemic stroke", *Computers in Biology and Medicine*, 171 (2024) 108141. https://doi.org/10.1016/j.compbiomed.2024.108141

- Byeonggeol Mun, Hyein Jeong, Ryunhyung Kim, **Boram Gu**, Jinyoung Kim, Hye Young Son, Hyun Wook Rho, Eun-Kyung Lim, Seungjoo Haam*, "3D-Nanostructured microfluidic device arranged in a herringbone pattern for the highly effective capture of HER2-Positive cancer-derived exosomes in urine", *Chemical Engineering Journal*, 482 (2024) 148851. https://doi.org/10.1016/j.cej.2024.148851

- Chonghyo Joo, Jaewon Lee, Yurim Kim, Hyungtae Cho, **Boram Gu***, Junghwan Kim*, "A novel on-site SMR process integrated with a hollow fiber membrane module for efficient blue hydrogen production: Modeling, validation, and techno-economic analysis", *Applied Energy*, 354 (2024), 122227. https://doi.org/10.1016/j.apenergy.2023.122227

- Seongeom Jeong, **Boram Gu***, Sanghun Park, Kyunghwa Cho, Alicia Kyoungjin An, Sanghyun Jeong*,

"Mechanism elucidation and scaling control in membrane distillation using 3D printed carbon nanotube spacer", *npj Clean Water* 6 (2023) 80. https://doi.org/10.1038/s41545-023-00296-0

- Sungjin Bae, **Boram Gu***, Jay H. Lee*, "A 3D CFD study on the effects of feed spacer designs on membrane performance for high-permeance RO membranes", *Journal of Water Process Engineering*, 53 (2023) 103887. https://doi.org/10.1016/j.jwpe.2023.103887

- Seongeom Jeong, **Boram Gu***, Subi Choi, Sukkyun An, Jaegeun Lee, Jieun Lee, Sanghyun Jeong*, "Engineered multi-scale roughness of carbon nanofiller-embedded 3D printed spacers for membrane distillation", *Water Research*, 231 (2023) 119649. https://doi.org/10.1016/j.watres.2023.119649

- Yilin Yang, **Boram Gu**, Xiao Yun Xu*, "In Silico Study of Different Thrombolytic Agents for Fibrinolysis in Acute Ischemic Stroke", *Pharmaceutics*, 15(3) (2023) 797. https://doi.org/10.3390/pharmaceutics15030797

- Nahyeon An, Seongbin Ga, Hyungtae Cho, **Boram Gu***, Junghwan Kim*, "Multiscale high-throughput screening for membrane-based green hydrogen separation process", *Computer Aided Chemical Engineering*, 52 (2023) 2399-2404. https://doi.org/10.1016/B978-0-443-15274-0.50381-4

- Mei Yan Chong, **Boram Gu**, Chlöe Harriet Armour, Socrates Dokos, Zhi Chao Ong, Xiao Yun Xu*, Einly Lim, "An integrated fluid-structure interaction and thrombosis model for type B aortic dissection", *Biomechanics and Modeling in Mechanobiology*, 21(1) (2022) 261-275. https://doi.org/10.1007/s10237-021-01534-5

- Choongkyun Yeom*, Jiwon Kim, Heeyoung Park, Jiwoong Lee, Seong Eun Park, **Boram Gu**, "Simulation Model for Prediction of Gas Separation in Membrane Contactor Process", *Membranes*, 12(2) (2022) 158. https://doi.org/10.3390/membranes12020158

- **Boram Gu**[†,]*, "Mathematical modelling of membrane CO_2 capture for blue hydrogen production", *IFAC-PapersOnLine*, 55 (7) (2022) 304-309. https://doi.org/10.1016/j.ifacol.2022.07.461

- **Boram Gu**[†,]*, "Mathematical modelling and simulation of CO_2 removal from natural gas using hollow fibre membrane modules", *Korean Chemical Engineering Research*, 60(1) (2022) 51-61. https://doi.org/10.9713/kcer.2022.60.1.51

- **Boram Gu**[†], Yu Huang, Emily Louise Manchester, Alun D Hughes, Simon A McG Thom, Rongjun Chen, Xiao Yun Xu*, "Multiphysics Modelling and Simulation of Thrombolysis via Activated Platelet-Targeted Nanomedicine", *Pharmaceutical Research*, 39(1) (2022) 41-56. https://doi.org/10.1007/s11095-021-03161-2

- Emily Louise Manchester, Dylan Roi, **Boram Gu**, Xiao Yun Xu*, Kyriakos Lobotesis*, "Modelling combined intravenous thrombolysis and mechanical thrombectomy in acute ischaemic stroke: Understanding the relationship between stent retriever configuration and clot lysis mechanisms", *Life*, 11(11) (2021) 1271. https://doi.org/10.3390/life11111271

- Yu Huang†, **Boram Gu**†, Isabelle I. Salles-Crawley, Kirk A. Taylor, Li Yua, Jie Ren, Xuhan Liu, Michael Emerson, Colin Longstaff, Alun D. Hughes, Simon A. Thom, Xiao Yun Xu*, Rongjun Chen*, "Fibrinogen-mimicking, multi-arm nanovesicles for thrombus-specific delivery of tissue plasminogen activator and targeted thrombolytic therapy", *Science Advances*, 7(23) (2021) eabf9033. http://doi.org/10.1126/sciadv.abf9033

- **Boram Gu**†,*****, Claire S. Adjiman, Xiao Yun Xu*, "Correlations for concentration polarization and pressure drop in spacer-filled RO membrane modules based on CFD simulations", *Membranes*, 11 (2021) 335. https://doi.org/10.3390/membranes11050338

- Mei Yan Chong, **Boram Gu**, Bee Ting Chan, Zhi Chao Ong, Xiao Yun Xu, Einly Lim*, "Effect of intimal flap motion on flow in acute type B aortic dissection by using fluid-structure interaction", *International Journal for Numerical Methods in Biomedical Engineering*, 36 (2020) e3399. https://doi.org/10.1002/cnm.3399

- Yu Huang, **Boram Gu**, Liu Cong, Kustin Stebbing, Wladyslay Cedroyc, Maya Thanou, Xiao Yun Xu*, "Thermosensitive liposome-mediated drug delivery in chemotherapy: mathematical modelling for spatio-temporal drug distributions and model-based optimisation", *Pharmaceutics* 11 (2019) 637. https://doi.org/10.3390/pharmaceutics11120637

- **Boram Gu**†, Andris Piebalgs, Yu Huang, Dylan Roi, Kyriakos Lobotesis, Colin Longstaff, Alun D. Hughes, Rongjun Chen, Simon A. Thom, Xiao Yun Xu*, "Computational simulations of thrombolysis in acute stroke: Effect of clot size and location on recanalisation", *Medical Engineering & Physics* 73 (2019) 9–17. https://doi.org/10.1016/j.medengphy.2019.07.014

- Yu Huang, Li Yu, Jie Ren, **Boram Gu**, Colin Longstaff, Alun D. Hughes, Simon A. Thom, Xiao Yun Xu, Rongjun Chen*, "An activated-platelet-sensitive nanocarrier enables targeted delivery of tissue plasminogen activator for effective thrombolytic therapy", *Journal of Controlled Release* 300 (2019) 1–12. https://doi.org/10.1016/j.jconrel.2019.02.033

- **Boram Gu**†, Andris Piebalgs, Yu Huang, Colin Longstaff, Alun Hughes, Rongjun Chen, Simon Thom, Xiao Yun Xu*, "Mathematical modelling of intravenous thrombolysis in acute ischaemic stroke: Effects of dose regimens on levels of fibrinolytic proteins and clot lysis time", *Pharmaceutics* 11 (2019) 111. https://doi.org/10.3390/pharmaceutics11030111

- Andris Piebalgs†, **Boram Gu**†, Dylan Roi, Kyriakos Lobostesis, Simon Thom, Xiao Yun Xu*, "Computational simulations of thrombolytic therapy in acute ischaemic stroke", *Scientific Reports* 8 (2018) 15810. https://doi.org/10.1038/s41598-018-34082-7

- **Boram Gu**†, Claire S. Adjiman, Xiao Yun Xu*, "The effect of feed spacer geometry on membrane performance and concentration polarisation based on 3D CFD simulations", *Journal of Membrane Science* 527 (2017) 78–91. https://doi.org/10.1016/j.memsci.2016.12.058

- **Boram Gu**†, Xiao Yun Xu, Claire S. Adjiman*, "A predictive model for spiral wound reverse osmosis membrane modules: the effect of winding geometry and accurate geometric details", *Computers & Chemical Engineering* 96 (2017) 248–265. https://doi.org/10.1016/j.compchemeng.2016.07.029

- Nur Muna Mazlan, Patrizia Marchetti, H.A. Maples, **Boram Gu**, Santanu Karan, A. Bismarck, Andrew G. Livingston*, "Organic fouling behaviour of structurally and chemically different forward osmosis membranes–A study of cellulose triacetate and thin film composite membranes", *Journal of Membrane Science* 520 (2016) 247–261. https://doi.org/10.1016/j.memsci.2016.07.065

- Do Yeon Kim, **Boram Gu**, Joon Ha Kim, Dae Ryook Yang*, "Theoretical analysis of a seawater desalination process integrating forward osmosis, crystallization, and reverse osmosis", *Journal of Membrane Science* 444 (2013) 440–448. https://doi.org/10.1016/j.memsci.2013.05.035

- Do Yeon Kim, **Boram Gu**, Dae Ryook Yang*, "An explicit solution of the mathematical model for osmotic desalination process", *Korean Journal of Chemical Engineering* 30 (2013) 1691–1699. https://doi.org/10.1007/s11814-013-0123-7

- Jae Sung Kim, Dae Hun Kim, **Boram Gu**, Do Yeon Kim, Dae Ryook Yang*, "Simulation of Taylor–Couette reactor for particle classification using CFD", *Journal of Crystal Growth* 373 (2013) 106–110. https://doi.org/10.1016/j.jcrysgro.2012.12.006

- **Boram Gu**†, Do Yeon Kim, Joon Ha Kim, Dae Ryook Yang*, "Mathematical model of flat sheet membrane modules for FO process: Plate-and-frame module and spiral-wound module", *Journal of Membrane Science* 379 (2011) 403–415. https://doi.org/10.1016/j.memsci.2011.06.012

- Do Yeon Kim, Myoung Ho Lee, **Boram Gu**, Joon Ha Kim, Sangho Lee, Dae Ryook Yang*, "Modeling of solute transport in multi-component solution for reverse osmosis membranes", *Desalination & Water Treatment* 15 (2010) 20–28. https://doi.org/10.5004/dwt.2010.1662

INTERNATIONAL CONFERENCE PRESENTATION

†presenting author, *corresponding author

- Dongkyu Kim†, **Boram Gu***, "Mathematical modeling and simulation of multi-feeding rotating packed bed (MF-RPB) absorber for MEA-based carbon capture", **Oral presentation** at the 35th European Symposium on Computer Aided Process Engineering (ESCAPE), Ghent, Belgium, July 2025.

- Dong-Gi Lee†, Seung-Jun Baek, Yong-Tae Kim, In-Hyoup Song, **Boram Gu***, "Mathematical modelling and optimisation of electrified reverse water gas shift reactor", **Oral presentation** at the 35th European Symposium on Computer Aided Process Engineering (ESCAPE), Ghent, Belgium, July 2025.

- Yu-hyeok Jeong†, **Boram Gu***, "Multi-level modeling of reverse osmosis process based on CFD results", **Poster presentation** at the 35th European Symposium on Computer Aided Process Engineering (ESCAPE), Ghent, Belgium, July 2025.

- Jiun Yun†, Kyung Hwan Ryu, **Boram Gu***, "Membrane-based Blue Hydrogen Production in Sub-Ambient Temperature: Process Optimization, Techno Techno-Economic Analysis and Life Cycle Assessment", **Poster presentation** at the 35th European Symposium on Computer Aided Process Engineering (ESCAPE), Ghent, Belgium, July 2025.

- **Boram Gu†,***, "Mechanistic Modelling of Thrombolytic Therapy and Model-based Optimisation of

Treatment Protocols", **Oral presentation** at the 35th European Symposium on Computer Aided Process Engineering (ESCAPE), Ghent, Belgium, July 2025.

- Sunyoung Oh, Heun-Se Kim, Kiho Park, **Boram Gu***, "Modeling of Electrolyzer-Pressure Retarded Membrane Distillation (E-PRMD) Hybrid Process for Energy-efficient Multi-functional System", **Oral presentation** at the 35th European Symposium on Computer Aided Process Engineering (ESCAPE), Ghent, Belgium, July 2025.

- **Boram Gu†,***, "A Mechanistic Approach to Predicting Rotating Packed Bed (RPB) Performance in Carbon Capture", **Keynote talk** at PSE Asia 2024, Penang, Malaysia, August 2024.

- JinGyeong Im†, Donggi Lee, **Boram Gu***, "Computational simulation of extracorporeal membrane oxygenator (ECMO) for efficiency evaluation", **Oral presentation** at the 29th Congress of the European Society of Biomechanics, Edinburgh, UK, June 2024.

- JinGyeong Im, **Boram Gu†,***, "A Mechanistic Approach for Predicting Mass Transfer in a Rotating Packed Bed Contactor for Carbon Capture", **Oral presentation** at American Institute of Chemical Engineering (AIChE) Annual Meeting, Orlando, US, November 2023.

- JinGyeong Im, Yu Zhu, X. Yun Xu, In-Seok Jeong, **Boram Gu†,***, "Computational simulation of haemodynamics in patients with VA-ECMO", **Oral presentation** at the 28th Congress of the European Society of Biomechanics, Maastricht, the Netherlands, July 2023.

- JinGyeong Im, Yu Zhu, X. Yun Xu, In-Seok Jeong, **Boram Gu†,***, "Computational analysis of aortic haemodynamics during VA-ECMO", **Oral presentation** at the 2nd International Conference on Medical Devices: Materials, Mechanics and Manufacturing (ICMD3M), Corfu, Greece, June 2023.

- Nahyeon An†, Seongbin Ga, Hyungtae Cho, **Boram Gu***, Junghwan Kim*, "Multiscale high-throughput screening for membrane-based green hydrogen separation process", **Poster presentation** at the 33rd European Symposium on Computer Aided Process Engineering (ESCAPE33), Athens, Greece, June 2023.

- **Boram Gu†,***, "Mathematical modelling of membrane CO_2 capture for blue hydrogen production", **Invited talk** at the 13th IFAC Symposium on Dynamics and Control of Process Systems, including Biosystems (DYCOPS), Busan, Republic of Korea, June 2022

- **Boram Gu†,***, Xiao Yun Xu, Claire Adjiman, "A multi-scenario optimisation approach to the design and operation planning of reverse osmosis desalination plants for long-term performance and cost-effectiveness", **Oral presentation** at the 5th International Conference on Desalination using Membrane Technology, China (Hybrid), November 2021.

- **Boram Gu**†, Andris Piebalgs, Dylan Roi, Kyriakos Lobotesis, Simon Thom, Xiao Yun Xu*, "Computational modelling of thrombolysis in the treatment of acute ischaemic stroke". **Oral presentation** at Challenges in Cardiovascular Flow (IOP Medical Physics Group), Bath, UK, July 2019.

- **Boram Gu**†, Andris Piebalgs, Yu Huang, Dylan Roi, Kyriakos Lobotesis, Rongjun Chen, Simon Thom, Xiao Yun Xu*, "Computational simulation of thrombolytic therapy in acute ischaemic stroke". Oral

presentation at Summer Biomechanics, Bioengineering & Biotransport Conference (SB3C2019), Seven Springs, Pennsylvania, US, June 2019.

- **Boram Gu**, Andris Piebalgs, Simon Thom, Xiao Yun Xu[†,*], "Computational modelling of thrombolysis in ischemic stroke". Invited talk at the 6th International Conference on Computational Mathematical Biomedical Engineering (CMBE2019), Shindai, Japan, June 2019.

- **Boram Gu[†,*]**, "Modelling blood flow and drug transport in the treatment of vascular diseases". **Invited talk** at Newton Advanced Fellowship Workshop, Kuala Lumpur, Malaysia, May 2019.

- **Boram Gu[†]**, Yu Huang, Rongjun Chen, Alun Hughes, Simon Thom, Xiao Yun Xu*, "Computational modelling of thrombolysis for the treatment of ischaemic stroke: Effects of arterial geometry and clot property on treatment efficacy". **Oral presentation** at the 2nd Joint Meeting of the International Society of Fibrinolysis and Proteolysis and the Plasminogen Activation Workshop, Edinburgh, UK, September 2018 (**travel award**).

- **Boram Gu[†]**, Andris Piebalgs, Xiao Yun Xu*, "A computational model of thrombolysis for ischaemic stroke treatment". **Oral presentation** at Young Researchers' Conference 2018, London, UK, July 2018 (**awarded 1st prize** for best vascular simulation work).

- **Boram Gu[†]**, Andris Piebalgs, Xiao Yun Xu*, "Multiscale modelling of thrombolytic therapy for ischemic stroke treatment". **Oral presentation** at World Congress of Biomechanics 2018, Dublin, Ireland, July 2018.

- **Boram Gu[†]**, Claire S. Adjiman, Xiao Yun Xu*, "Derivation of mathematical correlations for mass transfer in a spiral wound module using computational fluid dynamics". **Poster presentation** at Euromembrane 2015, Aachen, Germany, September 2015.

- **Boram Gu[†]**, Do Yeon Kim, Dae Ryook Yang*, "Energy consumption of vacuum membrane distillation as a draw solution recovery process in FO process". **Poster presentation** at the 4th International Desalination Workshop (IDW 2011), Jeju, South Korea, November 2011.

- **Boram Gu[†]**, Do Yeon Kim, Dae Ryook Yang*, "Performance and energy requirements for FO process under various draw solution conditions". **Poster presentation** at the 3rd International Desalination Workshop (IDW 2010), Jeju, South Korea, November 2010.

- **Boram Gu[†]**, Do Yeon Kim, Dae Ryook Yang*, "Modelling and simulation of flat sheet membrane modules for forward osmosis process". **Poster presentation** at the International Water Association on Membrane Technology and Water Reuse (IWA MTWR 2010), Istanbul, Turkey, October 2010.

RESEARCH PROJECTS

Ongoing Projects

- **Title: Mathematical Modelling of Bipolar Membrane Electrodialysis for Organic Acid Separation**
  Funding: Korea Research Institute of Chemical Technology
  Role: Principal Investigator **Period**: Jan 2025-Dec 2025

- **Title: Development of high thermal conductivity powder ceramic material**
  Funding: Korea Evaluation Institute of Industrial Technology (Ministry of Trade, Industry and Energy)
  Role: Co-Principal Investigator **Period**: Apr 2024-Dec 2028

- **Title: A Digital Twin of Biochemical Systems: Medical Device Design and Treatment Protocol Optimisation Towards Personalised Treatment**
  Funding: National Research Foundation of Korea (Ministry of Science and ICT)
  Role: Principal Investigator **Period**: Apr 2024-Mar 2029

- **Title: Novel CO2 Capture Process Development and Pilot Test for Refinery Industry Flue Gas**
  Funding: Korea Energy Technology Evaluation and Planning (Ministry of Trade, Industry and Energy)
  Role: Co-Principal Investigator **Period**: Aug 2022-Jun 2026

Completed Projects

- **Title: Modelling of Heat and Mass Transfer within Packed Bed Reactors**
  Funding: LG Chem
  Role: Principal Investigator **Period**: Jun 2024-May 2025

- **Title: Development of MDG Membrane System for Removal of Trace DO in Ultra-pure Water Production**
  Funding: Korea Environmental Industry & Technology Institute (Ministry of Environment)
  Role: Principal Investigator **Period**: Apr 2021-Dec 2024

- **Title: Multiphysics Modelling and Optimisation of Electrified Methane Reforming Reactors**
  Funding: Korea Research Institute of Chemical Technology
  Role: Principal Investigator **Period**: Jan 2024-Dec 2024

- **Title: Design and Feasibility Study of Electrolysis–Pressure Retarded Membrane Distillation (PRMD) Hybrid Process for Advanced Wastewater Treatment and Maximized Water-Energy Reuse**
  Funding: Gwangju Green Environment Centre (Ministry of Environment)
  Role: Principal Investigator **Period**: Apr 2024-Nov 2024

- **Title: Development of a Predictive Model for BPED Performance**
  Funding: POSCO Holdings
  Role: Principal Investigator **Period**: Mar 2024-Jul 2024

- **Title: On the Development of Fouling-resistant Next-generation Reverse Osmosis Desalination Technologies via Integrated Multi-level Modelling and Model-based Optimisation**
  Funding: National Research Foundation of Korea (Ministry of Science and ICT)
  Role: Principal Investigator **Period**: Mar 2021-Feb 2024

- **Title: Computational Simulation of Polystyrene Depolymerisation in an Auger Reactor**
  Funding: Korea Research Institute of Chemical Technology
  Role: Principal Investigator **Period**: Oct 2023-Dec 2023

- **Title: Multiphysics Modelling of E-cracking Furnaces for C1 Gas Pyrolysis**

Funding: Korea Research Institute of Chemical Technology
Role: Principal Investigator **Period**: Jan 2023-Dec 2023

- **Title: Simulation of Aerosolisation Performance of NGP HnB**
  Funding: KT&G Corporation
  Role: Principal Investigator **Period**: Dec 2022-Nov 2023

- **Title: RO Field Model Development**
  Funding: CJ CheilJedang Corp.
  Role: Principal Investigator **Period**: Nov 2022-Oct 2023

- **Title: CFD Analysis of Scrubber Systems**
  Funding: Research Institute of Industrial Science & Technology (RIST)
  Role: Principal Investigator **Period**: Nov 2020

- **Title: Development of Prediction and Reduction Technology for BOG Generation in LNG Tanks Using CFD and AI (Target: 5%)**
  Funding: HD Korea Shipbuilding & Offshore Engineering Co., Ltd
  Role: Researcher **Period**: Mar-Jul 2020 (Participated)

- **Title: Techno-Economic and Carbon Reduction Impact Analysis of Novel Process Routes for CCS**
  Funding: KOREA CCS 2020 (Ministry of Science and ICT)
  Role: Researcher **Period**: Mar-Jul 2020 (Participated)

- **Title: Development of FINEX-Chemical Process for Improving Economic Feasibility and Reducing CO_2 Emissions in Steelmaking**
  Funding: POSCO
  Role: Researcher **Period**: Mar-Jul 2020 (Participated)

- **Title: Stability requirements of stent grafts in the thoraco-abdominal aorta used as extensions of thoracic stent grafts, Part 1: Evaluation of flow-induced displacement forces**
  Funding: Cryolife+Jotec
  Role: Researcher **Period**: Apr 2019-Nov 2019

- **Title: Development of engineered liposomes for targeted thrombolytic therapy**
  Funding: National Institute for Health Research (NIHR)
  Role: Researcher **Period**: Oct 2017-Apr 2019

- **Title: Thermo-electro-mechanical optimisation of an electric motor**
  Funding: Innovate UK
  Role: Researcher **Period**: Apr 2017-Oct 2017

- **Title: Modelling of reverse osmosis membrane process and transport phenomena for performance analysis and optimisation**
  Funding: BP International Centre for Advanced Materials
  Role: Researcher **Period**: Apr 2013-Mar 2017

- **Title: Development of Forward Osmosis Desalination Process Technology**
  Funding: Ministry of Knowledge Economy
  Role: Researcher **Period**: Oct 2009-Aug 2012 (Participated)

- **Title: Development of Dynamic Process Simulators for Process Optimization and Optimal Design via Testbed Application**
  Funding: Ministry of Land, Infrastructure and Transport
  Role: Researcher **Period**: Sep 2009-Aug 2012 (Participated)

INTELECTUAL PROPERTY & TECHNOLOGY TRANSFER

- Patent Application (No. 10-2024-0154740): Eunjung Kim, Boram Gu, Jihee Lee, "Optimization of toehold-mediated rolling circle amplification for highly efficient detection of target nucleic acids"
- Patent Application (No. 10-2023-0069584): Boram Gu, Yu-hyeok Jeong, "A spacer having a twisted spiral structure and a membrane evaporation module including the same"
- Technology (Know-How) Transfer (Royalty 40,000,000 KRW): "Liquid hydrogen tanker simulation during road transport for safety (Liquid hydrogen tanker simulation during road transport for safety)" (2024)

ACADEMIC & PROFESSIONAL SERVICE

Journal Editorial Board

- 2020/01-present Korean Journal of Chemical Engineering (Transport Phenomena)

Conference Organisation

National Conferences

- 2025 Academic Director, Executive Committee, Korean Institute of Chemical
- 2025 Education Secretary, Process Systems Division, Korean Institute of Chemical Engineers
- 2024-2025 Member, Editorial Board, Korean Institute of Chemical Engineers
- 2024 Director of Planning, Korean Society of Clean Technology
- 2024 Secretary, Process Systems Division, Korean Society of Clean Technology
- 2024 Operations Secretary, Process Systems Division, Korean Society of Industrial and Engineering Chemistry
- 2023 Academic Secretary, Process Systems Division, Korean Institute of Chemical Engineers

International Conferences

- National organising committee — The 13th IFAC Symposium on Dynamics and Control of Process Systems, including Biosystems (DYCOPS), Busan, Republic of Korea, 14-17 June 2022.
- Organising committee — UK-China Newton Fund British Council Researcher Links Workshop, Zhongshan Hospital, Fudan University, Shanghai, China, 10-12 September 2019.

Awards

- Selected participants in Asian Deans' Forum 2018: Rising Stars Women in Engineering Workshop, Hong Kong University of Science and Technology, Hong Kong. October 2018.

- Travel grant awarded at the 2nd Joint Meeting of the International Society of Fibrinolysis and Proteolysis and the Plasminogen Activation Workshop, Edinburgh, UK. September 2018.

- 1st Prize for Best Vascular Simulation Work at Young Researchers' Conference 2018, London, UK, July 2018.

- Fully funded PhD scholarship awarded by BP International Centre for Advanced Materials (ICAM). April 2013 - March 2017. Imperial College London, UK.

- Scholarship awarded by Deutscher Akademischer Austauschdienst (DAAD, German Academic Exchange Service). September-December 2008. Technische Universitat Berlin, Germany.

TEACHING AND SUPERVISION EXPERIENCE

Lectures

Undergraduate Courses – School of Chemical Engineering, Chonnam National University

• Chemical Engineering Numerical Analysis (3 credits)	Autumn 2024
• Process Control (3 credits)	Spring 2021 – Spring 2025
• Process Control System Analysis (3 credits)	Autumn 2020 – Autumn 2024
• MATLAB Programming (3 credits)	Spring 2021 – Spring 2025
• Energy Application Programming (3 credits)	Spring 2023
• Transport Phenomena (3 credits)	Autumn 2022 – Autumn 2023
• Process Calculation I (3 credits)	Spring 2021 – Spring 2024
• Process Calculation II (3 credits)	Autumn 2020 – Autumn 2022
• Introduction to Chemical Engineering Design (3 credits)	Autumn 2020 – Autumn 2021

Postgraduate Courses – School of Chemical Engineering, Chonnam National University

• Advanced Transport Phenomena (3 credits)	Autumn 2023
• Advanced Chemical Process Optimisation (3 credits)	Spring 2024-2025
• Advanced Chemical Engineering Design (3 credits)	Autumn 2024

Thesis Supervision

- Sunyoung Oh – MSc in Chemical Engineering, Chonnam National University, February 2025
- Suwon Son – MSc in Chemical Engineering, Chonnam National University, February 2025
- Jingyeong Im – MSc in Chemical Engineering, Chonnam National University, February 2025