JAI HYUN KOH

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EDUCATION

The University of Texas at Austin — Austin, TX
Ph.D. in Chemical Engineering with Dr. C. Grant Willson and Dr. Nathaniel A. Lynd — 2019
Dissertation: "Functional Organic Materials for Directed Self-assembly of Si-containing Block Copolymers"

Seoul National University — Seoul, Korea
M.S. in Chemical and Biological Engineering with Dr. Kookheon Char — 2013
B.S. in Chemical and Biological Engineering, *Cum Laude* — 2011

APPOINTMENTS

Korea Institute of Science and Technology (KIST)
Senior Research Scientist (PI), Clean Energy Research Center — 2020–Present
Research Scientist, Clean Energy Research Center — 2013–2016

RESEARCH INTERESTS

Design and synthesis of functional materials for electrochemical energy conversion; ion-conducting polymers for membranes and binders; *in situ* analysis of electrode–electrolyte interfaces; and electrolysis of CO_2 and water.

RESEARCH GROUP

- Current Ph.D. students (total = 4): Jihyun Park, Young In Song, Hyung Rae Kim, Won So
- Current M.S. student (total = 1): Jisoo Park
- Former M.S. student (total = 1): Chanwoo Lee (Hanwha e-ssential, Aug 2023)

RESEARCH FUNDING

National Research Council of Science & Technology (NST); National Research Foundation of Korea (NRF).

- "Development of an Integrated Reactive Capture and Conversion (RCC) Platform for the Production of Value-added Chemicals," Research Grant, NRF. *TBD*. 5 years, **2026**. **Co-I.**
- "Strategic Research Initiative on Carbon Capture and Utilization," Research Grant, NST. GTL25021-210. 5 years, **2025**. **Co-I.**
- "Green and Scalable Routes to Single-atom Metal Catalysts for Semiconductor Applications," Research Grant, NRF. RS-2025-25442300. 5 years, **2025**. **Co-I.**
- "Developing Carbon-to-Liquid Process," Institutional Program Grant, KIST. 3 years, **2025**. **Co-I.**
- "Developing Polymeric Ion-exchange Membranes for Electrochemical Conversion of CO_2," Early Career Grant for International Networking, NST. 1 year, **2022**. **PI.**
- "Developing Supercritical Artificial Photosynthesis Technology," Research Grant, NST. CAP21011-100. 5 years, **2021**. **Co-I.**
- "e-Chemical Research Team," K-Lab Program Grant, KIST. 3 years, **2021**. **Co-I.**
- "Ion-exchange Membranes for Electrosynthesis of Value-added Chemicals," Seed Grant, KIST. 1 year, **2020**. **PI.**
- "e-Chemical Production Technology," Institutional Program Grant, KIST. 5 years, **2020**. **Co-I.**

PUBLICATIONS (*Total citations: 1,418; h-index: 18*) [Google Scholar]

Underlined: Koh Group members; [†]: equal contribution; [*]: corresponding author.

33. Y. I. Song†, D. Kim†, H. S. Jeon, J. K. Kim, D. W. Kim, **J. H. Koh***, C. Kim*, "Ionomer-controlled microenvironments govern hydrogenation pathways and reactant accessibility in electrochemical nitrate reduction", Submitted.

32. D. Kim, D. H. Seok, S.-H. Yu, J. H. Moon, J. Wang, **J. H. Koh**, C. Kim, J.-Y. Choi, H.-S. Oh*, W. H. Lee*, "Validation of Large Language Model Artificial Intelligence integrated Optical Microscopy Analysis: Application to In Situ/Operando Electrochemistry", Submitted.
31. J. Wang, S. Ramirez-Gomez, H. S. Jeon, Y. Kuang, Y. Sun, S. I. Suh, **J. H. Koh**, H.-S. Oh, D. K. Lee*, A. Soon*, W. H. Lee*, "Enhancing Electrocatalytic Hydrodeoxygenation of Aromatic Bio-Oil to Hydrocarbon Fuel via Support π–π Interaction", Submitted.
30. E. T. Kim, S. Kim, S.-E. Park, P. Park, E. Ko, J. Joe, H. Y. Son, J. Kang, J. J. Kim, K. Cheon, K. Kim, S. Kim, G. Lee, J. Jeong, M. Cho, N. Kim, **J. H. Koh***, K. Kim*, "Highly durable proton exchange membrane water electrolysis at 3 A cm^{-2} via dual-interface stabilization of low-iridium anodes", In revision.
29. W. T. Hong, D. N. Nguyen, J.-S. Kim, Y. Ha, **J. H. Koh**, X. Yu, T.-H. Kim, K. Jin, U. Sim, W.-S. Choe*, H. Shin*, J. Y. Lee, J. K. Kim*, "Epitaxially Grown Bimetallic Phosphide With High Activity and Durability for Bifunctional Alkaline Anion Exchange Membrane Water Electrolysis", *Adv. Funct. Mater.* **2026**, *36*, e21020. [doi]
28. Y. I. Song†, S. G. Akpe†, J. Park, D. Kim, W. H. Lee, J. K. Kim*, H. S. Jeon*, B. Yoon*, **J. H. Koh***, "Ionomer Charge Density Modulates Interfacial Water and Reaction Intermediates for CO_2 Electrolysis to C_2 Products", *ACS Catal.* **2026**, *16*, 2814–2826. [doi]
27. J. Park†, Y. Chae†, C. Lee, G. Kwon, W. H. Lee, H. S. Jeon, J. Cho, D. H. Won*, **J. H. Koh***, "Ionomer side chains modulate interfacial microenvironments for selective CO_2 electrolysis", *ACS Catal.* **2025**, *15*, 12222–12230. [doi]
26. J. Wang, M. H. Han, K. M. G. Langie, D. H. Won, M.-Y. Lee, C. Oh, H. S. Jeon, **J. H. Koh**, H.-S. Oh, D. K. Lee, W. H. Lee*, "Understanding the dynamics governing electrocatalytic hydrodeoxygenation of lignin bio-oil to hydrocarbons", *J. Am. Chem. Soc.* **2025**, *147*, 4962–4971. [doi]
25. Y. I. Song†, B. Yoon†, C. Lee, D. Kim, M. H. Han, H. Han, W. H. Lee, D. H. Won, J. K. Kim*, H. S. Jeon*, **J. H. Koh***, "Impact of side chains in 1-*n*-alkylimidazolium ionomers on Cu-catalyzed electrochemical CO_2 reduction", *Adv. Sci.* **2024**, *11*, 2406281. [doi]
24. W. Choi, Y. Chae, E. Liu, D. Kim, W. S. Drisdell, H.-S. Oh, **J. H. Koh**, D. K. Lee, U. Lee, D. H. Won*, "Exploring the influence of cell configurations on Cu catalyst reconstruction during CO_2 electroreduction", *Nat. Commun.* **2024**, *15*, 8345. [doi]
23. J. Y. Kim, W. T. Hong, T. K. C. Phu, S. C. Cho, B. Kim, U. Baeck, H.-S. Oh, **J. H. Koh**, X. Yu, C. H. Choi, J. Park*, S. U. Lee*, C.-H. Chung, J. K. Kim*, "Proton-coupled electron transfer on $Cu_2O/Ti_3C_2T_x$ MXene for propane (C_3H_8) synthesis from electrochemical CO_2 reduction", *Adv. Sci.* **2024**, *11*, 2405154. [doi]
22. T. K. C. Phu, W. T. Hong, H. Han, Y. I. Song, J. H. Kim, S. H. Roh, M.-C. Kim, **J. H. Koh**, B.-K. Oh, J. Y. Kim*, C.-H. Chung, D. H. Lee, J. K. Kim*, "Conformal surface intensive doping of low-valence Bi on Cu_2O for highly efficient electrochemical nitrate reduction to ammonia production", *Mater. Today* **2024**, *76*, 52–63. [doi]
21. J. Cho, J. Oh, J. Bang, **J. H. Koh**, H. Y. Jeong, S. Chung, J. G. Son*, "Roll-to-plate 0.1-second shear-rolling process at elevated temperature for highly aligned nanopatterns", *Nat. Commun.* **2023**, *14*, 8412. [doi]
20. W. H. Lee, K. Kim, **J. H. Koh**, D. K. Lee, D. H. Won, H.-S. Oh, U. Lee, B. K. Min*, "The green-ol (green-alcohol) economy", *Nano Energy* **2023**, *110*, 108373. [doi]
19. G. S. Park, S. Lee, D.-S. Kim, S. Y. Park, **J. H. Koh**, D. H. Won, P. Lee, Y. R. Do*, B. K. Min*, "Amorphous TiO_2 passivating contacts for Cu(In,Ga)$(S,Se)_2$ ultrathin solar cells: Defect-state-mediated hole conduction", *Adv. Energy Mater.* **2023**, *13*, 2203183. [doi]
18. J. Park, Y.-J. Ko, C. Lim, H. Kim, B. K. Min, K.-Y. Lee, **J. H. Koh**, H.-S. Oh*, W. H. Lee*, "Strategies for CO_2 electroreduction in cation exchange membrane electrode assembly", *Chem. Eng. J.* **2023**, *453*, 139826. [doi]
17. K. M. G. Langie, K. Tak, C. Kim, H. W. Lee, K. Park, D. Kim, W. Jung, C. W. Lee, H.-S. Oh, D. K. Lee, **J. H. Koh**, B. K. Min, D. H. Won*, U. Lee*, "Toward economical application of carbon capture and utilization technology with near-zero carbon emission", *Nat. Commun.* **2022**, *13*, 7482. [doi]

16. M. H. Han, Y.-J. Ko, S. Y. Lee, C. Lim, W. H. Lee, M. W. Pin, **J. H. Koh**, J. Kim, W. Kim, B. K. Min, H.-S. Oh*, "Thermo-selenized stainless steel as an efficient oxygen evolution electrode for water splitting and CO_2 electrolysis in real water matrices", *J. Power Sources* **2022**, *521*, 230953. [doi]
15. M. H. Han, M. W. Pin, **J. H. Koh**, J. H. Park, J. Kim, B. K. Min, W. H. Lee*, H.-S. Oh*, "Improving the oxygen evolution reaction using electronic structure modulation of sulfur-retaining nickel-based electrocatalysts", *J. Mater. Chem. A* **2021**, *9*, 27034–27040. [doi]
14. **J. H. Koh**†, Q. Zhu†, Y. Asano, M. J. Maher, H. Ha, S.-S. Kim, H. L. Cater, E. U. Mapesa, J. R. Sangoro, C. J. Ellison, N. A. Lynd, C. G. Willson*, "Unusual thermal properties of certain poly(3,5-disubstituted styrene)s", *Macromolecules* **2020**, *53*, 5504–5511. [doi]
13. J. Doise, **J. H. Koh**, J. Y. Kim, Q. Zhu, N. Kinoshita, H. S. Suh, P. R. Delgadillo, G. Vandenberghe, C. G. Willson, C. J. Ellison*, "Strategies for increasing the rate of defect annihilation in the directed self-assembly of high-χ block copolymers", *ACS Appl. Mater. Interfaces* **2019**, *11*, 48419–48427. [doi]
12. J. Doise*, G. Mannaert, H. S. Suh, P. Rincon, **J. H. Koh**, J. Y. Kim, Q. Zhu, G. Vandenberghe, C. G. Willson, C. J. Ellison, "Defect mitigation in sub-20 nm patterning with high-chi, silicon-containing block copolymers", *Advances in Patterning Materials and Processes XXXVI* **2019**, *10960*, 93–101. [doi]
11. **J. H. Koh**†, D. H. Won†, T. Eom†, N.-K. Kim, K. D. Jung, H. Kim*, Y. J. Hwang*, B. K. Min*, "Facile CO_2 electro-reduction to formate via oxygen bidentate intermediate stabilized by high-index planes of Bi dendrite catalyst", *ACS Catal.* **2017**, *7*, 5071–5077. [doi]
10. Y. Sung, J. Lim, **J. H. Koh**, B. K. Min, J. Pyun*, K. Char*, "Arm length dependency of Pt-decorated CdSe tetrapods on the performance of photocatalytic hydrogen generation", *Korean J. Chem. Eng.* **2016**, *33*, 2287–2290. [doi]
9. E. B. Nursanto, H. S. Jeon, C. Kim, M. S. Jee, **J. H. Koh**, Y. J. Hwang*, B. K. Min*, "Gold catalyst reactivity for CO_2 electro-reduction: From nano particle to layer", *Catal. Today* **2016**, *260*, 107–111. [doi]
8. M. S. Jee, H. S. Jeon, C. Kim, H. Lee, **J. H. Koh**, J. Cho, B. K. Min*, Y. J. Hwang*, "Enhancement in carbon dioxide activity and stability on nanostructured silver electrode and the role of oxygen", *Appl. Catal. B* **2016**, *180*, 372–378. [doi]
7. Y. Sung, J. Lim, **J. H. Koh**, L. J. Hill, B. K. Min, J. Pyun*, K. Char*, "Uniform decoration of Pt nanoparticles on well-defined CdSe tetrapods and the effect of their Pt cluster size on photocatalytic H_2 generation", *CrystEngComm* **2015**, *17*, 8423–8427. [doi]
6. H. S. Jeon, **J. H. Koh**, S. J. Park, M. S. Jee, D.-H. Ko, Y. J. Hwang*, B. K. Min*, "A monolithic and standalone solar-fuel device having comparable efficiency to photosynthesis in nature", *J. Mater. Chem. A* **2015**, *3*, 5835–5842. [doi]
5. H. Yoon*, S. H. Sung, **J. H. Koh**, S. M. Kim, S.-J. Choi, K. Y. Suh, K. Char*, "Directional step flow across ridges on multiscale two-face prism array", *Macromol. Res.* **2015**, *23*, 145–148. [doi]
4. **J. H. Koh**, H. S. Jeon, M. S. Jee, E. B. Nursanto, H. Lee, Y. J. Hwang*, B. K. Min*, "Oxygen plasma induced hierarchically structured gold electrocatalyst for selective reduction of carbon dioxide to carbon monoxide", *J. Phys. Chem. C* **2015**, *119*, 883–889. [doi]
3. S. Wooh†, **J. H. Koh**†, S. Lee, H. Yoon*, K. Char*, "Trilevel-structured superhydrophobic pillar arrays with tunable optical functions", *Adv. Funct. Mater.* **2014**, *24*, 5550–5556. [doi]
2. S. Wooh, H. Yoon, J.-H. Jung, Y.-G. Lee, **J. H. Koh**, B. Lee, Y. S. Kang*, K. Char*, "Efficient light harvesting with micropatterned 3D pyramidal photoanodes in dye-sensitized solar cells", *Adv. Mater.* **2013**, *25*, 3111–3116. [doi]
1. S. M. Kim†, D. H. Kang†, **J. H. Koh**, H. S. Suh, H. Yoon*, K.-Y. Suh*, K. Char*, "Thermoresponsive switching of liquid flow direction on a two-face prism array", *Soft Matter* **2013**, *9*, 4145–4149. [doi]

HONORS AND AWARDS

- Kwanjeong Scholarship ($30,000 per year), Kwanjeong Educational Foundation 2016–2019
- Graduate Dean's Prestigious Fellowship, UT Austin 2016–2019
- Superior Academic Performance Scholarship, Seoul National University 2012
- BK21 Scholarship, National Research Foundation of Korea 2011–2012

- Undergraduate Research Grant ($20,000), Korea Foundation for Science and Creativity 2010
- National Undergraduate S&T Scholarship (Full Tuition), National Research Foundation of Korea 2007–2011
- Gwangju Institute of Science and Technology Scholarship 2006
- Bronze Prize, Korean Chemistry Olympiad (KChO) 2005

RESEARCH TALKS AND SEMINARS

Invited Talks:

17. Chung-Ang University, Department of Chemical Engineering and Materials Science, Guest Lecture, "Electrochemical Strategies for CO_2 Capture and Utilization," Seoul, Korea, May 26th, 2026.
16. Korea Institute of Energy Technology, Institute for Environmental and Climate Technology, Seminar, "Ion-conducting polymers for CO_2 electrolysis to chemicals and fuels," Naju, Korea, May 6th, 2026.
15. 2026 Polymer Society of Korea Spring Meeting, Energy Division, "Functional ion-conducting polymers for CO_2 electrolysis to valuable chemicals," Daejeon, Korea, Apr 9th, 2026.
14. Seoul National University of Science and Technology, Chemical and Biomolecular Engineering, Seminar, "Functional ionomers for electrochemical CO_2 conversion to valuable chemicals," Seoul, Korea, Dec 4th, 2025.
13. University of Alabama, Department of Chemical and Biological Engineering, Departmental Seminar, "Ion-conducting polymers for selective CO_2 conversion to chemicals and fuels," Tuscaloosa, AL, Oct 30th, 2025.
12. 2025 KIChE Fall Meeting, Symposium on Future CCU Technologies for Carbon-Neutral Growth in the Refining and Petrochemical Industry, "Advancing electrochemical CO_2 conversion through ion-conducting polymers," Jeju, Korea, Oct 16th, 2025.
11. Sungkyunkwan University, School of Chemical Engineering, Seminar, "Functional ion-containing polymers for selective CO_2 electrolysis," Suwon, Korea, Jan 7th, 2025.
10. Chonnam National University, Department of Petrochemical Materials Engineering, Guest Lecture, "Functional ion-exchange polymers for CO_2 electrolysis," Yeosu, Korea, Nov 25th, 2024.
9. Korea University, Department of Chemical and Biological Engineering, Departmental Seminar, "Functional polymeric materials for CO_2 electrolysis," Seoul, Korea, Nov 20th, 2024.
8. Chung-Ang University, Department of Chemical Engineering and Materials Science, Guest Lecture, "Carbon capture and utilization via electrochemistry," Seoul, Korea, May 13th, 2024.
7. 2023 KIChE 16th Korea-China Bilateral Symposium on Polymer Materials, "Design and synthesis of imidazolium ionomers for Cu-catalyzed electrochemical CO_2 reduction," Yeosu, Korea, Nov 14th, 2023.
6. Chonnam National University, Department of Petrochemical Materials Engineering, Guest Lecture, "Tailoring styrene-based ionomers for enhanced electrochemical CO_2 reduction," Yeosu, Korea, Oct 5th, 2023.
5. Sookmyung Women's University, Department of Chemical and Biological Engineering, Guest Lecture, "Functional materials for electrochemical CO_2 reduction," Seoul, Korea, Sep 27th, 2023.
4. Hongik University, Department of Chemical Engineering, Departmental Seminar, "Functional materials for electrochemical CO_2 reduction," Seoul, Korea, Nov 29th, 2022.
3. 2022 KIChE Spring Meeting, Early Career Investigator Symposium, "Design and synthesis of silicon-containing block copolymers for nanolithography," Jeju, Korea, Apr 21th, 2022.
2. 2022 Polymer Society of Korea Spring Meeting, Early Career Investigator Symposium, "Functional organic materials for directed self-assembly of block copolymers," Daejeon, Korea, Apr 8th, 2022.
1. 2019 ACS Fall National Meeting, PMSE Division, "Selective grafting of polymer brushes enables directed self-assembly of high-χ block copolymers," San Diego, CA, Aug 26th, 2019.

Contributed Talks:

10. 2026 AIChE Annual Meeting, CRE Division, "Ion-conducting polymers for interfacial engineering in CO_2 electrolysis," Minneapolis, MN, *TBD*, 2026.
9. 2026 AIChE Annual Meeting, CRE Division, "Ionomer microenvironment engineering for mechanistic control of electrochemical nitrate reduction to ammonia," Minneapolis, MN, *TBD*, 2026.
8. 2026 ACS Spring National Meeting, POLY/PMSE/ENFL Divisions, "Ion-conducting polymers for interfacial engineering in CO_2 electrolysis," Atlanta, GA, Mar 24th, 2026.

7. 2025 AIChE Annual Meeting, CRE Division, "Interfacial engineering with anion-exchange ionomers for selective CO_2 electrolysis," Boston, MA, Nov 6th, 2025.
6. 2025 ACS Spring National Meeting, CATL Division, "Engineering of side chains in 1-*n*-alkylimidazolium ionomers for CO_2 electrolysis," San Diego, CA, Mar 27th, 2025.
5. 2024 GRC on Fuel Cells (Poster), "Side chain effects in 1-alkylimidazolium ionomers on Cu-catalyzed electrochemical CO_2 reduction," Smithfield, RI, Jul 29th, 2024.
4. 2023 ACS Fall National Meeting, ENFL Division, "Design and synthesis of styrene-based ionomers as binders for electrochemical CO_2 reduction," San Francisco, CA, Aug 17th, 2023.
3. 2019 SPIE Advanced Lithography Conference, "Selective grafting of polymer brushes for directed self-assembly of high-χ block copolymers," San Jose, CA, Feb 27th, 2019.
2. 2015 ACS Fall National Meeting, ENFL Division, "Electrochemical CO_2 conversion catalysts for integrated monolithic solar-fuel generators," Boston, MA, Aug 16th, 2015.
1. 2014 MRS Spring Meeting, "Photoelectrochemical CO_2 conversion for fuel production powered by monolithic thin-film photovoltaic devices," San Francisco, CA, Apr 24th, 2014.

PATENTS

27. "System of utilizing carbon dioxide," U. Lee, D. H. Won, J. H. Koh, D. K. Lee, H.-S. Oh, B. K. Min. US Patent 12,577,695, filed Apr 20, 2022, and issued Mar 17, **2026**.
26. "Electrochemical co-production method for 2,5-furandicarboxylic acid and chemical compound," D. K. Lee, B. C. Moon, W. H. Lee, D. H. Won, U. Lee, J. H. Koh, H.-S. Oh, B. K. Min. KR Patent 10-2936736, filed Sep 26, 2023, and issued Mar 5, **2026**. [doi]
25. "Porous membrane for CO_2 reduction reaction system, the devices containing the membrane and the manufacturing method of the membrane," W. H. Lee, H.-S. Oh, U. Lee, J. H. Koh, D. H. Won, B. K. Min, D. K. Lee. KR Patent 10-2930251, filed Sep 8, 2022, and issued Feb 19, **2026**. [doi]
24. "Catalyst electrode for production of 2,5-furandicarboxylic acid and method for preparation thereof," D. K. Lee, U. Lee, H.-S. Oh, B. K. Min, D. H. Won, J. H. Koh, W. H. Lee, J. Woo, B. C. Moon. KR Patent 10-2893544, filed Sep 14, 2023, and issued Nov 26, **2025**. [doi]
23. "Flow cell and its electrodes for the synchrotron-based in-situ/operando near-edge X-ray absorption spectroscopy measurement using polymer ion exchange membrane," W. H. Lee, H.-S. Oh, K. H. Chae, D. K. Lee, U. Lee, D. H. Won, J. H. Koh, B. K. Min. KR Patent 10-2890545, filed Jan 12, 2023, and issued Nov 20, **2025**. [doi]
22. "Flow-through reactor for conversion of carbon dioxide and method for reduction of carbon dioxide using the reactor," D. H. Won, H.-S. Oh, U. Lee, W. H. Lee, D. K. Lee, J. H. Koh, B. K. Min, C. Kim, D. Kim. KR Patent 10-2858288, filed Oct 23, 2023, and issued Sep 8, **2025**. [doi]
21. "Mixed catalyst electrode for electrochemical production of 2.5-furandicarboxylic acid, manufacture of the same," D. K. Lee, J. Woo, B. C. Moon, W. H. Lee, J. H. Koh, D. H. Won, U. Lee, H.-S. Oh, B. K. Min. KR Patent 10-2793233, filed Oct 7, 2022, and issued Apr 3, **2025**. [doi]
20. "Manufacturing method of cobalt foam electrode for oxygen evolution reaction," H.-S. Oh, W. H. Lee, B. K. Min, U. Lee, D. K. Lee, D. H. Won, J. H. Koh, K. H. Chae. KR Patent 10-2783121, filed Sep 8, 2022, and issued Mar 13, **2025**. [doi]
19. "Silver chloride nanoparticle, catalyst electrode, electrochemical reactor and system for reduction of carbon dioxide," D. H. Won, U. Lee, H.-S. Oh, D. K. Lee, J. H. Koh, W. H. Lee, B. K. Min, Y. Chae. KR Patent 10-2707019, filed Jul 7, 2022, and issued Sep 10, **2024**. [doi]
18. "Electrode Structure and Electrolysis Apparatus using the same," U. Lee, H. W. Lee, C. Kim, K. Kim, D. H. Won, J. H. Koh, D. K. Lee, H.-S. Oh, B. K. Min. KR Patent 10-2700321, filed Nov 22, 2021, and issued Aug 26, **2024**. [doi]
17. "System of utilizing Carbon Dioxide," U. Lee, D. H. Won, J. H. Koh, D. K. Lee, H.-S. Oh, B. K. Min. KR Patent 10-2653962, filed Aug 19, 2021, and issued Mar 28, **2024**. [doi]
16. "Electrolysis Apparatus Capable of Controlling Gas Pressure," U. Lee, K. Kim, C. Kim, H. W. Lee, D. H. Won, J. H. Koh, D. K. Lee, H.-S. Oh, B. K. Min. KR Patent 10-2649663, filed Oct 28, 2021, and issued Mar 15,

2024. [doi]

15. "Catalyst-electrode structure and electrochemical reactor using the same and system of utilizing carbon dioxide using the same," U. Lee, D. H. Won, J. H. Koh, D. K. Lee, H.-S. Oh, H. J. Lee, B. K. Min, Y. J. Ko, C. Kim. KR Patent 10-2638399, filed Aug 19, 2021, and issued Feb 15, **2024**. [doi]
14. "Metal-phosphorized catalyst for producing 2,5-furandicarboxylic acid and producing method of 2,5-furandicarboxylic acid using thereof," D. K. Lee, B. C. Moon, J. Woo, J. H. Koh, D. H. Won, U. Lee, H.-S. Oh, B. K. Min. KR Patent 10-2543047, filed Nov 2, 2021, and issued Jun 8, **2023**. [doi]
13. "Flow plate for electrochemical carbon dioxide reduction device forming unidirectional flow," U. Lee, C. Kim, D. H. Won, J. H. Koh, H.-S. Oh, D. K. Lee, B. K. Min. KR Patent 10-2524209, filed Apr 29, 2021, and issued Apr 18, **2023**. [doi]
12. "Silver incorporated chalcopyrite thin film and manufacturing method thereof," B. K. Min, B. W. Kim, Y. J. Hwang, H.-S. Oh, U. Lee, D. K. Lee, D. H. Won, J. H. Koh. KR Patent 10-2512512, filed Sep 3, 2020, and issued Mar 16, **2023**. [doi]
11. "Iridium alloy catalyst having reversible catalytic activity and preparation method thereof," H.-S. Oh, W. H. Lee, B. K. Min, Y. J. Hwang, U. Lee, D. K. Lee, D. H. Won, J. H. Koh. KR Patent 10-2491462, filed Mar 10, 2020, and issued Jan 18, **2023**. [doi]
10. "A hydrogen production and storage system using solar energy independently operated without external power," U. Lee, B. K. Min, H. J. Lee, Y. J. Hwang, H.-S. Oh, D. K. Lee, D. H. Won, J. H. Koh, D. G. Han. KR Patent 10-2434620, filed Mar 23, 2020, and issued Aug 17, **2022**. [doi]
9. "Carbon dioxide CO_2 recycling electrochemical device," U. Lee, H. W. Lee, K. Kim, J. H. Koh, D. H. Won, D. K. Lee, H.-S. Oh, Y. J. Hwang, B. K. Min. KR Patent 10-2418964, filed Oct 6, 2020, and issued Jul 5, **2022**. [doi]
8. "Catalyst electrode, method for manufacturing the catalyst electrode, electrochemical reactor comprising the same and system for reduction of carbon dioxide," D. H. Won, U. Lee, H.-S. Oh, D. K. Lee, J. H. Koh, B. K. Min. KR Patent 10-2409746, filed Oct 26, 2021, and issued Jun 13, **2022**. [doi]
7. "System for reduction of carbon dioxide," U. Lee, D. H. Won, D. K. Lee, H.-S. Oh, J. H. Koh, B. K. Min. KR Patent 10-2399070, filed Sep 7, 2021, and issued May 12, **2022**. [doi]
6. "Self-driving electrochemical cell," U. Lee, B. K. Min, H. J. Lee, Y. J. Hwang, H.-S. Oh, D. K. Lee, D. H. Won, J. H. Koh, K. Kim. KR Patent 10-2386012, filed Mar 10, 2020, and issued Apr 8, **2022**. [doi]
5. "Electrocatalyst for CO_2 reduction and method for manufacturing the same," H.-S. Oh, W. H. Lee, C. Lim, Y. J. Hwang, U. Lee, D. K. Lee, D. H. Won, J. H. Koh. KR Patent 10-2372659, filed Feb 13, 2020, and issued Mar 4, **2022**. [doi]
4. "Photoelectrode for hydrogen generation in solar water splitting and manufacturing method thereof," D. K. Lee, B. K. Min, B. W. Kim, Y. J. Hwang, H.-S. Oh, U. Lee, J. H. Koh. KR Patent 10-2311750, filed Feb 13, 2020, and issued Oct 5, **2021**. [doi]
3. "Photoelectrochemical artificial photosynthesis device," B. K. Min, Y. J. Hwang, J. H. Koh, H. S. Jeon. KR Patent 10-2155231, filed Mar 16, 2015, and issued Sep 7, **2020**. [doi]
2. "Carbon dioxide reduction electrode and the preparation method thereof," B. K. Min, J. H. Koh, Y. J. Hwang. KR Patent 10-1636024, filed Jul 18, 2014, and issued Jun 28, **2016**. [doi]
1. "Selective reducing method of carbon dioxide using silicon nanowire and pyridine," Y. J. Hwang, B. K. Min, O. S. Joo, J. H. Koh, S. J. Sim, H. S. Jeon, M. S. Jee. KR Patent 10-1566471, filed Feb 20, 2014, and issued Oct 30, **2015**. [doi]

TEACHING

Teaching Assistant

- Introduction to Polymers (ChE 355), UT Austin — Fall 2018
- Organic Chemistry for Chemical Engineers (Chem 328N), UT Austin — Spring 2018
- Elementary Lab for Chemical and Biological Engineering, Seoul National University — Fall 2011

SERVICE AND MEMBERSHIP

- **Industrial Liaison Officer** of KIChE Polymer Division 2024–Present
- **Judge** for KIChE Polymer Division Poster Awards Spring, Fall 2023
- **Judge** for PSK Student Presentation Awards Fall 2022
- **Member** of Korean Institute of Chemical Engineers (KIChE), Polymer Society of Korea (PSK), American Chemical Society (ACS), American Institute of Chemical Engineers (AIChE)
- **Reviewer** for *ACS Nano; ACS Sustainable Chemistry & Engineering; Journal of Industrial and Engineering Chemistry; International Journal of Precision Engineering and Manufacturing.*
- **Thesis Committee Member** for Younghyun Chae (UST, Dec 2025), Myeonghwan Oh (UST, Dec 2023), Chanwoo Lee (UST, May 2023), Achmad Buhori (UST, Dec 2022), Jaekyoung Kim (SeoulTech, Dec 2022), Seong Gil Heo (SeoulTech, Jun 2022)
- **Qualifying Exam Committee Member** for Hyung Rae Kim (Korea Univ., Jul 2025), Younghyun Chae (UST, Mar 2025), Jihyun Park (Korea Univ., Jan 2025), Myeonghwan Oh (UST, Sep 2023), Wonsang Jung (UST, Mar 2023), Chanwoo Lee (UST, Mar 2023)
- **Undergraduate Research Advisor** for Insu Jeong (Incheon Nat'l Univ., Feb 2024), Hyeon Ji Kim (Yonsei Univ., Jun 2023), Su Min Choi (Konkuk Univ., Dec 2022), Hyesu Song (Sogang Univ., Dec 2022), Da Young Shim (Hanyang Univ., Aug 2022), Gyeongjin Kwon (Yonsei Univ., Aug 2022), Minju Kang (Ewha Womans Univ., Feb 2022), Kwanwoo Chun (Hanyang Univ., Feb 2022)