

Curriculum Vitae

Seoni Kim, Ph.D.

Affiliation

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Education

2012.03 – 2018.02 Ph.D. in Chemical and Biological Engineering

Seoul National University, Seoul, Republic of Korea

Advisor: Prof. Jeyong Yoon

Dissertation: “*Studies on System Operation and Electrode Designs for Faradaic and Non-Faradaic Ion Capturing in Environmental Applications*”

2008.03 – 2012.02 B.S. in Chemical and Biological Engineering

Seoul National University, Seoul, Republic of Korea

Work Experience

2023.03 – present Assistant Professor

Department of Environmental Science and Engineering, Ewha Womans University,
Seoul, Republic of Korea

2019.06 – 2023.02 Postdoctoral Associate

Department of Chemical Engineering, Massachusetts Institute of Technology (MIT),
Cambridge, Massachusetts, USA

Advisor : Prof. T. Alan Hatton

2018.04 – 2019.05 Postdoctoral Research Fellow

Institute for Chemical Processes (ICP) and School of Chemical and Biological
Engineering, Seoul National University, Seoul, Republic of Korea

Advisor : Prof. Jeyong Yoons

Honors and Awards

- 20th Human Tech Paper Award, Samsung Electronics (2014): recipient

- 24th Human Tech Paper Award, Samsung Electronics (2017): co-recipient

List of Publications

(*Corresponding authors, †Equal contribution)

- [1] Seoni Kim*, Hyejung Shin, Jin Soo Kang*, *Current Opinion in Electrochemistry* **2023**, 40, 101321, “Electrochemical reduction of captured CO₂: a route toward the integrated carbon capture and utilization”
- [2] **Seoni Kim**, Michael Nitzsche, Simon B. Rufer, Jack R. Lake, Kripa K. Varanasi*, T. Alan Hatton*, *Energy & Environmental Science* **2023**, 16, 2030-2044, “Asymmetric chloride-mediated electrochemical process for CO₂ removal from oceanwater”
- [3] Jin Soo Kang†, **Seoni Kim**†, Jiho Kang, Hwajoo Joo, Junghwan Jang, Kyusik Jo, Subin Park, Hyoung-il Kim, Sung Jong Yoo, Jeyong Yoon*, Yung-Eun Sung*, T. Alan Hatton*, *Environmental Science & Technology* **2022**, 56, 12602-12612. “Surface electrochemistry of carbon electrodes and faradaic reactions in capacitive deionization”
- [4] **Seoni Kim**†, Minjune Choi†, Jin Soo Kang, Hwajoo Joo, Byung Hyun Park, Yung-Eun Sung, Jeyong Yoon*, *Catalysis Today* **2021**, 359, 83-89. “Electrochemical recovery of LiOH from used CO₂ adsorbents”
- [5] Jin Soo Kang†, **Seoni Kim**†, Dong Young Chung, Yoon Jun Son, Kyusik Jo, Xiao Su, Myeong Jae Lee, Hwajoo Joo, T. Alan Hatton, Jeyong Yoon*, Yung-Eun Sung*, *Advanced Functional Materials* **2020**, 30, 1909387. “Rapid inversion of surface charges in heteroatom-doped porous carbon: a route to robust electrochemical desalination”
- [6] **Seoni Kim**†, Jin Soo Kang†, Hwajoo Joo, Yung-Eun Sung*, Jeyong Yoon*, *Environmental Science & Technology* **2020**, 54, 9044-6051. “Understanding the behaviors of λ -MnO₂ in electrochemical lithium recovery: Key limiting factors and a route to the enhanced performance”
- [7] **Seoni Kim**, Hwajoo Joo, Taegyun Moon, Seung-Hyun Kim, Jeyong Yoon*, *Environmental Science: Processes and Impacts* **2019**, 21, 667-676 “Rapid and selective lithium recovery from desalination brine using an electrochemical system”

- [8] **Seoni Kim**, Jiye Kim, Seonghwan Kim, Jaehan Lee, Jeyong Yoon*, *Environmental Science: Water Research & Technology* **2018**, 4, 175-182. "Electrochemical lithium recovery and organic pollutant removal from industrial wastewater of a battery recycling plant" (highlighted as front cover)
- [9] **Seoni Kim**, Jaehan Lee, Jin Soo Kang, Kyusik Jo, Seonghwan Kim, Yung-Eun Sung, Jeyong Yoon*, *Chemosphere* **2015**, 125, 50-56. "Lithium recovery from brine using a λ -MnO₂/activated carbon hybrid supercapacitor system"
- [10] Kyle M. Diederichsen, Rezvan Sharifian, Jin Soo Kang, Yayuan Liu, **Seoni Kim**, Betar M. Gallant, David Vermaas, T. Alan Hatton*, *Nature Reviews Methods Primers* **2022**, 2, 68. "Electrochemical methods for carbon dioxide separations"
- [11] Lei Wu, Changyong Zhang, **Seoni Kim**, T. Alan Hatton, Hengliang Mo, T. David Waite*, *Water Research* **2022**, 221, 118822. "Lithium recovery using electrochemical technologies: Advances and challenges"
- [12] Seon Yeop Jung, Hwajoo Joo, Ji Hee Kim, **Seoni Kim**, Seongmin Heo*, Jeyong Yoon*, *Desalination* **2022**, 532, 115732. "Electrode design and performance of flow-type electrochemical lithium recovery (ELR) systems"
- [13] Jin Soo Kang, **Seoni Kim**, T. Alan Hatton*, *Current Opinion in Green and Sustainable Chemistry* **2021**, 31, 100504. "Redox-responsive sorbents and mediators for electrochemically based CO₂ capture"
- [14] Seok Kim, Jin Soo Kang, **Seoni Kim**, Seongmin Kang, Yung-Eun Sung, Kangwoo Cho*, Jeyong Yoon*, *Catalysis Today* **2021**, 375, 514-521. "Electrochemical regeneration of free chlorine treated nickel oxide catalysts for oxidation of aqueous pollutants"
- [15] Kyusik Jo, Youngbin Baek*, **Seoni Kim**, Sung Pil Hong, Jeyong Yoon*, *Korean Journal of Chemical Engineering* **2020**, 37, 1199-1205. "Evaluation of long-term stability in capacitive deionization using activated carbon electrodes coated with ion exchange polymers"
- [16] Hwajoo Joo, Seon Yeop Jung, **Seoni Kim**, Kyung Hyun Ahn, Won Sun Ryoo*, Jeyong Yoon*, *ACS Sustainable Chemistry & Engineering* **2020**, 8, 9622-9631.

“Application of a Flow-Type Electrochemical Lithium Recovery System with λ -MnO₂/LiMn₂O₄: Experiment and Simulation”

[17] Sung Pil Hong, Hansun Yoon, Jaehan Lee, Choonsoo Kim, **Seoni Kim**, Jiho Lee, Changha Lee, Jeyong Yoon*, *Journal of Colloid and Interface Science* **2020**, 564, 1-7. “Selective phosphate removal using layered double hydroxide/reduced graphene oxide (LDH/rGO) composite electrode in capacitive deionization”

[18] Jaehan Lee, Seoni Kim, Nayeong Kim, Choonsoo Kim*, Jeyong Yoon*, *Applied Sciences* **2020**, 10, 403. “Enhancing the desalination performance of capacitive deionization using a layered double hydroxide coated activated carbon electrode”

[19] Hwajoo Joo, **Seoni Kim**, Seongsoo Kim, Minjune Choi, Seung-Hyun Kim, Jeyong Yoon*, *Environmental Science: Water Research & Technology* **2020**, 6, 290-295. “Pilot-scale demonstration of an electrochemical system for lithium recovery from the desalination concentrate”

[20] Jaewuk Ahn, Jiho Lee, **Seoni Kim**, Choonsoo Kim, Jaehan Lee, P. M. Biesheuvel, Jeyong Yoon*, *Desalination* **2020**, 476, 114216. “High performance electrochemical saline water desalination using silver and silver-chloride electrodes”

[21] Hansun Yoon, Jiho Lee, **Seoni Kim**, Jeyong Yoon*, *Separation and Purification Technology* **2019**, 215, 190-2070 “Review of concepts and applications of electrochemical ion separation (EIONS) process”

[22] Jin Soo Kang, Jiho Kang, Dong Young Chung, Yoon Jun Son, **Seoni Kim**, Seongjun Kim, Jin Kim, Juwon Jeong, Myeong Jae Lee, Heejong Shin, Subin Park, Sung Jong Yoo, Min Jae Ko, Jeyong Yoon, Yung-Eun Sung*, *Journal of Materials Chemistry A* **2018**, 6, 20170-20183. “Tailoring the porosity of MOF-derived N-doped carbon electrocatalysts for highly efficient solar energy conversion”

[23] Seungyeon Choi, Barsha Chang, **Seoni Kim**, Jiho Lee, Jeyong Yoon, Jang Wook Choi*, *Advanced Functional Materials* **2018**, 1802665. “Battery electrode materials with omnivalent cation storage for fast and charge-efficient ion removal of asymmetric capacitive deionization”

- [24] Seongsoo Kim, Jaehan Lee, **Seoni Kim**, Seonghwan Kim, Jeyong Yoon*, *Energy Technology* **2018**, 6, 340-344. "Electrochemical lithium recovery with a LiMn₂O₄-Zinc battery system using zinc as a negative electrode"
- [25] Seonghwan Kim, Choonsoo Kim, Jaehan Lee, **Seoni Kim**, Jiho Lee, Jiye Kim, Jeyong Yoon*, *ACS Sustainable Chemistry & Engineering* **2018**, 6, 1620-1626. "Hybrid electrochemical desalination system combined with an oxidation process"
- [26] Jaehan Lee, **Seoni Kim**, Choonsoo Kim, Jeyong Yoon*, *Energy & Environmental Science* **2014**, 7, 3683-3689. "Hybrid capacitive deionization to enhance the desalination performance of capacitive techniques"
- [27] Choonsoo Kim, Jaehan Lee, **Seoni Kim**, Jeyong Yoon*, *Desalination* **2014**, 342, 70-74. "TiO₂ sol-gel spray method for carbon electrode fabrication to enhance desalination efficiency of capacitive deionization"

International Presentations

- [1] “Electrochemical resource recovery using battery electrode materials” 2023 MRS Spring Meeting & Exhibit 2023, San Francisco, California, United States.
- [2] “Electrochemically modulated CO₂ removal from oceanwater” 242nd ECS Meeting 2022, Atlanta, Georgia, United States.
- [3] “Electrochemical ion separation processes: lithium recovery” 5th Ertl Symposium on Catalytic & Adsorption Reactions in Chemical Processes 2018, Gwangju, Republic of Korea. (Invited)
- [4] “Faradaic and non-Faradaic electrode designs for robust electrochemical lithium recovery from brine and wastewater” 256th American Chemical Society (ACS) National Meeting & Exhibition 2018, Boston, Massachusetts, United States.
- [5] “Electrochemical system for simultaneous lithium recovery and organic removal from industrial wastewater” 2017 International Conference on Capacitive Deionization, Electrosorption & Electrodialysis (CDI&E) 2017, Seoul, Republic of Korea.
- [6] “Effect of ion composition and electrode properties on electrochemical lithium ion recovery process for application in various source waters” 253rd American Chemical Society (ACS) National Meeting & Exhibition 2017, San Francisco, California, United States.
- [7] “Electrocatalysis-integrated strategy for lithium recovery from industrial wastewater” 18th Topical Meeting of the International Society of Electrochemistry (ISE) 2016, Gwangju, Republic of Korea.
- [8] “A new electrochemical system for simultaneous lithium ion recovery and organic pollutant removal from industrial wastewater” 1st International Water Nexus Conference (IWNC) 2015, Daegu, Republic of Korea.
- [9] “Lithium recovery from wastewater using a hybrid supercapacitor” 65th Annual Meeting of the International Society of Electrochemistry (ISE) 2014, Lausanne, Switzerland.
- [10] “Lithium recovery using carbon electrode as negative electrode in battery” 9th World Congress of Chemical engineering (WCCE) 2013, Seoul, Republic of Korea.
- [11] “Performance evaluation of CDI system based on electrode capacitance” American Chemical Society (ACS) National Meeting & Exhibition 2012, Philadelphia, Pennsylvania, United States.

Patents

- [1] T. Alan Hatton, Kripa K. Varanasi, John Lake, **Seoni Kim**, WO 2022/178119 (2022.8.25) “Electrochemical removal of carbon dioxide and related methods”
- [2] T. Alan Hatton, Kripa K. Varanasi, John Lake, **Seoni Kim**, WO 2022/178125 (2022.8.25) “Electrochemical conversion to carbonate-containing compounds and related methods”
- [3] Jeyong Yoon, Jaehan Lee, Sungpil Hong, **Seoni Kim**, Jiho Lee, Hansun Yoon, United States #16219957 (2020.3.5) “Methods for manufacturing adsorption electrode and adsorption electrode manufactured using the same”
- [4] Jeyong Yoon, Sungpil Hong, Jaehan Lee, **Seoni Kim**, Jiho Lee, Republic of Korea #10-2069444 (2020.2.11) “Selective Removal for Phosphate by Electrochemical Process with Layered Double Hydroxide / reduced Graphene Oxide (LDH/rGO) Composite Electrode”
- [5] Jeyong Yoon, **Seoni Kim**, Hwajoo Joo, Republic of Korea #10-1859871 (2018.5.14) “Recovery method of lithium from used carbon dioxide absorbent”
- [6] Jeyong Yoon, Jaehan Lee, **Seoni Kim**, Choonsoo Kim, Republic of Korea #10-1759158 (2017.7.12) “Hybrid deionization apparatus”
- [7] Jeyong Yoon, **Seoni Kim**, Jaehan Lee, Choonsoo Kim, Republic of Korea #10-1455093 (2014.10.21) “Method for recovering metal from waste battery”
- [8] Jeyong Yoon, **Seoni Kim**, Jaehan Lee, Choonsoo Kim, Republic of Korea #10-1464272 (2014.11.17) “Method for recovering lithium A”.