Dong-Joo Yoo

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School of Mechanical Engineering,
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Professional Experiences

Assistant Professor, 2022.03 – present
School of Mechanical Engineering,
Korea University, Seoul, Korea

Postdoctoral Research Associate, 2021.04 – 2022.02
Advanced Electrolyte Team, Chemical Sciences and Engineering Division,
Argonne National Laboratory, IL, USA.
Advisor: Dr. Zhengcheng (John) Zhang

Postdoctoral Research Associate, 2020.09 – 2021.03
School of Chemical and Biological Engineering and Institute of Chemical Processes,
Seoul National University, Seoul, Korea
Advisor: Prof. Jang Wook Choi

Education

Seoul National University, Seoul, Korea 2020.8
Ph.D. School of Chemical and Biological Engineering
Research Advisor: Prof. Jang Wook Choi

Thesis: Design and analysis of organic molecules for lithium metal and aluminum complex ion batteries

Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Korea 2017.2
M.S. Graduate School of EEWS (Energy, Environment, Water, Sustainability)
Research Advisor: Prof. Jang Wook Choi

Thesis: Aluminum metal-based high efficiency energy storage system development

Yonsei University, Seoul, Korea 2015.2
B.S. Material Science and Engineering (double-major: Chemical and Biomolecular Engineering)
GPA: 3.81/4.3 (3.98/4.5, rank: 1/33)

Military service 2010.01.26 – 2011.11.15

Research Interest

- Electrochemistry (Electrochemical reaction mechanism, Solid-Electrolyte-Interphase layer)
- Novel Process Technology for Batteries (Laser-based process, Patterning, Calendering)
- Physics-based Battery System Analysis (Electrodes, Cells, Packs)
- Secondary Batteries (Lithium metal anodes, Multivalent ion batteries)

Awards and Honors

- Miwon Young Investigator Award, the Korean Society of Industrial and Engineering Chemistry May 2023
- POSCO Science Fellowship (Post-Doc in energy material field), POSCO TJ Park Foundation Jan 2021

- Postdoctoral Fellowship of the Fostering Next Generation Researchers Program (Post-Doc Domestic Training), National Research Foundation of Korea (NRF) Sep 2020
- Shinyang Young Investigator Award, Shinyang Foundation, Seoul National University Jun 2019
- User Paper Award, Seoul National University Center for Inter-University Research Facilities (NCIRF) Apr 2019
- Full Scholarship in B.S. degree, Korea Student Aid Foundation (KOSAF) 2008-2014

Publications

1. S. Kim, D. Lee, Y. Han, H. W. Kim, **D.-J. Yoo***, “"Abnormal lithium plating in the electrode edges at low N/P ratios in lithium-ion batteries”, ***J. Power Sources***, 2024, 601, 234301 ***(IF=9.2)***

2. I. Hwang†, D.-U. Kim†, J. W. Choi*, **D.-J. Yoo***, “"Toward practical multivalent ion batteries with quinone-based organic cathodes”, ***ACS Appl. Mater. Interfaces***, 2023, accepted ***(IF=9.5)***

3. Q. Liu, W. Jiang, J. Xu, Y. Xu, Z. Yang, **D.-J. Yoo**, K. Pupek, C. Wang, C. Liu, K. Xu*, Z. Zhang*, “A fluorinated cation introduces new interphasial chemistries to enable high-voltage lithium metal batteries”, ***Nat. Commun.***, 2023, 14, 3678 ***(IF=16.6)***

4. **D.-J. Yoo**, Q. Liu, O. Cohen, M. Kim, K. A. Persson*, Z. Zhang*, "Rational Design of Fluorinated Electrolytes for Low Temperature Lithium-Ion Batteries", ***Adv. Energy Mater***, 2023, 2204182 ***(IF=27.8)***

5. D. H. Yun†, J.-j. Song†, J. Kim, J. K. Seo, J. Kang, S. Park, **D.-J. Yoo***, S. Choi*, “Binder-Driven Cathode-Electrolyte Interphase via Displacement Reaction for High Voltage Na3V2(PO4)2F3 Cathode in Sodium-Ion Batteries”, ***J. Mater. Chem. A***, 2023, 11, 5540-5547 ***(IF=11.9)***

6. E. Park†, J. Park†, K. Lee†, Y. Zhao, T. Zhou, G. Park, M.-G. Jeong, M. Choi, **D.-J. Yoo**, H.-G. Jung, A. Coskun*, J. W. Choi*, “Exploiting the Steric Effect and Low Dielectric Constant of 1,2-Dimethoxypropane for 4.3 V Lithium Metal Batteries”, ***ACS Energy Lett.***, 2023, 8, 179, ***(IF=22.0)***

7. G. Park, K. Lee, **D.-J. Yoo***, J. W. Choi*, “Strategy for Stable Interface in Lithium Metal Batteries: Free Solvent-derived vs. Anion-derived”, ***ACS Energy Lett.***, 2022, 7, 4274, ***(IF=22.0)***

8. S. Azam, Q. Meisner, C. P. Aiken, W. Song, Q. Liu, **D.-J. Yoo**, A. Eldesoky, Z. Zhang, J. R. Dahn*, “Performance of a Novel In-Situ Converted Additive for High Voltage Li-ion Pouch Cells”, ***J. Electrochem. Soc.***, 2022, 169, 100552, ***(IF=3.9)***

9. **D.-J. Yoo**, Q. Liu, O. Cohen, M. Kim, K. A Persson, Z. Zhang*. “Understanding the role of SEI layer in low-temperature performance of lithium-ion batteries”, ***ACS Appl. Mater. Interfaces***, 2022, 14, 11910, ***(IF=9.5)***

10. N. M Johnson, Z. Yang, M. Kim, **D.-J. Yoo**, Q. Liu, Z. Zhang*, “Enabling Silicon Anodes with Novel Isosorbide-Based Electrolytes”, ***ACS Energy Lett.***, 2022, 7, 897, ***(IF=22.0)***

11. J. Kim†, H. Shin†, **D.-J. Yoo**†, S. Kang, S.-Y. Chung*, K. Char*, J. W. Choi*, “Cobalt(II)-Centered Fluorinated Phthalocyanine-Sulfur SNAr Chemistry for Robust Lithium-Sulfur Batteries with Superior Conversion Kinetics”, ***Adv. Funct. Mater.***, 2021, 2106679 ***(IF=19.0)***

12. **D.-J. Yoo**, M. Heeney, F. Glöcklhofer*, J. W. Choi*, “Tetradiketone macrocycle for divalent aluminium ion batteries”, ***Nat. Commun.***, 2021, 12, 2386 ***(IF=16.6)***

13. S.-G. Woo, E.-K. Hwang, H.-K. Kang, H. Lee, J.-N. Lee, H.-S. Kim, G. Jeong, **D.-J. Yoo**, J. Lee, S. Kim, J.-S. Yu *, J. W. Choi*, “High transference number enabled by sulfated zirconia superacid for lithium metal batteries with carbonate electrolytes”, ***Energy Environ. Sci.***, 2021, 14, 1420-1428 ***(IF=32.5)***

14. **D.-J. Yoo**, S. Yang, K. J. Kim*, J. W. Choi*, "Fluorinated Aromatic Diluent for High-Performance Lithium Metal Batteries", ***Angew. Chem. Int. Ed.***, 2020, 59, 14869-14876 ***(IF=16.6)***

15. S. Eder†, **D.-J. Yoo**†, W. Nogala, M. Pletzer, A. S. Bonilla, A. White, K. Jelfs, M. Heeney, J. W. Choi*, F. Glocklhofer*, "Switching between local and global aromaticity in a conjugated macrocycle enables high-performance organic sodium-ion battery anodes", ***Angew. Chem. Int. Ed.***, 2020, 59, 12958-12964 ***(IF=16.6)***

16. **D.-J. Yoo**, J. W. Choi*, "Elucidating the Extraordinary Rate and Cycling Performance of Phenanthrenequinone in Aluminum Complex-Ion Batteries", ***J. Phys. Chem. Lett.*** 2020, 11, 2384-2392 ***(IF=5.7)***

17. S. H. Choi†, S. J. Lee†, **D.-J. Yoo**, J. H. Park, J.-H Park, Y. N. Ko, J. Park, Y.-E. Sung, S.-Y. Chung*, H. Kim*, J. W. Choi*, "Marginal Magnesium Doping for High Performance Lithium Metal Batteries", ***Adv. Energy Mater.*** 2019, 1902278 ***(IF=27.8)***

18. **D.-J. Yoo**†, A. Elabd†, S. Choi†, Y. Cho, J. Kim, S. J. Lee, S. H. Choi, T.-w. Kwon, K. Char, K. J. Kim*, A. Coskun*, J. W. Choi*, "Highly Elastic Polyrotaxane Binders for Mechanically Stable Lithium Hosts in Lithium Metal Batteries", ***Adv. Mater.***, 2019, 31, 1901645 ***(IF=29.4)***

19. B. Lee, J. Choi, S. Na, **D.-J. Yoo**, J. H. Kim, B. W. Cho, Y.-T. Kim, T. Yim*, J. W. Choi*, S. H. Oh*, "Critical role of elemental copper for enhancing conversion kinetics of sulphur cathodes in rechargeable magnesium batteries", ***Appl. Surf. Sci.***, 2019, 484, 933 (***IF=6.7***)

20. D. J. Kim†, **D.-J. Yoo**†, M. T. Otley, A. Prokofjevs, C. Pezzato, M. Owczarek, S. J. Lee, J. W. Choi*, J. F. Stoddart*, "Rechargeable Aluminium Organic Batteries", ***Nat. Energy***, 2019, 4, 51-59 (***IF=56.7***)

21. **D.-J. Yoo**†, S. Yang†, Y. S. Yun, J. H. Choi, D. Yoo, K. J. Kim*, J. W. Choi*, "Tuning the Electron Density of Aromatic Solvent for Stable Solid-Electrolyte-Interphase Layer in Carbonate-based Lithium Metal Batteries"***, Adv. Energy Mater.***, 2018, 8, 1802365 (***IF=27.8***)

22. **D.-J. Yoo**, K. J. Kim*, J. W. Choi*, "The Synergistic Effect of Cation and Anion of an Ionic Liquid Additive for Lithium Metal Anodes", ***Adv. Energy Mater.***, 2018, 8, 1702744 (***IF=27.8***)

23. **D.-J Yoo**†, J.-S. Kim†, J. Shin, K. J. Kim, J. W. Choi*, "Stable Performance of Aluminum Metal Battery by Incorporating Lithium Ion Chemistry", ***ChemElectroChem***, 2017, 4, 2345-2351 **(*IF=4.0*)**

24. S. C. Jung, Y.-J. Kang, **D.-J. Yoo**, J. W. Choi*, Y.-K. Han*, "Flexible Few-Layered Graphene for the Ultrafast Rechargeable Aluminum-Ion Battery", ***J. Phys. Chem. C***, 2016, 120, 13384-13389 **(*IF=3.7*)**

25. J.-S. Kim, **D.-J. Yoo**, J. Min, R. A. Shakoor, R. Kahraman*, J. W. Choi*, "Poreless Separator and Electrolyte Additive for Lithium-Sulfur Batteries with High Areal Energy Densities", ***ChemNanoMat***, 2015, 1, 240-245 (***IF=3.8***)

26. J.-S. Kim, D. Ko, **D.-J. Yoo**, D. S. Jung, C. T. Yavuz, N.-I. Kim, I.-S. Choi, J. Y. Song*, J. W. Choi*, "A Half Millimeter Thick Co-planar Flexible Battery with Wireless Recharging Capability", ***Nano Lett.***, 2015, 15, 2350-2357 (***IF=10.8***)

Patents

1. 리튬금속 전지용 전해액 및 이를 포함하는 리튬 금속 전지, 2021. 5. 11 (10-2021-0060670 출원)

2. RECHARGEABLE ALUMINUM ORGANIC BATTERIES (알루미늄 유기 이차 전지), 2019. 7. 19 (17/261,490 출원)

3. 전해질 및 이를 포함하는 리튬 금속전지, 2022. 11. 17 (10-2468498 등록) (LG 화학공동출원)

Conference Presentation

1. Elucidating the Extraordinary Rate and Cycling Performance of Phenanthrenequinone in Aluminum Complex-Ion Batteries, 2020. 7. 7. KCS (Korean Chemical Society), Suwon, Korea (oral)

2. Highly Elastic Polyrotaxane Binders for Mechanically Stable Lithium Hosts in Lithium-Metal Batteries, 2020. 01. 17. NCC (Nano Convergence Conference), Gangwon, Korea (poster)

3. Rechargeable Aluminium Organic Batteries, 2019. 12. 3. MRS (Materials Research Society), Boston, USA (poster)

4. Highly Elastic Polyrotaxane Binders for Mechanically Stable Lithium Hosts in Lithium-Metal Batteries, 2019. 10. 17. KCS (Korean Chemical Society), Changwon, Korea (poster)

5. Rechargeable Aluminium Organic Batteries, 2019. 4. 17. KCS (Korean Chemical Society), Suwon, Korea (oral)

6. Tuning the Electron Density of Aromatic Solvent for Stable Solid-Electrolyte-Interphase Layer in Lithium Metal Batteries, 2018. 10. 18. KCS (Korean Chemical Society), Daegu, Korea (oral)

7. The Synergistic Effect of Cation and Anion of an Ionic Liquid Additive for Lithium Metal Anodes, 2018. 6. 20. IMLB (International Meeting on Lithium Batteries), Kyoto, Japan (Poster)

8. The Synergistic Effect of Cation and Anion of an Ionic Liquid Additive for Lithium Metal Anodes, 2018. 4. 26. KICHE (Korean Institute of Chemical Engineers), Changwon, Korea (Poster)

9. The Synergistic Effect of Cation and Anion of an Ionic Liquid Additive for Lithium Metal Anodes, 2018. 1. 11. NCC (Nano Convergence Conference), Seoul, Korea (Poster)

10. Stable Performance of Aluminum Metal Batter by Incorporating Lithium Ion Chemistry, 2017. 4. 21. KCS (Korean Chemical Society), Goyang, Korea (Poster)