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Education

- 2020.03. ~ Present: Combined MS and Ph. D in Chemical Engineering, Sungkyunkwan University, Korea
- 2016.03. ~ 2020.02.: BS in Chemical Engineering, Sungkyunkwan University, Korea

Research Expertise

- **Battery Chemistry:** Specializing in plating/stripping chemistry on Zn metal anode with a focus on surface modification, substrate design, and electrolyte optimization to reduce electrolyte decomposition and dendrite growth.
- **MnO₂ Deposition/Stripping Mechanism:** Development for cathode applications.
- **Li-S Battery:** Synthesis of carbon/metal composites to enhance cathode stability.
- **2D Materials:** Application of black phosphorus as a substitute for graphene.

Research Experience

- **Electrochemical Analysis:** Expertise in GC, CV, EIS, GITT, CA, CP, EQCM, and other techniques.
- **Materials Synthesis:** Proficient in hydrothermal methods, electrospinning, sintering, etc.
- **Battery Testing:** Skilled in battery fabrication from powder to coin cell, working with glove boxes, and testing with equipment from Wonatech, Maccor, Neware, and EC-Lab.
- **Computational Analysis:** Experienced in DFT using VASP, chemical structure optimization, and binding energy calculations.
- **Analysis Techniques:** Proficient in XRD, XPS, SEM, TEM, FIB, CP (cross-sectional polisher), confocal microscopy, and SIMS (secondary ion mass spectroscopy).

Publications

1. First Author:

- Electrospun carbon nanofiber hosts for stable zinc metal anode. *International Journal of Energy Research* 46.6 (2022): 7201-7214.
- Polyoxometalate-polymer hybrid artificial layers for ultrastable and reversible Zn metal anodes. *Chemical Engineering Journal* 468 (2023): 143644.
- Hierarchical hybrid architecture of carbon nanotube branches grown onto steam activated-reduced graphene oxide/Ni nanoparticle for lithium-sulfur battery cathode. *Electrochimica Acta* 462 (2023): 142750.

2. Co-Author:

- High Na-ion conductivity and mechanical integrity of anion-exchanged polymeric hydrogel electrolytes for flexible sodium ion hybrid energy storage. *SusMat* (2024).
- Crystal reconstruction of V₂O₃/carbon heterointerfaces via anodic hydration for ultrafast and reversible Mg-ion battery cathodes. *InfoMat* (2024): e12517.
- Polyacrylic acid tethered onto the surface of vinyl functionalized silica nanoparticles for flexible hydrogel electrolytes of sodium ion hybrid supercapacitors. *Next Energy* 1.4 (2023): 100066.
- Intercalation of bilayered V₂O₅ by electronically coupled PEDOT for greatly improved kinetic performance of magnesium ion battery cathodes. *Chemical Engineering Journal* 460 (2023): 141706.
- MXene ink hosting zinc anode for high performance aqueous zinc metal batteries. *Journal of Energy Chemistry* 76 (2023): 187-194.
- Hierarchically structured silicon/graphene composites wrapped by interconnected carbon nanotube branches for lithium-ion battery anodes. *International Journal of Energy Research* 46.11 (2022): 15627-15638.
- Recent progress of artificial interfacial layers in aqueous Zn metal batteries. *EnergyChem* 4.4 (2022): 100076.

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- Galvanically replaced artificial interfacial layer for highly reversible zinc metal anodes. Applied Physics Reviews 9.1 (2022).

Patents

- 산화 포스포린이 코팅된 아연 이온 전극 및 이를 포함하는 아연 이온 배터리 및 상기 전극을 제조하는 방법 (등록)
- 인공계면층이 형성된 아연 금속 전극 및 그 제조 방법 (등록)
- 음극 전극 그 제조 방법 및 이를 이용한 이차 전지 (출원, US patent application in progress)
- 수계-비수계 혼합형 아연이온전지 전해질 및 이의 제조방법 (출원)
- 알루미늄 이온 이차전지, 알루미늄 이온 이차전지용 전해질, 알루미늄 이온 이차전지용 음극, 알루미늄 이온 이차전지용 음극 제조방법 및 알루미늄 이온 이차전지 제조방법 (출원)

Current Position

- Visiting Graduate Researcher at UCLA under PI Bruce Dunn (2023.08.20 - 2024.07.28)
- PI at Home Institution: Ho Seok Park

Skills

- Technical Skills: Electrochemical analysis, materials synthesis, battery testing, computational modeling.
- Software: VASP, EC-Lab, Maccor, Neware, Wonatech.
- Languages: Korean (native), English (fluent in work situations)