Mun Sek KIM
Nanyang Assistant Professor | School of Mechanical and Aerospace Engineering | Nanyang Technological University
Email: munsek.kim@ntu.edu.sg | Web: www.munsekkimlab.com | ORCID: 0000-0003-0918-3870

ACADEMIC PROFILE

FWCI (2020-2026): 11.62 | **H-Index**: 28 | **Citations**: >5500

Research Focus: Governing principles of metallic-anode interphases; Electrolyte/interphase coupling; Metallic-anode and anode-free systems

Publications: 31 peer-reviewed journal articles
First-Author in Nature Materials, Nature Energy, Science Advances (Full List)

Patents: 31 patent documents across US, KR, and CN jurisdictions (30 granted)
Lead-Inventor on 28 patents [US/KR/CN] (Full List)

EDUCATION

09/2019 – 06/2024	**Stanford University** Doctor of Philosophy (**Ph.D.**) in Chemical Engineering	California, USA
08/2014 – 05/2016	**Cornell University** Master of Science (**M.S.**) in Chemical and Biomolecular Engineering	New York, USA
08/2010 – 05/2014	**University of California, Berkeley** Bachelor of Science (**B.S.**) in Chemical & Biomolecular Engineering	California, USA

PROFESSIONAL EXPERIENCE

10/2025 – Present
School of Mechanical and Aerospace Engineering
Nanyang Technological University (Singapore)
Nanyang Assistant Professor (Tenure-track)

06/2024 – 06/2025
Battery Electrolyte Team
SES AI (Woburn, MA, USA)
Senior Scientist (Post-PhD experience)

01/2020 – 06/2024
Professor Yi Cui's Laboratory
Stanford University (Stanford, CA, USA)
Graduate Student Researcher
(Advisors/Dissertation Committees: Yi Cui, Zhenan Bao, Jian Qin)

09/2019 – 01/2020
Professor Zhenan Bao's Laboratory
Stanford University (Stanford, CA, USA)
Graduate Student Researcher (Department Rotation Program)

07/2016 – 07/2019
Center for Energy Storage Research
Korea Institute of Science and Technology (Seoul, Rep. of Korea)
Research Scientist (In lieu of national military service, extremely selective)

08/2014 – 06/2016
Professor Lynden A. Archer's Laboratory
Cornell University (Ithaca, NY, USA)
Graduate Student Researcher
(Advisor: Lynden A. Archer)

05/2011 – 05/2014
Professor Roya Maboudian's Laboratory
University of California, Berkeley (Berkeley, CA, USA)
Undergraduate Student Researcher
(Advisor: Roya Maboudian)

Mun Sek KIM
Nanyang Assistant Professor | School of Mechanical and Aerospace Engineering | Nanyang Technological University
Email: munsek.kim@ntu.edu.sg | Web: www.munsekkimlab.com | ORCID: 0000-0003-0918-3870

AWARDS & RECOGNITION

- **Distinguished Student Speaker Chemical Engineering Convocation**, *Selected as a distinguished student in the chemical engineering department at Stanford to present research areas of Life, Energy, and the Environment*, **Stanford University** (2023).

- **IOP Trusted Reviewer Award**, *Demonstrating a high level of peer review competence, with the ability to critique scientific literature to an excellent standard*, **Institute of Physics** (2023)

- **KIST Award**, *The highest award of KIST given to the best employee who has provided the most creative and innovative contribution to KIST's development*, **Korea Institute of Science and Technology** (2018)

- **John M. Prausnitz Award for Outstanding Undergraduate Research in Chemical and Biomolecular Engineering**, *The highest graduation award for the one distinguished undergraduate*, Department of Chemical & Biomolecular Engineering at **University of California, Berkeley** (2014)

- **Dean's honor list of 2013**, *Recognition from College of Chemistry Dean for outstanding academic performance*, Department of Chemical & Biomolecular Engineering at **University of California, Berkeley** (2013)

- **College of Chemistry Undergraduate Research Stipend Winner**, *Research stipend grant from College of Chemistry Department to highly selective undergraduate researchers*, Department of Chemical & Biomolecular Engineering at **University of California, Berkeley** (2013)

- **Green Chemistry Competition third-prize winner**, *Proposing the most innovative ideas on Green Chemistry with $3,000 award*, Big Ideas at **University of California, Berkeley** (2011)

- **MIT IDSS Data Science and Machine Learning**: Making Data-Driven Decisions, *2nd Place in Data Science and Machine Learning Program*, **MIT IDSS** (2025).

Mun Sek KIM
Nanyang Assistant Professor | School of Mechanical and Aerospace Engineering | Nanyang Technological University
Email: munsek.kim@ntu.edu.sg | Web: www.munsekkimlab.com | ORCID: 0000-0003-0918-3870

FIRST/CO-FIRST AUTHOR PUBLICATIONS († denotes co-first author | * denotes corresponding author)

---

1. **Mun Sek Kim**†, Jingyang Wang†, Wenbo Zhang†, Philaphon Sayavong, Zewen Zhang, Solomon T. Oyakhire, Sanzeeda Baig Shuchi, Sang Cheol Kim, Yi Cui, Yuelang Chen, Zhiao Yu, Huaxin Gong, Rong Xu, Junyoung Lee, Il Rok Choi, Jun Ho Lee, Kristin A. Persson, Jian Qin, Zhenan Bao*, and Yi Cui*
   Elucidating the Effects of LiF on Lithium Metal Anodes
   Nano Letters 25, 14625–14634 (2025).

2. Junyoung Lee†, **Mun Sek Kim**†, Yi Cui, Wenbo Zhang, Sanzeeda Baig Shuchi, Sarah E. Holmes, Jun Ho Lee, Chad Serrao, Sang Cheol Kim, John Holoubek, Philaphon Sayavong, Angela Cai, Il Rok Choi, and Yi Cui*
   Reactive Suspension Electrolytes for Lithium Metal Batteries
   ACS Energy Letters 10, 4252−4259 (2025).

3. **Mun Sek Kim**, Zewen Zhang, Jingyang Wang, Solomon T. Oyakhire, Sang Cheol Kim, Zhiao Yu, Yuelang Chen, David T. Boyle, Yusheng Ye, Zhuojun Huang, Wenbo Zhang, Rong Xu, Philaphon Sayavong, Stacey F. Bent, Jian Qin, Zhenan Bao, Yi Cui*
   Revealing the Multifunctions of Li3N in the Suspension Electrolyte for Lithium Metal Batteries
   ACS Nano 17, 3, 3168–3180 (2023).

4. **Mun Sek Kim**†, Zewen Zhang†, Paul E. Rudnicki, Zhiao Yu, Jingyang Wang, Hansen Wang, Solomon T. Oyakhire, Yuelang Chen, Sang Cheol Kim, Wenbo Zhang, David T. Boyle, Xian Kong, Rong Xu, Zhuojun Huang, William Huang, Stacey F. Bent, Lin-Wang Wang, Jian Qin, Zhenan Bao, Yi Cui*
   Suspension electrolyte with modified Li^+ solvation environment for lithium metal batteries
   Nature Materials 21, 445–454 (2022). Behind the Paper [Link]

5. Seung Hun Lee†, **Mun Sek Kim**†, Jung-Hoon Lee, Ji-Hyun Ryu, Vandung Do, Byeong Gwon Lee, Woong Kim*, Won Il Cho*
   A Li–In alloy anode and Nb_2CTX artificial solid-electrolyte interphase for practical Li metal batteries
   Journal of Materials Chemistry A 10, 4157-4169 (2022).

6. **Mun Sek Kim**, Deepika, Seung Hun Lee, Min-Seop Kim, Ji-Hyun Ryu, Kwang-Ryeol Lee, Lynden A. Archer*, Won Il Cho*
   Enabling reversible redox reactions in electrochemical cells using protected LiAl intermetallics as lithium metal anodes
   Science Advances 5, eaax5587 (2019).

7. **Mun Sek Kim**, Ji-Hyun Ryu, Deepika, Young Rok Lim, In Wook Nah, Kwang-Ryeol Lee, Lynden A. Archer*, Won Il Cho*
   Langmuir–Blodgett artificial solid-electrolyte interphases for practical lithium metal batteries
   Nature Energy 3, 889–898 (2018).

8. **Mun Sek Kim**, Min-Seop Kim, Vandung Do, Young Rok Lim, In Wook Nah, Lynden A. Archer*, Won Il Cho*
   Designing solid-electrolyte interphases for lithium sulfur electrodes using ionic shields
   Nano Energy 41, 573-582 (2017).

9. **Mun Sek Kim**, Lin Ma, Snehashis Choudhury, Lynden A. Archer*
   Multifunctional Separator Coatings for High-Performance Lithium–Sulfur Batteries
   Advanced Materials Interfaces 3, 1600450 (2016).

10. **Mun Sek Kim**, Lin Ma, Snehashis Choudhury, Surya Moganty, Shuya Wei, Lynden A. Archer*
    Fabricating multifunctional nanoparticle membranes by a fast layer-by-layer Langmuir–Blodgett process: application in lithium–sulfur batteries
    Journal of Materials Chemistry A 4, 14709-14719 (2016).

11. Ben Hsia†, **Mun Sek Kim**†, Lunet E. Luna†, Nisha R. Mair, Yongkwan Kim, Carlo Carraro, Roya Maboudian*
Templated 3D Ultrathin CVD Graphite Networks with Controllable Geometry: Synthesis and Application As Supercapacitor Electrodes
ACS Applied Materials & Interfaces 6, 18413-18417 (2014).

12. **Mun Sek Kim**, Ben Hsia, Carlo Carraro, Roya Maboudian*
Flexible micro-supercapacitors with high energy density from simple transfer of photoresist-derived porous carbon electrodes
Carbon 74, 163-169 (2014).

CO-AUTHOR PUBLICATIONS († denotes co-first author | * denotes corresponding author)

---

1. Yuqi Li, Xueli Zheng, Evan Z. Carlson, Xin Xiao, Xiwen Chi, Yi Cui, Louisa C. Greenburg, Ge Zhang, Elizabeth Zhang, Chenwei Liu, Yufei Yang, **Mun Sek Kim**, Guangxia Feng, Pu Zhang, Hance Su, Xun Guan, Jiawei Zhou, Yecun Wu, Zhichen Xue, Weiyu Li, Michal Bajdich, Yi Cui
In situ formation of liquid crystal interphase in electrolytes with soft templating effects for aqueous dual-electrode-free batteries
Nature Energy 9, 1350–1359 (2024).

2. Sang Cheol Kim, Xin Gao, Sheng-Lun Liao, Hance Su, Yuelang Chen, Wenbo Zhang, Louisa C. Greenburg, Jou-An Pan, Xueli Zheng, Yusheng Ye, **Mun Sek Kim**, Philaphon Sayavong, Aaron Brest, Jian Qin, Zhenan Bao, Yi Cui*
Solvation-property relationship of lithium-sulphur battery electrolytes
Nature Communications 15, 1268 (2024).

3. Wenbo Zhang, Philaphon Sayavong, Xin Xiao, Solomon T. Oyakhire, Sanzeeda Baig Shuchi, Rafael A. Vilá, David T. Boyle, Sang Cheol Kim, **Mun Sek Kim**, Sarah E. Holmes, Yusheng Ye, Donglin Li, Stacey F. Bent, Yi Cui*
Recovery of isolated lithium through discharged state calendar ageing
Nature 626, 306–312 (2024).

4. Solomon T. Oyakhire, Sheng-Lun Liao, Sanzeeda Baig Shuchi, **Mun Sek Kim**, Sang Cheol Kim, Zhiao Yu, Rafael A. Vilá, Paul E. Rudnicki, Yi Cui, Stacey F. Bent*
Proximity Matters: Interfacial Solvation Dictates Solid Electrolyte Interphase Composition
Nano Letters 23, 16, 7524–7531 (2023).

5. Sang Cheol Kim, Jingyang Wang, Rong Xu, Pu Zhang, Yuelang Chen, Zhuojun Huang, Yufei Yang, Zhiao Yu, Solomon T. Oyakhire, Wenbo Zhang, Louisa C. Greenburg, **Mun Sek Kim**, David T. Boyle, Philaphon Sayavong, Yusheng Ye, Jian Qin, Zhenan Bao, Yi Cui*
High-entropy electrolytes for practical lithium metal batteries
Nature Energy 8, 814–826 (2023).

6. Philaphon Sayavong, Wenbo Zhang, Solomon T. Oyakhire, David T. Boyle, Yuelang Chen, Sang Cheol Kim, Rafael A. Vilá, Sarah E. Holmes, **Mun Sek Kim**, Stacey F. Bent, Zhenan Bao, Yi Cui*
Dissolution of the Solid Electrolyte Interphase and Its Effects on Lithium Metal Anode Cyclability
Journal of the American Chemical Society 145, 22, 12342–12350 (2023).

7. Sang Cheol Kim, Solomon T. Oyakhire, Jingyang Wang, Zewen Zhang, Wenbo Zhang, David T. Boyle, **Mun Sek Kim**, Zhiao Yu, Xin Gao, Tomi Sogade, Esther Wu, Jian Qin, Zhenan Bao, Stacey F. Bent, Yi Cui*
Data-driven electrolyte design for lithium metal anodes
Proceedings of the National Academy of Sciences 120 (10) e2214357120 (2023).

8. Solomon T. Oyakhire, Wenbo Zhang, Zhiao Yu, Sarah E. Holmes, Philaphon Sayavong, Sang Cheol Kim, David T. Boyle, **Mun Sek Kim**, Zewen Zhang, Yi Cui, Stacey F. Bent*
Correlating the Formation Protocols of Solid Electrolyte Interphases with Practical Performance Metrics in Lithium Metal Batteries
ACS Energy Letters 8, 1, 869–877 (2023).

9. David T. Boyle, Yuzhang Li, Allen Pei, Rafael A. Vilá, Zewen Zhang, Philaphon Sayavong, **Mun Sek Kim**, William Huang, Hongxia Wang, Yunzhi Liu, Rong Xu, Robert Sinclair, Jian Qin, Zhenan Bao, Yi Cui*
Resolving Current-Dependent Regimes of Electroplating Mechanisms for Fast Charging Lithium Metal Anodes
Nano Letters 22, 20, 8224–8232 (2022).

10. Zhiao Yu, Paul E. Rudnicki, Zewen Zhang, Zhuojun Huang, Hasan Celik, Solomon T. Oyakhire, Yuelang Chen, Xian Kong, Sang Cheol Kim, Xin Xiao, Hansen Wang, Yu Zheng, Gaurav A. Kamat, **Mun Sek Kim**, Stacey F. Bent, Jian Qin, Yi Cui, Zhenan Bao*
Rational solvent molecule tuning for high-performance lithium metal battery electrolytes
Nature Energy 7, 94-106 (2022).

11. Jingxu Zheng, **Mun Sek Kim**, Zhengyuan Tu, Snehashis Choudhury, Tian Tang, Lynden A. Archer*
Regulating electrodeposition morphology of lithium: towards commercially relevant secondary Li metal batteries
Chemical Society Reviews 49(9), 2701-2750 (2020).

12. Min-Seop Kim, **Mun Sek Kim**, Vandung Do, Yongyao Xia, Woong Kim, Won Il Cho*
Facile and scalable fabrication of high-energy-density sulfur cathodes for pragmatic lithium-sulfur batteries
Journal of Power Sources 422, 104-112 (2019).

13. Vandung Do, Deepika, **Mun Sek Kim**, Min Seop Kim, Kwang Ryeol Lee, Won Il Cho*
Carbon Nitride Phosphorus as an Effective Lithium Polysulfide Adsorbent for Lithium–Sulfur Batteries
ACS Applied Materials & Interfaces 11, 12, 11431–11441 (2019).

14. Ki Min Kwon, In Gyeom Kim, Kwan-Young Lee, Hansung Kim, **Mun Sek Kim**, Won Il Cho, Jaeyoung Choi, In Wook Nah*
α-Fe2O3 anchored on porous N doped carbon derived from green microalgae via spray pyrolysis as anode materials for lithium ion batteries
Journal of Industrial and Engineering Chemistry 69, 39-47 (2019).

15. Lin Ma, **Mun Sek Kim**, Lynden A. Archer*
Stable Artificial Solid Electrolyte Interphases for Lithium Batteries
Chemistry of Materials 29, 10, 4181–4189 (2017).

16. Lin Ma, Houlong L. Zhuang, Shuya Wei, Kenville E. Hendrickson, **Mun Sek Kim**, Gil Cohn, Richard G. Hennig, Lynden A. Archer*
Enhanced Li–S Batteries Using Amine-Functionalized Carbon Nanotubes in the Cathode
ACS Nano 10, 1, 1050–1059 (2015).

17. Ben Hsia, **Mun Sek Kim**, Carlo Carraro, Roya Maboudian*
Cycling characteristics of high energy density, electrochemically activated porous-carbon supercapacitor electrodes in aqueous electrolytes
Journal of Materials Chemistry A 1, 10518-10523 (2013).

18. John P. Alper, **Mun Sek Kim**, Maxime Vincent, Ben Hsia, Velimir Radmilovic, Carlo Carraro, Roya Maboudian*
Silicon carbide nanowires as highly robust electrodes for micro-supercapacitors
Journal of Power Sources 230, 298-302 (2013).

19. Ben Hsia, **Mun Sek Kim**, Maxime Vincent, Carlo Carraro, Roya Maboudian
Photoresist-derived porous carbon for on-chip micro-supercapacitors
Carbon 57, 395-400 (2013).

CONFERENCE PROCEEDINGS

1. **Mun Sek Kim**, Ben Hsia, Carlo Carraro, Roya Maboudian
Flexible micro-supercapacitors from photoresist-derived carbon electrodes on flexible substrates
The 27th International Conference (IEEE MEMS 2014, San Francisco, USA) 389-392 (2014).

2. Ben Hsia, Shuya Wang, **Mun Sek Kim**, Carlo Carraro, Roya Maboudian
All solid-state micro-supercapacitors using ionogel electrolyte
The 17th International Conference (TRANSDUCERS 2013, Barcelona, Spain) 1328-1331 (2013).

3. Maxime Vincent, **Mun Sek Kim**, Carlo Carraro, Roya Maboudian
Silicon carbide nanowires as an electrode material for high temperature supercapacitors
The 25th International Conference (IEEE MEMS 2012, Paris, France) 39-42 (2012).

4. Ben Hsia, Maxime Vincent, **Mun Sek Kim**, Carlo Carraro, Roya Maboudian
Photoresist-derived porous carbon for integrated on-chip energy storage
2012 Hilton Head Solid-State Sensors, Actuators and Microsystems Workshop 254-255 (2012).

PATENTS

1. **Mun Sek Kim**, Won Il Cho, Ji-Hyun Ryu, Seung Hun Lee
Anode for lithium metal secondary battery including mxene thin film, method for producing the anode and lithium metal secondary battery including the anode
Worldwide Application: US
Filing Date: February 26, 2019
Issue Date: February 16, 2021
Patent Number: US10923725B2
Status: Granted

2. Won Il Cho, Vandung Do, **Mun Sek Kim**, In Wook Nah, Min-Seop Kim
Aqueous binder for lithium-sulfur secondary battery, preparation method thereof and lithium-sulfur secondary battery comprising the same
Worldwide Application: US
Filing Date: February 14, 2019
Issue Date: November 17, 2020
Patent Number: US10840514B2
Status: Granted

3. **Mun Sek Kim**, Won Il Cho, Ji-Hyun Ryu, Seung Hun Lee, In Wook Nah
Lithium-based hybrid anode material, preparation method thereof and lithium metal battery comprising the same
Worldwide Application: KR
Filing Date: November 27, 2018
Issue Date: January 4, 2021
Patent Number: 1022002680000
Status: Granted

4. Won Il Cho, Vandung Do, **Mun Sek Kim**, In Wook Nah, Min-Seop Kim
Aqueous binder for lithium-sulfur secondary battery, preparation method thereof and lithium-sulfur secondary battery comprising the same
Worldwide Application: KR
Filing Date: October 15, 2018
Issue Date: September 8, 2020
Patent Number: KR102152982B1
Status: Granted

5. **Mun Sek Kim**, Won Il Cho, Seung Hun Lee, Ji-Hyun Ryu, In Wook Nah
Artificial solid electrolyte interphase for protecting anode of rechargeable battery, preparation method thereof and lithium metal battery comprising the same
Worldwide Application: KR
Filing Date: July 26, 2018
Issue Date: May 27, 2020
Patent Number: 1021180230000
Status: Granted

6. Won Il Cho, Vandung Do, **Mun Sek Kim**, Min-Seop Kim, In Wook Nah
Coating composition for separator of secondary battery comprising P-doped graphitic carbon nitride, preparation method thereof and Li-S battery comprising the same
Worldwide Application: KR
Filing Date: June 14, 2018
Issue Date: May 14, 2020
Patent Number: 1021132220000
Status: Granted

7. **Mun Sek Kim**, Won Il Cho, Ji-Hyun Ryu, In Wook Nah, Min-Seop Kim, Sun Min Park
Electrolyte system for lithium metal secondary battery and lithium metal secondary battery including the same
Worldwide Application: US
Filing Date: May 9, 2018
Issue Date: October 13, 2020
Patent Number: US10804567B2
Status: Granted

8. **Mun Sek Kim**, Won Il Cho, Ji-Hyun Ryu, In Wook Nah, Min-Seop Kim, Sun Min Park
Electrolyte system and lithium metal battery comprising the same
Worldwide Application: KR
Filing Date: April 23, 2018
Issue Date: April 3, 2020
Patent Number: 1020993870000
Status: Granted

9. **Mun Sek Kim**, Won Il Cho, In Wook Nah, Vandung Do, Min-Seop Kim, Ji-Hyun Ryu, Sun Min Park
ANODE FORMED SOLID ELECTROLYTE INTERPHASE PROTECTIVE LAYER COMPRISING GRAPHENE NANOPARTICLE AND LITHIUM METAL BATTERY COMPRISING THE SAME
Worldwide Application: KR
Filing Date: April 17, 2018
Issue Date: December 18, 2019
Patent Number: 1020591040000
Status: Granted

10. **Mun Sek Kim**, Won Il Cho, In Wook Nah, In-Hwan Oh, Seung Hun Lee
Interlayer for protecting anode of rechargeable battery, preparation method thereof and lithium metal battery comprising the same
Worldwide Application: KR
Filing Date: April 2, 2018
Issue Date: January 16, 2020
Patent Number: 1020692840000
Status: Granted

11. **Mun Sek Kim**, Won Il Cho, In Wook Nah, In-Hwan Oh, Seung Hun Lee
Solid electrolyte interphase comprising amino functionalized reduced graphene oxide thin film for protecting anode of rechargeable battery, preparation method thereof and lithium metal battery comprising the same
Worldwide Application: KR
Filing Date: March 14, 2018
Issue Date: April 18, 2019
Patent Number: 1019720340000
Status: Granted

12. **Mun Sek Kim**, Won Il Cho, Seung Hun Lee, Min-Seop Kim, Van Dung Do, In Wook Nah, In-Hwan Oh
Artificial solid electrolyte interphase of metallic anode for secondary battery including amino-functionalized carbon structures to protect anode material, method for producing anode and lithium metal secondary battery including anode produced by the method
Worldwide Application: US
Filing Date: March 8, 2018
Issue Date: February 16, 2021
Patent Number: US10923726B2
Status: Granted

13. **Mun Sek Kim**, Won Il Cho, Seung Hun Lee, Min-Seop Kim, Vandung Do
Solid electrolyte interphase comprising amino functionalized multi-walled carbon nanotube for protecting anode of rechargeable battery, preparation method thereof and lithium metal battery comprising the same
Worldwide Application: KR
Filing Date: March 8, 2018
Issue Date: October 17, 2019
Patent Number: 1020357780000
Status: Granted

14. **Mun Sek Kim**, Won Il Cho, Ji-Hyun Ryu, Seung Hun Lee
Anode for lithium metal battery comprising Nb2C thin film, preparation method thereof and lithium metal battery comprising the same
Worldwide Application: KR
Filing Date: February 26, 2018
Issue Date: April 21, 2020
Patent Number: KR102100849B1
Status: Granted

15. **Mun Sek Kim**, Won Il Cho, Ji-Hyun Ryu, Seung Hun Lee
Anode for lithium metal battery comprising Nb2C thin film, preparation method thereof and lithium metal battery comprising the same
Worldwide Application: KR
Filing Date: February 26, 2018
Issue Date: April 8, 2020
Patent Number: 1021008490000
Status: Granted

16. **Mun Sek Kim**, Won Il Cho, Ji-Hyun Ryu, Seung Hun Lee
Anode for lithium metal battery comprising Ti2C thin film, preparation method thereof and lithium metal battery comprising the same
Worldwide Application: KR
Filing Date: February 26, 2018
Issue Date: April 8, 2020
Patent Number: 1021008540000
Status: Granted

17. **Mun Sek Kim**, Won Il Cho, Ji-Hyun Ryu, Seung Hun Lee, Sun Min Park
Anode for lithium metal battery comprising Ti3C2 thin film, preparation method thereof and lithium metal battery comprising the same
Worldwide Application: KR
Filing Date: February 26, 2018
Issue Date: April 8, 2020
Patent Number: 1021008760000
Status: Granted

18. **Mun Sek Kim**, Won Il Cho, In Wook Nah, Ji-Hyun Ryu, Sun Min Park, Min-Seop Kim
Nitrogen doped reduced graphene oxide artificial solid electrolyte interphase and anode for lithium metal battery comprising the same
Worldwide Application: KR
Filing Date: February 23, 2018
Issue Date: November 13, 2019
Patent Number: 1020465470000
Status: Granted

19. **Mun Sek Kim**, Won Il Cho, In Wook Nah, Ji-Hyun Ryu, Min-Seop Kim, Sun Min Park
PHOSPHORUS DOPED and phosphate functionalized REDUCED GRAPHENE OXIDE ARTIFICIAL SOLID ELECTROLYTE INTERPHASE AND ANODE FOR LITHIUM METAL BATTERY COMPRISING THE SAME
Worldwide Application: KR
Filing Date: February 23, 2018
Issue Date: November 13, 2019
Patent Number: 1020465540000
Status: Granted

20. **Mun Sek Kim**, Won Il Cho, Ji-Hyun Ryu, Seung Hun Lee, Kyung Won Lee
Electrolyte system and lithium metal battery comprising the same
Worldwide Application: KR
Filing Date: January 3, 2018
Issue Date: January 2, 2020
Patent Number: 1020638210000
Status: Granted

21. **Mun Sek Kim**, Won Il Cho, Ji-Hyun Ryu, Seung Hun Lee
Electrolyte system and lithium metal battery comprising the same
Worldwide Application: KR
Filing Date: January 3, 2018
Issue Date: November 13, 2019
Patent Number: 1020465380000
Status: Granted

22. **Mun Sek Kim**, Won Il Cho, In Wook Nah, Young Rok Lim, Sun Min Park, In-Hwan Oh
Polyethyleneimine-attached carbonaceous material and separator for lithium-sulfur battery coated with the same
Worldwide Application: US
Filing Date: December 19, 2017
Issue Date: July 28, 2020
Patent Number: US10727466B2
Status: Granted

23. **Mun Sek Kim**, Won Il Cho, In Wook Nah, In-Hwan Oh, Vandung Do
Functionalized metal oxide nanoparticles and lithium anode for lithium-sulfur battery including the same
Worldwide Application: US
Filing Date: December 19, 2017
Issue Date: May 19, 2020
Patent Number: US10658670B2
Status: Granted

24. **Mun Sek Kim**, Won Il Cho, In Wook Nah, Min-Seop Kim, Sun Min Park, Byung Ik Jang, Seung Hun Lee
SEPARATOR WITH SANDWICHED CONFIGURATION FOR SECONDARY BATTERY, METHOD FOR FABRICATING THE SAME, AND SECONDARY BATTERY COMPRISING THE SAME
Worldwide Application: KR
Filing Date: June 27, 2017
Issue Date: June 20, 2019
Patent Number: 1019932770000
Status: Granted

25. **Mun Sek Kim**, Won Il Cho, Vandung Do, Seung Hun Lee, Byung Ik Jang, Min-Seop Kim, In Wook Nah
CATHODE FOR LITHIUM-SULFUR BATTERY WITH POLYETHYLENEIMINE AND MANGANESE DIOXIDE, AND LITHIUM-SULFUR BATTERY COMPRISING THE SAME
Worldwide Application: KR
Filing Date: June 27, 2017
Issue Date: December 12, 2018
Patent Number: 1019303950000
Status: Granted

26. **Mun Sek Kim**, Won Il Cho, In Wook Nah, Young Rok Lim, Sun Min Park, In-Hwan Oh
Polyethyleneimine carbon-based material attached and separator for lithium-sulfur battery comprising the same
Worldwide Application: KR
Filing Date: March 15, 2017
Issue Date: July 8, 2019
Patent Number: KR101997074B1
Status: Granted

27. **Mun Sek Kim**, Won Il Cho, In Wook Nah, Min Seop Kim, Lynden A. Archer, Snehashis Choudhury, Zhengyuan Tu
Lithium metal anode comprising langmuir-blodgett films as an artificial solid electrolyte interface layer, lithium metal battery comprising the same, and preparation method thereof
Worldwide Application: US
Filing Date: February 27, 2017
Issue Date: March 26, 2019
Patent Number: US10243197B2
Status: Granted

28. **Mun Sek Kim**, Won Il Cho, In Wook Nah, In-Hwan Oh, Vandung Do
FUNCTIONALIZED METAL OXIDE NANOPARTICLES AND LITHIUM ANODE FOR LITHIUM-SULFUR BATTERY INCLUDING THE SAME
Worldwide Application: KR
Filing Date: February 22, 2017
Issue Date: September 4, 2018
Patent Number: 1018972060000
Status: Granted

29. **Mun Sek Kim**, Snehashis Choudhury, Lin Ma, Lynden A. Archer
Organized nanoparticulate and microparticulate coatings and methods of making and using same
Worldwide Application: US
Filing Date: December 12, 2016
Issue Date: April 19, 2022
Patent Number: US11309613B2
Status: Granted

30. **Mun Sek Kim**, Snehashis Choudhury, Lin Ma, Lynden A. Archer
Organized nanoparticulate and microparticulate coatings and methods of making and using same
Worldwide Application: CN
Filing Date: December 12, 2016
Issue Date: September 28, 2018
Patent Number: CN108602017A
Status: Published

31. **Mun Sek Kim**, Won Il Cho, In Wook Nah, Min Seop Kim, Lynden A. Archer, Snehashis Choudhury, Zhengyuan Tu
Lithium metal anode comprising Langmuir-Blodgett layer, battery comprising the same, and preparation method thereof
Worldwide Application: KR
Filing Date: October 28, 2016
Issue Date: October 30, 2018
Patent Number: KR101913338B1
Status: Granted

Mun Sek KIM
Nanyang Assistant Professor | School of Mechanical and Aerospace Engineering | Nanyang Technological University
Email: munsek.kim@ntu.edu.sg | Web: www.munsekkimlab.com | ORCID: 0000-0003-0918-3870

PROFESSIONAL SERVICE

Journal Reviewer: Nature Communications, Science Advances, Advanced Materials, Advanced Energy Materials, Advanced Functional Materials, ACS Nano, SusMat, Advanced Materials Interfaces, Materials Today Energy, Small, ACS Applied Materials & Interfaces, Science Bulletin, Journal of The Electrochemical Society, Carbon.

Academic Service:
2026 Dissertation Defence Committee Member: Dong Hyuk Kang, Korea University
2026 NTU MAE FYP Moderator
2026 MOE Innovation Programme Mentor
2026 Singapore Science and Engineering Fair Judge
2026 NTU Faculty Supervisor for Internship Students (Thow Jia Jing Isaac, Tian Haotong, Varun Krishna)
2026 NTU Open House Faculty Service
2026 Singapore Airshow NTU MAE Faculty
2026 EASE Tea Party NTU MAE Faculty
2025 Qualifying Exam Committee Member: Hee-Jae Ahn

INVITED PRESENTATIONS

- **Mun Sek Kim**, "Engineering the Interphase for Lithium Metal Batteries", The 7th International Conference on Manufacturing Process & Technology, Malaysia, February 2026.
- **Mun Sek Kim**, "Investigating the effects of solid-electrolyte interphase inorganic compounds for lithium metal anodes", The 14th International Conference on Advanced Materials and Devices, South Korea, December 2025.
- **Mun Sek Kim**, "Engineering the Interphase for Lithium Metal Batteries", Pusan National University, South Korea, December 2025.
- **Mun Sek Kim**, "Elucidating the Effects of LiF on Lithium Metal Anodes", Advancing Science and Technology from Asia to Global Collaboration, Singapore, November 2025.
- **Mun Sek Kim**, "Engineering the Interphase for Lithium Metal Batteries", Ulsan National Institute of Science & Technology, South Korea, October 2025.
- **Mun Sek Kim**, "Suspension Electrolytes for Lithium Metal Batteries", Stanford University Chemical Engineering Convocation Distinguished Student Speaker, USA, September 2023.
- **Mun Sek Kim**, "Suspension Electrolytes for Lithium Metal Batteries", Stanford StorageX Tech Talk, USA, March 2023.
- **Mun Sek Kim**, "Suspension electrolyte with modified Li^+ solvation environment for lithium metal batteries", SLAC Battery 500, USA, May 2022.
- **Mun Sek Kim**, "Suspension electrolyte with modified Li^+ solvation environment for lithium metal batteries", Stanford StorageX Tech Talk, USA, February 2022.
- **Mun Sek Kim**, "Suspension Electrolytes for Lithium Metal Batteries", SLAC Ola Electric, USA, February 2022.
- **Mun Sek Kim**, "Developing 260 Wh kg^{-1} Lithium-metal based battery technology, cell, and pack-level", The Society for Aerospace System Engineering, South Korea, April 2017