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EES Batteries 2025 Outstanding Papers

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We are proud to announce the launch of the *EES Batteries* Outstanding Papers. This is an opportunity to recognise the exceptional work published in the journal and celebrate the authors behind the work by selecting one Outstanding Article and one Outstanding Review each year.

These papers are chosen from a shortlist compiled by the Editorial Office using a range of metrics. The journal's Editorial and Advisory Boards review and vote on these papers based on the science presented and the potential impact. The Editor-in-Chief selects the final winning papers, taking the Board members' votes into account.

We are delighted to introduce the inaugural Outstanding Article and Outstanding Review. Please join us in congratulating the authors behind these exceptional contributions.

EES Batteries 2025 Outstanding Article

High-performance anode-less all-solid-state batteries enabled by multisite nucleation and an elastic network

Jihoon Oh, Yeeun Sohn and Jang Wook Choi

"*The Outstanding Article on anode-less all-solid-state batteries presents a particularly novel approach to addressing one of the key challenges in all-solid-state-batteries: non-uniform lithium nucleation.*[1] *The combination of multisite nucleation control and an elastic network is both conceptually innovative and experimentally convincing, and the work provides clear insights that are likely to influence future designs of high-energy-density solid-state battery systems*". – Ungyu Paik, Editor-in-Chief, *EES Batteries*

We spoke to the authors Jihoon Oh, Yeeun Sohn and Jang Wook Choi about their work.

Which part of this paper do you think will have the greatest impact?

The most impactful aspect is the novel interlayer design that integrates a multisite nucleation strategy with an elastic interfacial network, enabling uniform lithium deposition and stable cycling even under the harsh conditions of anode-less all-solid-state batteries.

What was the most challenging part of completing this research?

The main challenge was simultaneously achieving interfacial stability and mechanical compliance, while maintaining the high energy density and long cycle life inherent to anode-less configurations.

What are the next steps for this research?

The next steps include further reducing the required stack pressure, scaling up to practical cell formats, and optimizing the interlayer chemistry to enhance long-term stability and manufacturability.

EES Batteries 2025 Outstanding Review

Principles and trends in extreme fast charging lithium-ion batteries

Yu-Xing Yao, Lei Xu, Chong Yan and Qiang Zhang

"*The Outstanding Review on extreme fast charging lithium-ion batteries offers a timely overview of the fundamental principles governing fast-charging behaviour, including kinetic limitations, interfacial stability, and materials-level design strategies.*[2] *Importantly, the paper goes beyond summarising existing work by clearly identifying current bottlenecks and future research directions, making it a highly valuable reference for researchers working on both academic and industrial fast-charging applications*". – Ungyu Paik, Editor-in-Chief, *EES Batteries*

The authors Yu-Xing Yao, Lei Xu, Chong Yan and Qiang Zhang were invited to answer a few questions about their perspective.

What do you see as the most significant insights or conclusions from your review?

In this contribution, we reviewed the state-of-the-art of fast-charging batteries for the electric vehicle market to clarify the technological gap between existing capabilities and extreme fast charging targets. From multiple dimensions such as energy density, charging speed, cycle life, and battery chemistry systems, we presented the latest academic progress and future research goals in fast-charging technology. Additionally, we analyzed the impact of electrode loading and battery configuration on fast-charging performance.

We emphasized the importance of focusing on fast charging for thick electrodes and called for the research community to establish a unified performance benchmarking system. When studying extreme fast charging, researchers should adopt Ah-level pouch cells with a single-sided areal capacity of no less than 3.0 mAh cm^{-2} and a charging rate of at least 4 C, while rigorously evaluating cycle life and lithium plating behavior in the cells.

What are the biggest challenges currently facing researchers in this area?

Battery fast-charging technology is a systemic challenge involving the complex interplay of multiple factors, such as electrode materials, electrolytes, electrode structures, and battery configurations. Researching from a single factor alone can easily lead to a fragmented understanding and self-deception. However, most researchers find it difficult to approach fast-charging development from a holistic and integrated perspective.

What do you hope readers take away from your review?

We hope readers can systematically consider and develop fast-charging technology from the perspectives of key cathode materials, electrolytes, electrode interfaces, and fast-charging safety. This will help avoid ineffective and unsustainable "performance improvements" resulting from non-systematic thinking during development.

We extend our sincerest congratulations to the authors of our 2025 Outstanding Papers whose work will continue to advance and shape battery science. We look forward to celebrating more exceptional work in the years to come.

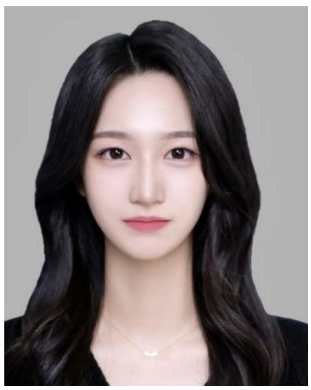
Emma Eley, Executive Editor
Nour Tanbouza, Development Editor

Author Biographies

***EES Batteries* 2025 Outstanding Article**

High-performance anode-less all-solid-state batteries enabled by multisite nucleation and an elastic network

Jihoon Oh is a Research Assistant Professor at the Institute for Battery Research Innovation (IBRI) at Seoul National University. He earned his Ph.D. degree from the School of Chemical and Biological Engineering at Seoul National University under the supervision of Prof. Jang Wook Choi in 2025. His research interests lie in designing sulfide-based all-solid-state batteries, battery manufacturing processes, and battery thermodynamics.



Yeeun Sohn is a Ph.D. candidate in the School of Chemical and Biological Engineering at Seoul National University under the supervision of Prof. Jang Wook Choi. She received her B.S. degree from the School of Chemical and Biological Engineering at Seoul National University in 2022. Her research mainly focuses on alloy-based electrode materials for sulfide-based all-solid-state batteries.

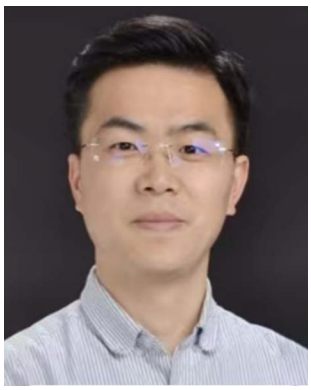
Jang Wook Choi is currently a faculty member in the School of Chemical and Biological Engineering at Seoul National University. After earning his Ph.D. degree in the Department of Chemical Engineering at Caltech in 2007, Prof. Choi conducted postdoctoral research at Stanford University before starting his independent career at the Korea Advanced Institute of Science and Technology (KAIST) in 2010. He relocated to Seoul National University in 2017. His research encompasses materials and cell design for various lithium-ion and post-lithium-ion batteries, along with battery cell health diagnostics.

***EES Batteries* 2025 Outstanding Review**

Principles and trends in extreme fast charging lithium-ion batteries

Yu-Xing Yao obtained his PhD from the Department of Chemical Engineering at Tsinghua University in 2024 and currently works at EVE Energy Co., Ltd. His main research interests lie in fast-charging lithium-ion batteries, electrolytes, and electrode interfaces.

Lei Xu graduated from Beijing Institute of Technology in 2024 and currently works at Contemporary Amperex Technology Co., Limited (CATL). His primary research focuses on the principles of lithium plating detection in lithium-ion batteries and the development of detection methods.



Chong Yan, a professor at Beijing Institute of Technology, focuses on the application scenarios of lithium batteries under extreme conditions such as extreme fast charging/discharging. He conducts research on fast-charging/fast-discharging theories and devices related to electrode/electrolyte materials and interfaces, develops time-frequency dynamic response-based detection principles for battery lithium plating and artificial intelligence detection instruments, and constructs the lithium-ion battery lithium plating imaging database.

Qiang Zhang, a professor at Tsinghua University, has long been engaged in emerging energy chemistry and energy materials of rechargeable batteries. His research team has conducted in-depth exploration into the principles of various power sources such as lithium–sulfur batteries, lithium metal batteries, and lithium-ion batteries. He has proposed the lithium bond theory and emerging composite lithium metal anodes protected by solid electrolyte interphase (SEI), and constructed pouch cell devices for lithium metal batteries, lithium–sulfur batteries, and solid-state batteries. He serves as an Associate Editor for *J. Am. Chem. Soc.* and as an editorial board member for journals including *EES Batteries*, *Joule*, *Chem. Soc. Rev.*, *J. Mater. Chem. A*, *Chem. Commun.*, *Adv. Energy Mater.*, *Energy Fuels*, and so on.

References

1 J. Oh, Y. Sohn and J. W. Choi, High-performance anode-less all-solid-state batteries enabled by multisite nucleation and an elastic network, *EES Batteries*, 2025, **1**, 566–575.
2 Y.-X. Yao, L. Xu, C. Yan and Q. Zhang, Principles and trends in extreme fast charging lithium-ion batteries, *EES Batteries*, 2025, **1**, 9–22.