

# Energy & Environmental Science

rsc.li/ees

The Royal Society of Chemistry is the world's leading chemistry community. Through our high impact journals and publications we connect the world with the chemical sciences and invest the profits back into the chemistry community.

## IN THIS ISSUE

ISSN 1754-5706 CODEN EESNBY 18(19) 8715–8980 (2025)



### Cover

See Guoming Ma,  
Dingguo Xia, Hao Zhao  
*et al.*, pp. 8756–8767.  
Image reproduced  
by permission of  
Hao Zhao from  
*Energy Environ. Sci.*,  
2025, 18, 8756.



### Inside cover

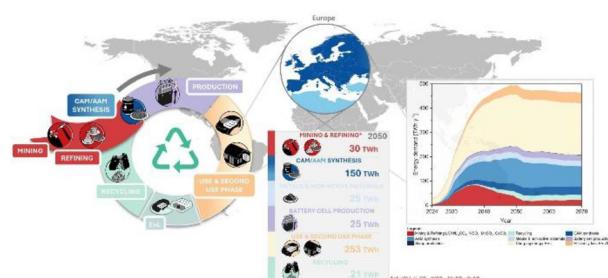
See Xiaodong Shi,  
Wei Zhang, Xinlong Tian  
*et al.*, pp. 8768–8779.  
Image reproduced  
by permission of  
Xinlong Tian from  
*Energy Environ. Sci.*,  
2025, 18, 8768.

## ANALYSIS

8724

### Future energy demand for automotive and stationary lithium- and sodium-ion battery production towards a European circular economy

Lukas Ihlbrock, Anne Sehnal, Moritz Gutsch and Simon Lux\*

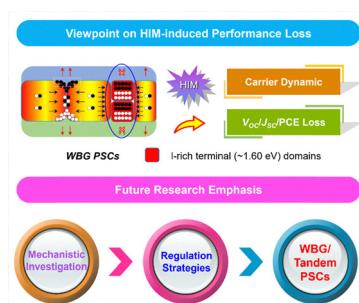


## MINIREVIEW

8744

### Deciphering halide ion migration and performance loss in wide-bandgap perovskite solar cells: connection, mechanism, and solutions

Yuxiao Guo, Hairen Tan\* and Bo Xu\*



GOLD  
OPEN  
ACCESS

# EES Batteries

Exceptional research on  
batteries and energy storage

Part of the EES family

Join  
in | Publish with us  
[rsc.li/EESBatteries](http://rsc.li/EESBatteries)

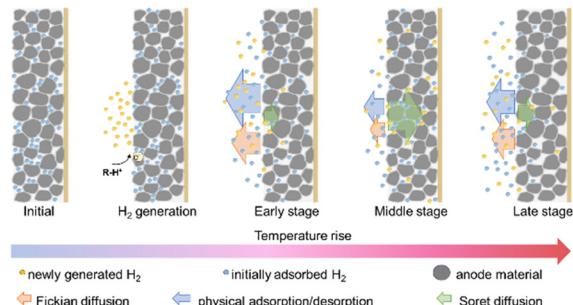


## PAPERS

8756

**Operando observing hydrogen evolution in commercial lithium-ion batteries**

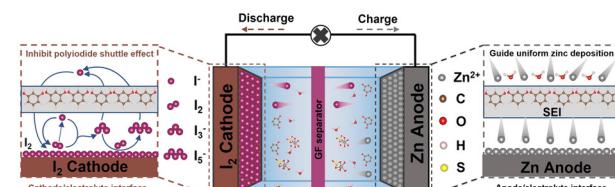
Yuan Wang, Shuyan Guo, Yuntian Guo, Peng Zhang, Guoming Ma,\* Dingguo Xia\* and Hao Zhao\*



8768

**Taming polyiodides: phenol chemistry for shuttle-free and durable zinc–iodine batteries**

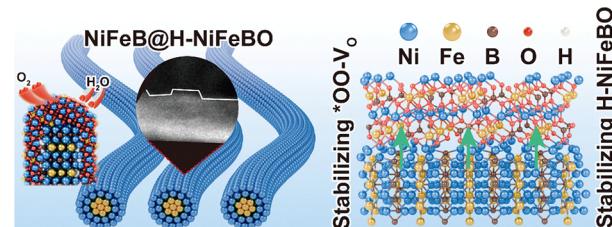
Zhixiang Chen, Xinlei Gao, Lutong Shan, Qingjin Fu, Zhenyue Xing, Peng Rao, Zhenye Kang, Xiaodong Shi,\* Wei Zhang\* and Xinlong Tian\*



8780

**High-index facet NiFeB@H-NiFeBO core–shell nanowires for a highly efficient oxygen evolution reaction in water splitting**

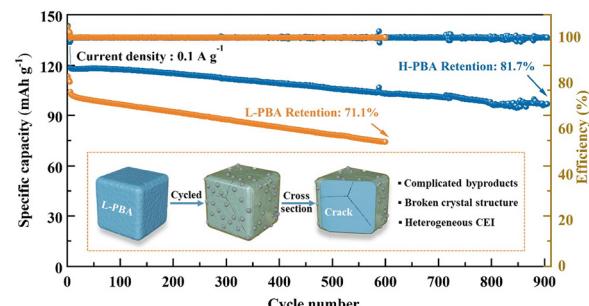
Xing Wang, Wei Pi, Yu Qiu, Zhangquan Gong, Jinchang Fan, Haifeng Bao,\* Na Yao\* and Xiaoqiang Cui\*



8791

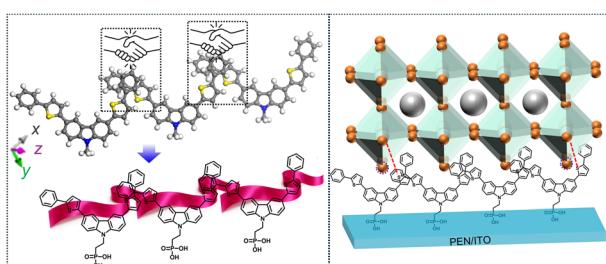
**Unraveling the degradation mechanism of sodium iron hexacyanoferrate cathodes in sodium ion batteries**

Junyi Dai, Jiahao Li, Fangxin Ling, Yu Yao,\* Yanru Wang, Mingze Ma, Jian Feng, Jun Xia, Yinbo Zhu, Hai Yang,\* Xianhong Rui, Hengan Wu and Yan Yu\*



## PAPERS

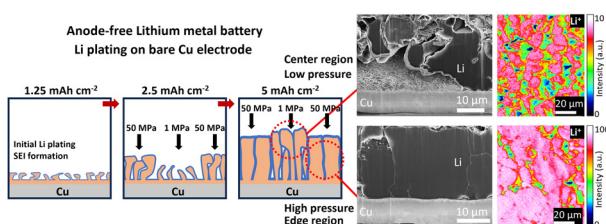
8803



## Soft conjugation extension strategy of self-assembled molecules for achieving efficient and mechanically stable flexible perovskite solar cells

Biao Zhou, Mingliang Li\*, Qi Xiong, Liren Zhang, Shiwei Zhang, Jiayun Sun, Jinyao Tang\* and Wallace C. H. Choy\*

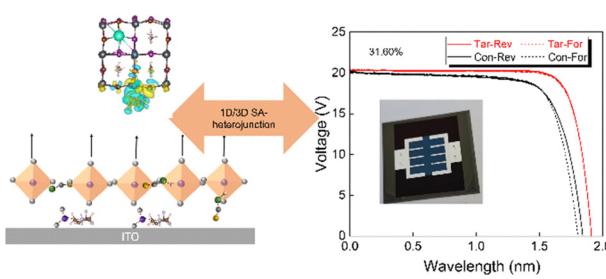
8815



## Direct visualization and mechanistic insights into initial lithium plating in anode-free lithium metal batteries

Jin Su\* and Chun Huang\*

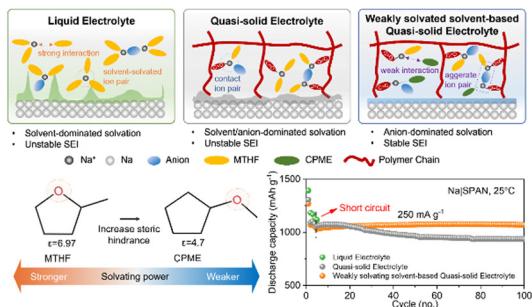
8827



## Bottom directional deposition perovskite heterojunctions for efficient and stable lead halide perovskite/silicon tandem solar cells

Shengjie Du, Feng Ye, Yutao Wang, Shuangbiao Xia, Guoyi Chen, Zhiqiu Yu, Kailian Dong, Zixi Yu, Yangyang Guo, Kexin Ming, Yansong Ge, Qinxian Lin, Kun Dai, Jiwei Liang, Zhenhua Yu,\* Weijun Ke,\* Liping Zhang\* and Guojia Fang\*

8838



## A weakly solvating solvent-based quasi-solid electrolyte for sodium metal batteries

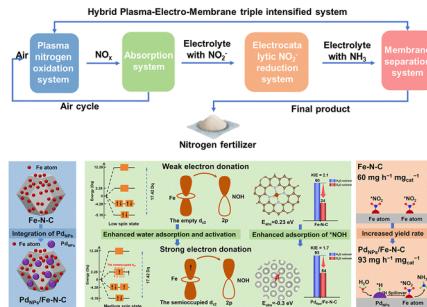
Ho Mei Law, Zilong Wang, Shengjun Xu, Longyun Shen, Baptiste Py, Yuhao Wang, Renée Siegel, Jürgen Senker, Qingsong Wang\* and Francesco Ciucci\*

## PAPERS

8849

## A hybrid plasma-electro-membrane triple intensified system over $\text{Pd}_{\text{NPs}}/\text{Fe-N-C}$ for ammonium fertilizer synthesis

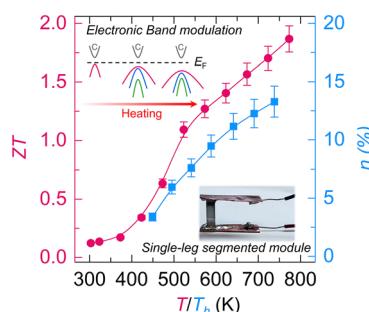
Cheng Wang, Chang Yu,\* Bingzhi Qian, Yongwen Ren, Rulong Ma, Yue Chu and Jieshan Qiu\*



8860

## Manganese doping induced record-high medium-temperature $\text{AgCuTe}$ thermoelectrics

Nan-Hai Li, Xiao-Lei Shi,\* Chao Zhang, Meng Li, Xiaodong Wang, Min Zhang, Wen-Yi Chen, Yong-Qi Chen, Dmitri Golberg, Dong-Chen Qi and Zhi-Gang Chen\*



8876

## How multi-length scale disorder shapes ion transport in lithium argyrodites

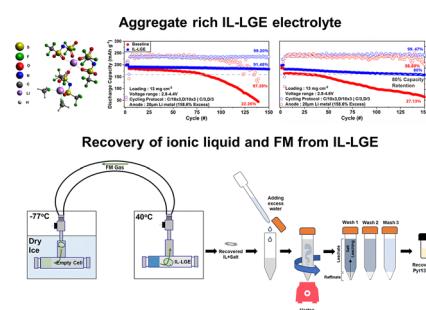
Bartholomew T. Payne, Mikkel Juelskolt, Miguel A. Pérez-Osorio, Dominic L. R. Melvin, Gabriel J. Cuello, Emmanuelle Suard, Daniel J. M. Irving, Nicholas H. Rees, Mark Feaivour, Enrico Petrucco, Stephen P. Day, Gregory J. Rees\* and Peter G. Bruce\*



8889

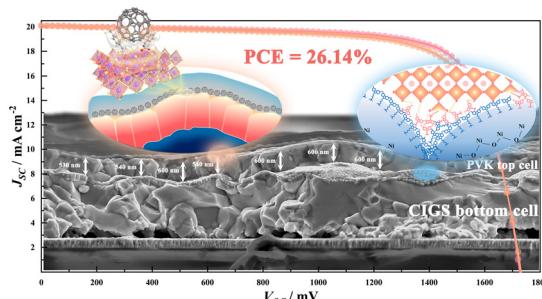
## Recoverable aggregate-rich liquefied gas electrolytes for enabling high-voltage lithium metal batteries

Ganesh Raghavendran, Alex Liu, Oleg Borodin, Nathan Hahn, Kevin Leung, Na-Ri Park, Tejas Nivarty, Mingqian Li, Aiden Larson, Yijie Yin, Minghao Zhang\* and Ying Shirley Meng\*



## PAPERS

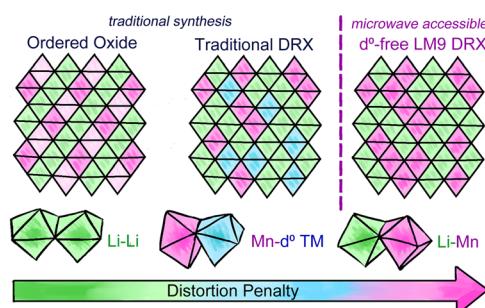
8907



**Two-terminal perovskite/Cu(In,Ga)Se<sub>2</sub> tandems with conformal coatings based on commercial bottom cells with >26% efficiency**

Cong Geng, Kuanxiang Zhang, Jiwen Jiang, Changhua Wang, Chung Hsien Wu, Jize Wang, Fei Long, Liyuan Han, Yi-Bing Cheng and Yong Peng\*

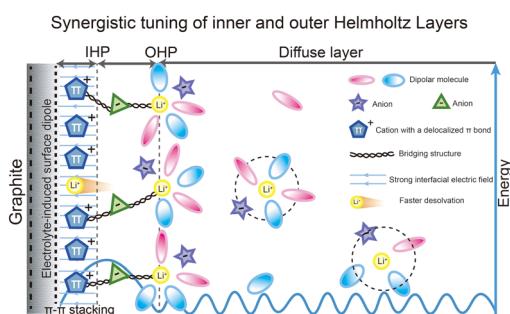
8918



**High energy density and micrometer-sized d<sup>0</sup>-free disordered rocksalt cathodes**

Vincent C. Wu, Erick A. Lawrence, Tianyu Li, Euan N. Bassey, Chia-Yu Chang, Bing Joe Hwang, Pierre-Etienne Cabelguen and Raphaële J. Clément\*

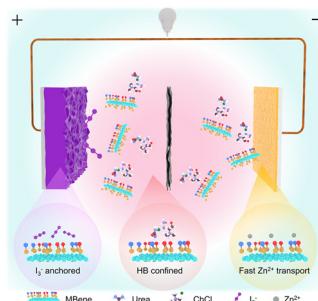
8929



**Synergistic tuning of inner and outer Helmholtz layers for ultra-stable fast charging in lithium-ion batteries**

Sai Li, Xianhui Zhao, Zheng Liu, Rang Xiao, Xin Zhang, Binghan Cui, Geping Yin, Pengjian Zuo, Yulin Ma, Chaoyang Li, Ning Wang, Guokang Han,\* Huaizheng Ren\* and Chunyu Du\*

8941



**An MBene-based colloidal electrolyte for high depth-of-discharge and energy-density 2 Ah-scale Zn metal batteries**

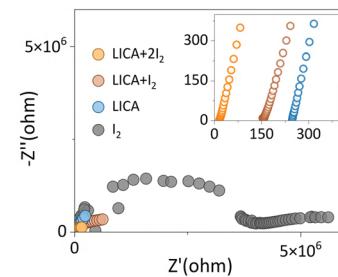
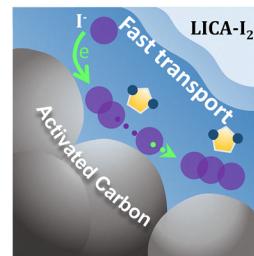
Hongyu Qin, Ao Liu, Kefeng Ouyang, Sheng Chen, Shubing Wei and Yan Huang\*

## PAPERS

8952

**Hydrophobic ionic liquid enabled polyiodide confined transport in a cathode, realizing high areal capacity, stable zinc–iodine batteries**

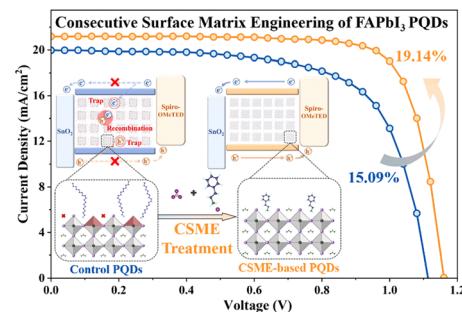
Lanya Zhao, Dandan Yin, Yanan Zhang, Boyang Li, Shen Wang, Xiaofeng Cui, Jie Feng, Na Gao, Xiaowei Liu, Shujiang Ding\* and Hongyang Zhao\*



8964

**Consecutive surface matrix engineering of  $\text{FAPbI}_3$  perovskite quantum dots for solar cells with over 19% efficiency**

Mingxu Zhang, Sicong Huang, Xinyi Mei, Guoliang Wang, Bainian Ren, Junming Qiu, Zehong Yuan and Xiaoliang Zhang\*



## CORRECTION

8977

**Correction: Deciphering the interplay between tin vacancies and free carriers in the ion transport of tin-based perovskites**

Luis Huerta Hernandez, Luis Lanzetta, Anna M. Kotowska, Ilhan Yavuz, Nikhil Kalasariya, Badri Vishal, Marti Gibert-Roca, Matthew Piggott, David J. Scarr, Stefaan De Wolf, Martin Stolterfoht and Derya Baran\*