

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(10) 4483-5010 (2025)



Cover

See Pengcheng Du et al., pp. 4496–4520. Image reproduced by permission of Pengcheng Du from *Energy Environ. Sci.*, 2025, 18, 4496.



Inside cover

See Tsun-Kong Sham, Xueliang Sun et al., pp. 4521–4554. Image reproduced by permission of Weihan Li and Xueliang Sun from *Energy Environ. Sci.*, 2025, 18, 4521.

REVIEWS

4496

Enhancing green mobility through vehicle-to-grid technology: potential, technological barriers, and policy implications

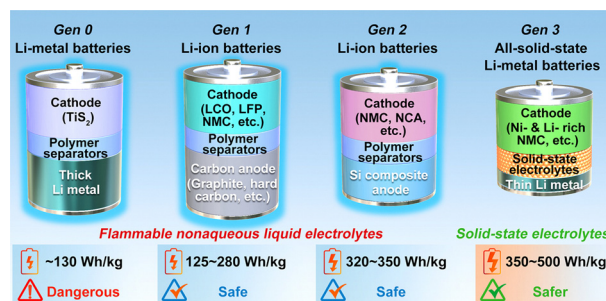
Pengcheng Du, Tianhao Liu,* Tuoyu Chen, Meihui Jiang, Hongyu Zhu, Yitong Shang, Hui Hwang Goh, Haisen Zhao, Chao Huang, Fannie Kong, Tonni Agustiono Kurniawan, Kai Chen Goh, Yu Du and Dongdong Zhang*



4521

Nitride solid-state electrolytes for all-solid-state lithium metal batteries

Weihan Li, Minsi Li, Haoqi Ren, Jung Tae Kim, Ruying Li, Tsun-Kong Sham* and Xueliang Sun*



**GOLD
OPEN
ACCESS**

EES Batteries

**Exceptional research on
batteries and energy storage**

Part of the EES family



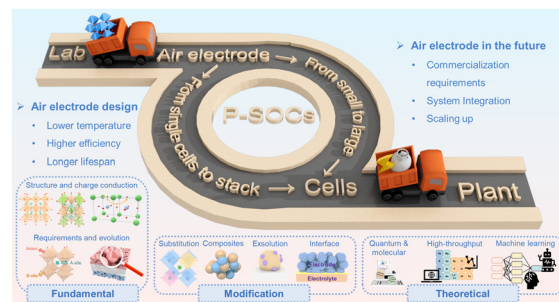
**Join
in** | Publish with us
rsc.li/EESBatteries

REVIEWS

4555

Recent advances in perovskite air electrode materials for protonic solid oxide electrochemical cells

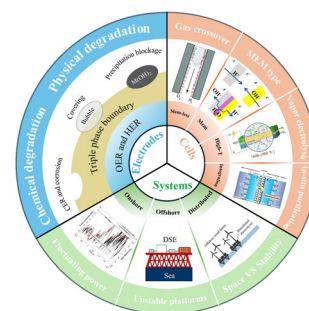
Cancan Peng, Xu Han, Sebete Mabaleha, Philip Kwong, Yao Zheng* and Xiaoyong Xu*



4596

Direct seawater electrolysis for green hydrogen production: electrode designs, cell configurations, and system integrations

Lizhen Wu, Yifan Xu, Qing Wang, Xiaohong Zou, Zhefei Pan,* Michael K. H. Leung* and Liang An*

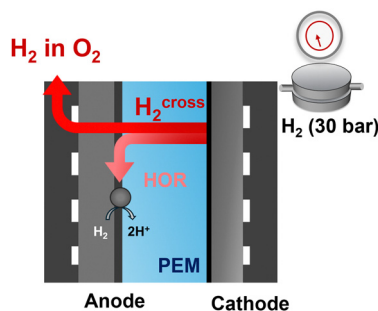


COMMUNICATIONS

4625

Importance of hydrogen oxidation reaction current in quantifying hydrogen crossover in PEM water electrolyzers at high differential pressure

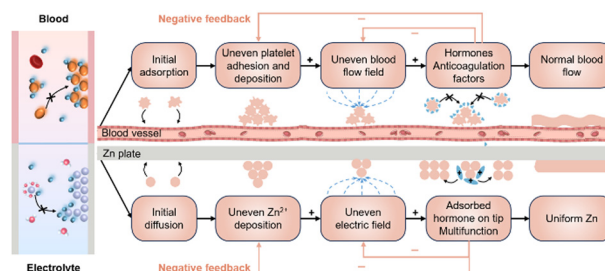
Ramchandra Gawas, Douglas I. Kushner, Xiong Peng* and Rangachary Mukundan*



4632

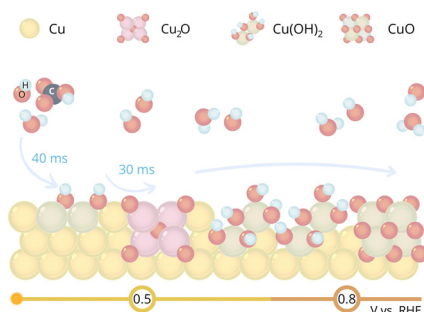
Bio-inspired harmonic electrolyte: negative feedback for ultra-stable zinc anodes

Fan Bu, Shaofei La, Wenbo Zhao, Yifan Deng, Yong Gao, Jizhang Jiang, Qinghe Cao, Jipeng Chen, Pei Song Chee, Salah A. Makhlof and Cao Guan*



COMMUNICATIONS

4643

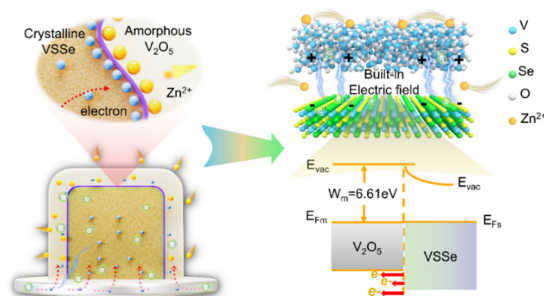


The electrode–electrolyte interface of Cu via modulation excitation X-ray absorption spectroscopy

Angel T. Garcia-Esparza, Xiang Li, Finn Babbe, Jinkyu Lim, Dean Skoien, Philipp S. Simon, Junko Yano* and Dimosthenis Sokaras*

PAPERS

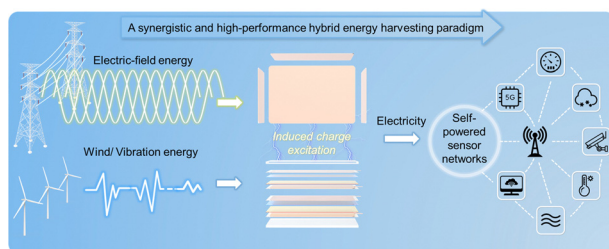
4651



Customizable crystalline-amorphous rectifying heterostructure cathodes for durable and super-fast zinc storage

Ming Yang, Mingyan Chuai, Mengnan Lai, Jianhui Zhu, Yanyi Wang,* Qicheng Hu, Minfeng Chen, Jizhang Chen, Kang Fang, Guoliang Chai, Hongwei Mi, Lingna Sun, Chuanxin He, Dingtiao Ma* and Peixin Zhang*

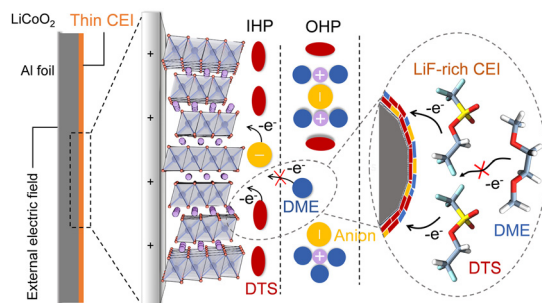
4665



An ultrahigh performance hybrid energy harvester leveraging the induced charge excitation strategy

Dongyang Hu, Qianwang Wang, Haocheng Deng, Changming Ding, Yuxiao Jin, Jing Kang, Xiaolong Huang, Feng Wang, Yi Li,* Sixing Xu* and She Chen*

4677



Regulation of the cathode inner Helmholtz plane in dilute ether electrolytes using an electric-field-responsive solvent for high-voltage lithium metal batteries

Junru Wu, Ziyao Gao, Zhiqiang Fu, Lili Lin, Xianshu Wang,* Yun Zhao,* Lele Peng, Feiyu Kang, Zhenyu Guo, Maria-Magdalena Titirici, Yunlong Zhao, Xiulin Fan and Baohua Li*

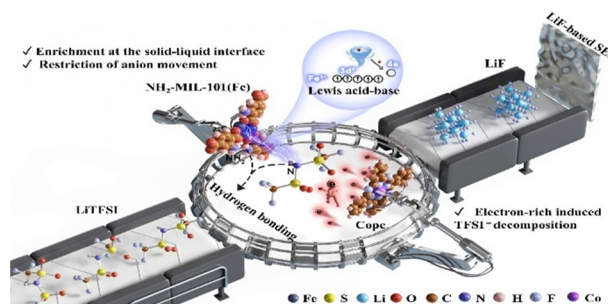


PAPERS

4690

The spontaneous cascade optimization strategy of the double enrichment improves anion-derived solid electrolyte interphases to enable stable lithium-metal batteries

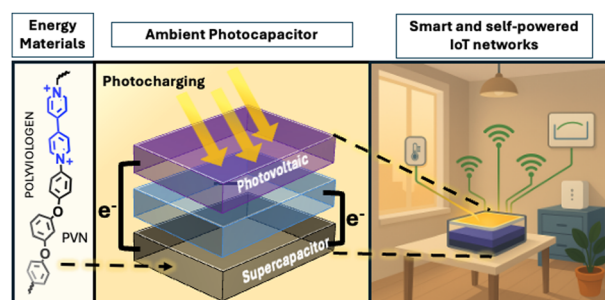
Fengxu Zhen, Hong Liu, Yingbin Wu, Xinjia Zhou, Weiping Li, Yuzhi Chen, Yuke Zhou, Haoyang Wang, Xiangkai Yin, Shujiang Ding,* Xiaodong Chen* and Wei Yu*



4704

Unlocking high-performance photocapacitors for edge computing in low-light environments

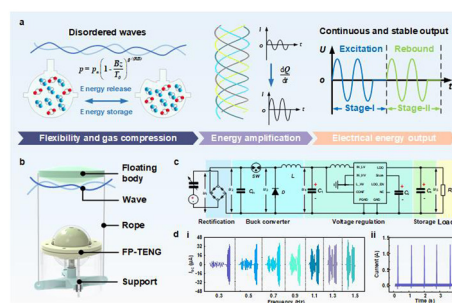
Natalie Flores-Diaz, Francesca De Rossi, Timo Keller, Harvey Morritt, Zaida Perez Bassart, Amparo Lopez-Rubio, Maria Jose Fabra, Richard Freitag, Alessio Gagliardi, Francesca Fasulo, Ana Belen Muñoz-Garcia, Michele Pavone, Hamed Javanbakht Lomeri, Sandy Sanchez Alonso, Michael Grätzel, Francesca Brunetti and Marina Freitag*



4717

A flexibility-pneumatic triboelectric nanogenerator for stable output of irregular wave energy

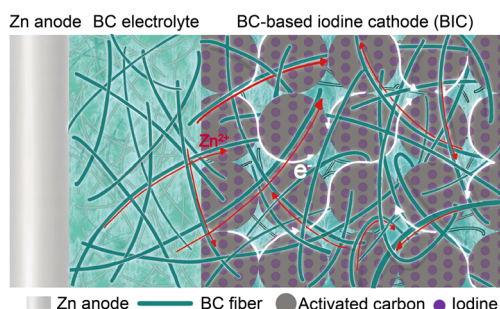
Jianlong Wang, Zheng Yang, Zhenjie Wang, Xinxian Wang, Yanrui Zhao, Jinbiao Ma, Hengyu Li, Yang Yu,* Zhong Lin Wang* and Tinghai Cheng*



4730

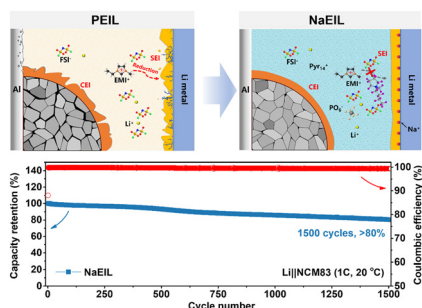
High-iodine-loading quasi-solid-state zinc-iodine batteries enabled by a continuous ion-transport network

Xin Yang, Minghao Xie, Zhijie Yan, Hang Ruan, Chunpeng Yang,* Zaiping Guo* and Zi-Jian Zheng*



PAPERS

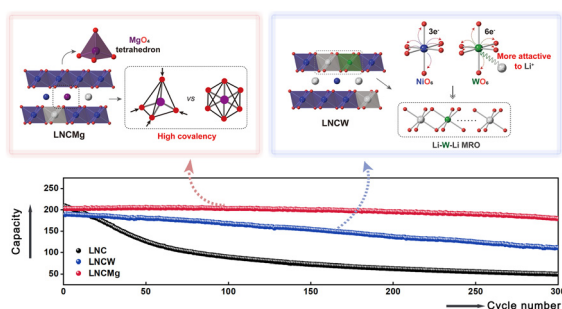
4740



Robust interphase derived from a dual-cation ionic liquid electrolyte enabling exceptional stability for nickel-rich layered cathodes

Fanglin Wu, Haolin Tang,* Jian Wang, Xilai Xue, Thomas Diemant, Shan Fang, Huihua Li, Ziyuan Lyu, Hao Li, En Xie, Hongzhen Lin, Jae-Kwang Kim, Guk-Tae Kim* and Stefano Passerini*

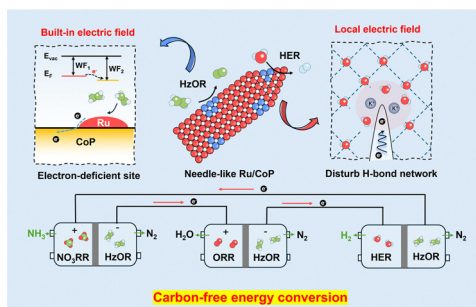
4753



Mitigating chemo-mechanical heterogeneity of Ni-rich layered cathodes through the regulated medium-range order by doping

Junfeng Luo, Gi-Hyeok Lee, Seongkoo Kang, Jiliang Zhang,* Chi-Liang Chen, Chung-Kai Chang, Zheng-Yao Li, Ronghua Zeng, Hong Li, Jialu Li, Ruirui Zhao,* Qifeng Zheng and Yong-Mook Kang*

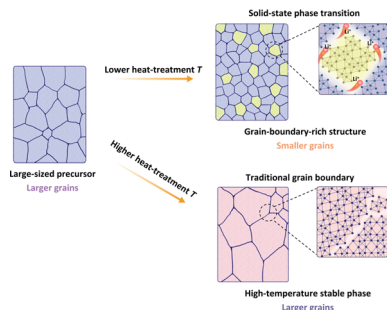
4764



Modeling carbon-free energy conversion systems: enhanced hydrazine-assisted hydrogen production with dual-electric-field effect on needle-like Ru/CoP catalysts

Kang Ji, Shiyu Wang, Shuyun Yao, Yingjie Ji, Guixi Wang, Weikun Ren, Jun Wang, Feike Zhang, Jiangzhou Xie,* Zhiyu Yang* and Yi-Ming Yan*

4775



Grain-boundary-rich cathode enabling fast ion diffusion kinetics for low-temperature and high-rate lithium-ion batteries

Fanteng Meng, Yutong Li,* Shitong Wang, Dong Luo, Xinghao Zhang, Manfred Wagner, Zilong Tang, Yanpeng Li, Debin Kong* and Linjie Zhi*

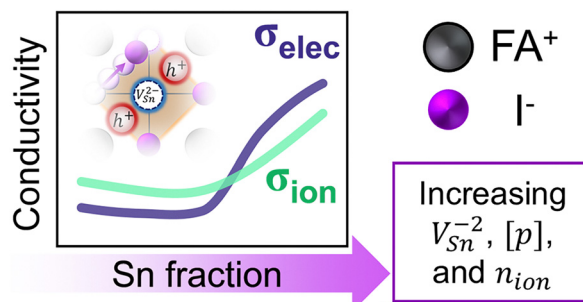


PAPERS

4787

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

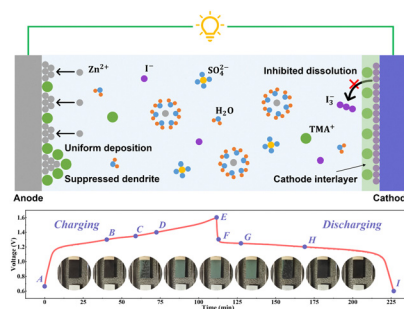
Luis Huerta Hernandez, Luis Lanzetta, Anna M. Kotowska, Ilhan Yavuz, Nikhil Kalasariya, Badri Vishal, Marti Gibert-Roca, Matthew Piggott, David J. Scurr, Stefaan De Wolf, Martin Stolterfoht and Derya Baran*



4800

A dynamic cathode interlayer for ultralow self-discharge and high iodide utilization in zinc–iodine batteries

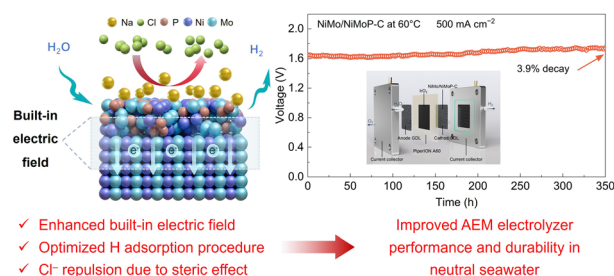
Junming Kang, Jiajia Zhang, Wang Wan, Zhimin Zhai, Ganxiong Liu, Ying Ge, Lequan Wang, Chao Wang* and Hongbin Lu*



4811

Constructing a built-in electric field across an NiMo/NiMoP heterointerface for efficient and durable seawater electrolysis in anion exchange membrane electrolyzers

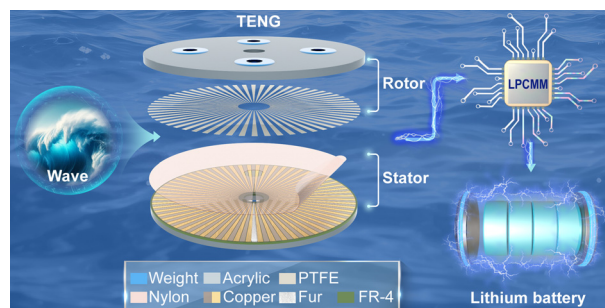
Yue Xu, Shuaidong Li, Jiawen Cao, Zhongqi Ren, Yingjian He, Zeyun Cai,* Chen Hou, Jingzi Zhang, Zuhuang Chen, Rongpei Shi,* Samuel Jeong,* Xi Lin* and Kailong Hu*



4821

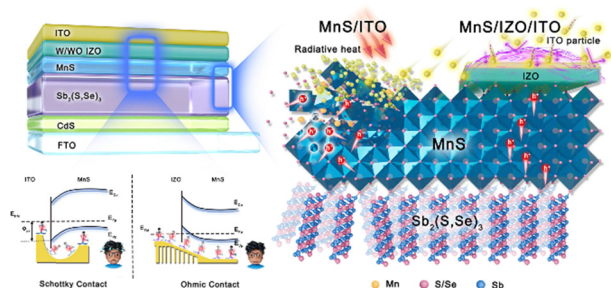
Advanced energy harvesting from low-frequency ocean waves for lithium-ion battery applications

Yingjin Luo, Wentao Lei, Pengfei Chen, Tao Jiang, Andeng Liu, Meidan Ye, Zijie Xu, Zhong Lin Wang* and Wenxi Guo*



PAPERS

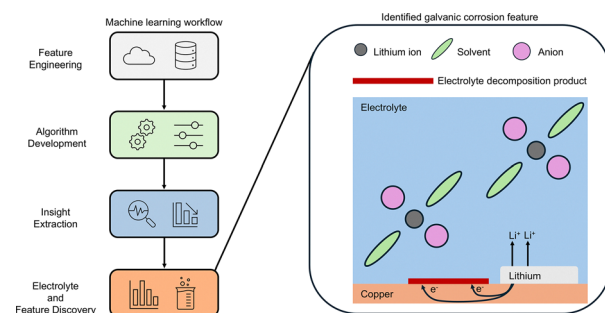
4833



Amorphous indium–zinc oxide layer with transport and protective dual-function for high-efficiency semitransparent and tandem $\text{Sb}_2(\text{S,Se})_3$ solar cells

Junjie Yang, Jianyu Li, Yuehao Gu, Rongfeng Tang,*
Lei Huang, Zhiyuan Cai, Bo Che, Qi Zhao, Shuwei Sheng,
Hong Wang, Changfei Zhu and Tao Chen*

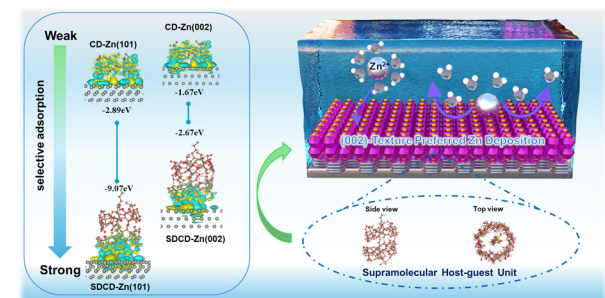
4847



Galvanic corrosion underlies coulombic efficiency differences in high-performing lithium metal battery electrolytes

Solomon T. Oyakhire, Sang Cheol Kim, Wenbo Zhang,
Sanzeeda Baig Shuchi, Yi Cui* and Stacey F. Bent*

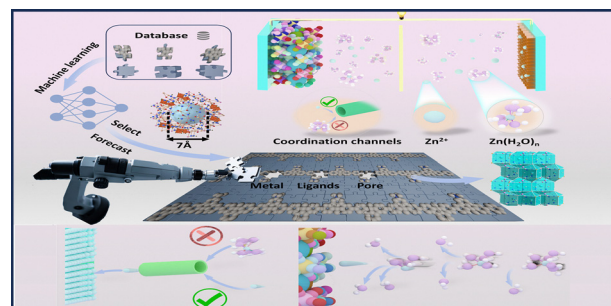
4859



Synergistically enhancing the selective adsorption for crystal planes to regulate the (002)-texture preferred Zn deposition via supramolecular host-guest units

Lequan Wang, Yizhen Shao, Zhongheng Fu,
Xianfu Zhang, Junming Kang, Xingxiu Yang, Zhimin Zhai,
Ying Ge, Long Zhang,* Yanglong Hou* and Hongbin Lu*

4872



Machine learning-assisted benign transformation of three zinc states in zinc ion batteries

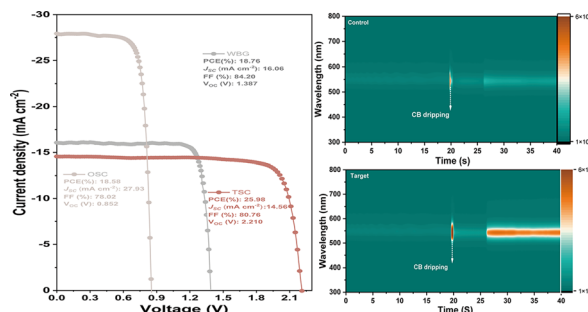
Jianbo Dong, Guolang Zhou, Wenhao Ding, Jiayi Ji,
Qing Wang, Tianshi Wang, Lili Zhang, Xiuyang Zou,*
Jingzhou Yin* and Edison Huixiang Ang*



4883

Optimization of crystallization dynamics in wide-bandgap bromine–iodine perovskite films for high-performance perovskite–organic tandem solar cells

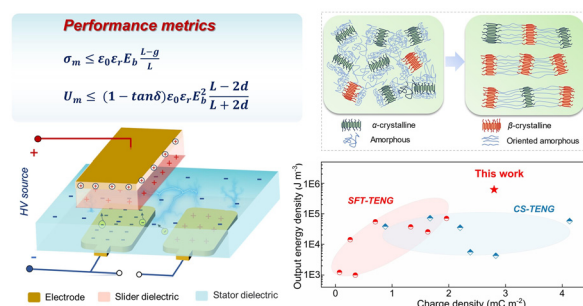
Zonglong Song, Jiangfeng Wang, Yuqi Bao, Jie Zeng, Deng Wang, Jiang He, Peide Zhu, Bo Jiang, Zhixin Liu, Siru He, Yanna Hou, Ziyang Hu, Chen Xie, Yongsheng Chen, Yongsheng Liu,* Xingzhu Wang* and Baomin Xu*



4893

Performance metrics of triboelectric nanogenerator toward record-high output energy density

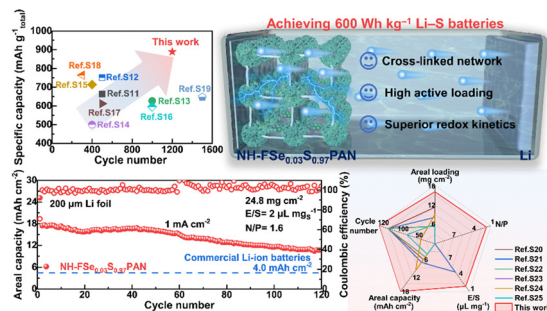
Ru Guo, Hang Luo, Shaoshuai He, Xin Xia, Tingting Hou, Haoyu Wang, Chaojie Chen, Dou Zhang and Yunlong Zi*



4905

A cross-linked nanoflower network and Se-doping enabling sulfur-rich SPAN towards lithium–sulfur batteries beyond 600 W h kg⁻¹

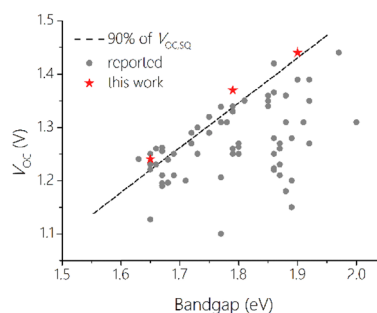
Qiang Wu, Yuanke Wu, Hui Yan, Wei Zhong, Mingsheng Qin, Haolin Zhu, Shijie Cheng and Jia Xie*



4916

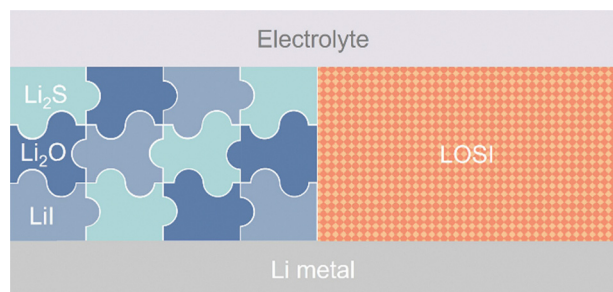
A universal surface fixed charge reconstruction strategy to minimize contact loss in wide bandgap perovskite photovoltaics

Yaxiong Guo, Fang Yao, Yunchen Zhang, Guoyi Chen, Shengjie Du, Zixi Yu, Hai Zhou,* Weijun Ke,* Chun Li* and Guojia Fang*



PAPERS

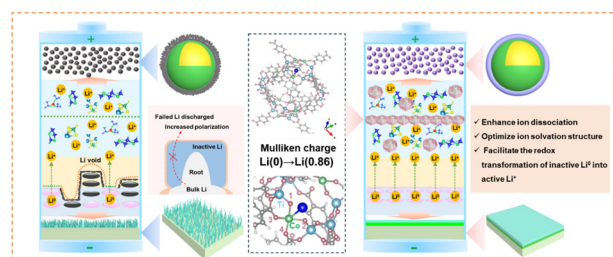
4925



Thermoresponsive solid electrolyte interphase enables safe lithium–sulfur batteries with high energy density

Feng Jiang, Yun-Fei Du, Jia-Xin Guo, Nai-Lu Shen, Zi-Xian Chen, Mei Geng, Dongsheng Ren, Bo-Quan Li, Xue-Qiang Zhang, Tao Wang, Yuan Ma, Yiren Zhong, Jiarui He, Zhi Zhu, Faxing Wang, Jia-Qi Huang, Xin-Bing Cheng* and Yuping Wu

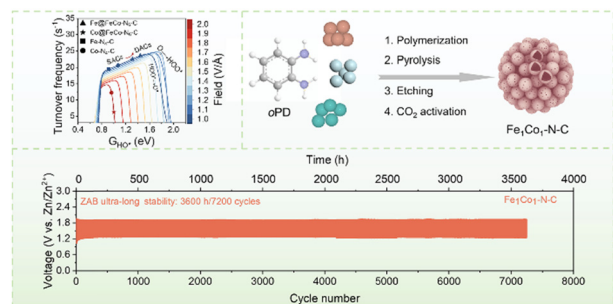
4934



Tuning electronic structure of MOF-based solid-state electrolytes to activate dormant lithium and facilitate ion transport kinetics towards lithium metal batteries

Qing Liu, Qi An, Kun Zeng, Mou Yang, Haiye Zhu, Xilin Liang, Guiquan Zhao, Mengjiao Sun, Yunchun Zha, Li Yang, Lingyan Duan, Genfu Zhao, Yongjiang Sun and Hong Guo*

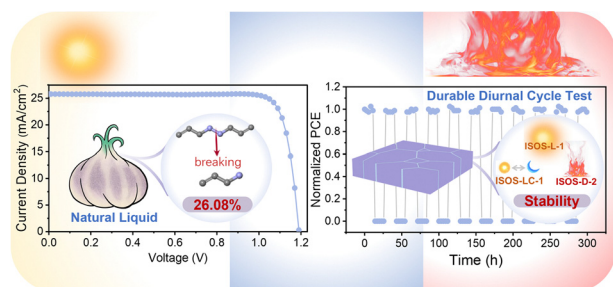
4949



A pH-dependent microkinetic modeling guided synthesis of porous dual-atom catalysts for efficient oxygen reduction in Zn–air batteries

Tingting Li, Di Zhang, Yun Zhang, Danli Yang, Runxin Li, Fuyun Yu, Kengqiang Zhong, Xiaozhi Su, Tianwei Song, Long Jiao, Hai-Long Jiang, Guo-Ping Sheng, Jie Xu,* Hao Li* and Zhen-Yu Wu*

4962



Sustainable protection of natural liquid enables ultra-stable inverted perovskite solar cells via allylic disulfide rearrangement

Yang Yang, Shuyuan Wan, Hang Wei, Lijun Yang, Zhiyuan Dai, Haoze Lu, Zhe Liu, Bo Chen, Ruihao Chen* and Hongqiang Wang*

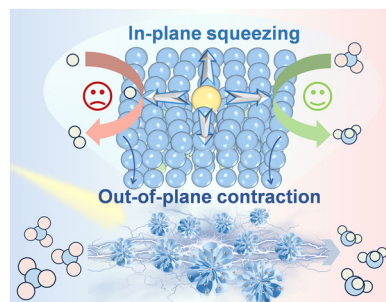


PAPERS

4971

Dual strain regulated RhNiAu trimetallic for efficient plasmonic-promoted acidic nitrate electroreduction

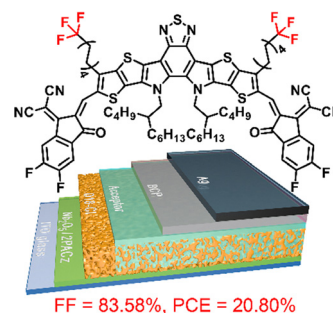
Wei Zhong, Qing-Ling Hong, Qiu-Yu Du, Bao Yu Xia,*
Xuan Ai,* Fu-Min Li* and Yu Chen*



4982

Dielectric constant engineering of nonfullerene acceptors enables a record fill factor of 83.58% and a high efficiency of 20.80% in organic solar cells

Junwei Dong, Yinfeng Li, Chentong Liao, Xiaopeng Xu,*
Liyang Yu, Ruipeng Li and Qiang Peng*



4996

Ultrafast synthesis of an efficient urea oxidation electrocatalyst for urea-assisted fast-charging Zn–air batteries and water splitting

Tongtong Li, Zhiyang Zheng, Zherui Chen,
Mengtian Zhang, Zhexuan Liu, Huang Chen, Xiao Xiao,
Shaogang Wang, Haotian Qu, Qingjin Fu, Le Liu,
Ming Zhou, Boran Wang* and Guangmin Zhou*

