

# Energy & Environmental Science

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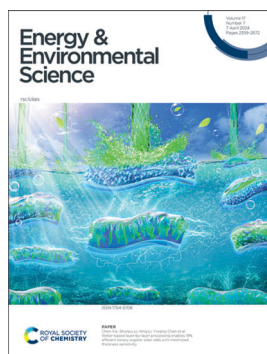
## IN THIS ISSUE

ISSN 1754-5706 CODEN EESNBY 17(7) 2359-2672 (2024)



### Cover

See Marco Siniscalchi, Chris R. M. Grovenor *et al.*, pp. 2431–2440. Image reproduced by permission of Marco Siniscalchi from *Energy Environ. Sci.*, 2024, 17, 2431.



### Inside cover

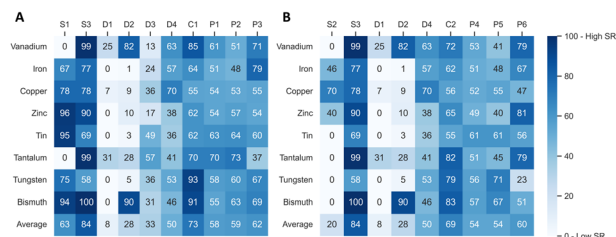
See Chen Xie, Shunpu Li, Ning Li, Yiwang Chen *et al.*, pp. 2441–2452. Image reproduced by permission of Chen Xie from *Energy Environ. Sci.*, 2024, 17, 2441.

## ANALYSIS

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### Supply risk considerations for photoelectrochemical water splitting materials

Martin Hillenbrand, Christoph Helbig\* and Roland Marschall

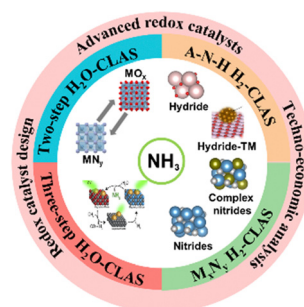


## REVIEWS

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### Towards green and efficient chemical looping ammonia synthesis: design principles and advanced redox catalysts

Xianhua Zhang, Chunlei Pei, Zhi-Jian Zhao and Jinlong Gong\*



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Elemental answers

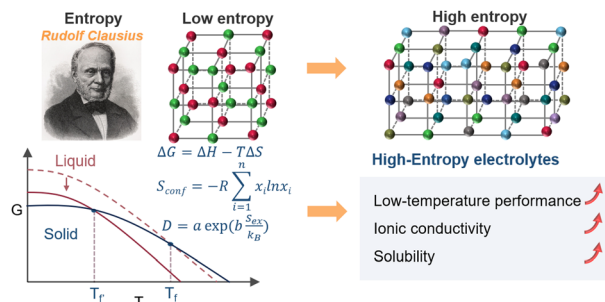


## REVIEWS

2406

### More is better: high-entropy electrolyte design in rechargeable batteries

Xin Zhao, Zhiqiang Fu, Xiang Zhang, Xia Wang, Baohua Li, Dong Zhou\* and Feiyu Kang\*

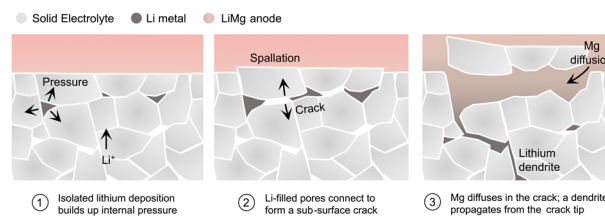


## PAPERS

2431

### Initiation of dendritic failure of LLZTO via sub-surface lithium deposition

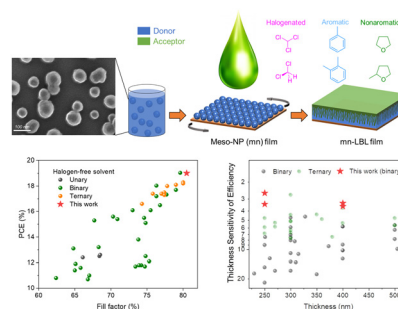
Marco Siniscalchi,\* Yifu Shi, Guanchen Li, Joshua S. Gibson, Robert S. Weatherup, Ruy S. Bonilla, Susannah C. Speller and Chris R. M. Groveror\*



2441

### Water-based layer-by-layer processing enables 19% efficient binary organic solar cells with minimized thickness sensitivity

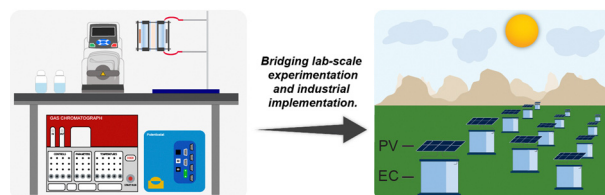
Chen Xie,\* Xianghui Zeng, Chengsheng Li, Xiaokang Sun, Songqiang Liang, Hui Huang, Baoshen Deng, Xuanlin Wen, Guangye Zhang, Peng You, Chuqun Yang, Yulai Han, Shunpu Li,\* Guanghao Lu, Hanlin Hu, Ning Li\* and Yiwang Chen\*



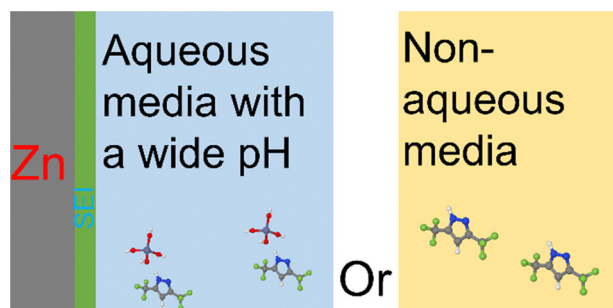
2453

### Modeling diurnal and annual ethylene generation from solar-driven electrochemical CO<sub>2</sub> reduction devices

Kyra M. K. Yap, William J. Wei, Melanie Rodríguez Pabón, Alex J. King, Justin C. Bui, Lingze Wei, Sang-Won Lee, Adam Z. Weber,\* Alexis T. Bell,\* Adam C. Nielander\* and Thomas F. Jaramillo\*



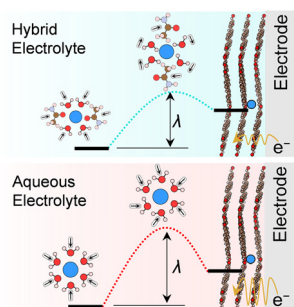
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### Engineering a zinc anode interphasial chemistry for acidic, alkaline and non-aqueous electrolytes

Lin Ma,\* Travis P. Pollard, Marshall A. Schroeder,\* Chao Luo, Ye Zhang, Glenn Pastel, Longsheng Cao, Jiaxun Zhang, Vadim Shipitsyn, Yan Yao, Chunsheng Wang, Oleg Borodin\* and Kang Xu\*

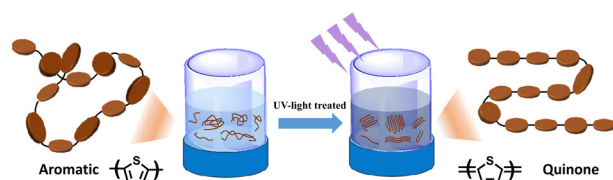
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### An ultrafast Na-ion battery chemistry through coupling sustainable organic electrodes with modulated aqueous electrolytes

Yunpei Zhu, Xianrong Guo, Simil Thomas, Jian Yin, Youyou Yuan, Zhengnan Tian, George T. Harrison, Stefaan De Wolf, Osman M. Bakr, Omar F. Mohammed and Husam N. Alshareef\*

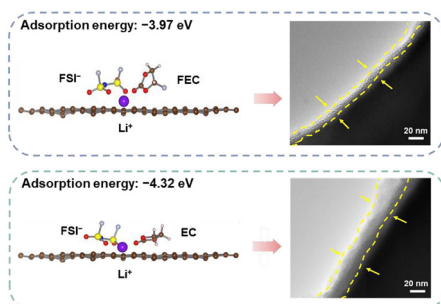
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### Light-induced quinone conformation of polymer donors toward 19.9% efficiency organic solar cells

Chuanhang Guo, Yuandong Sun, Liang Wang, Chenhao Liu, Chen Chen, Jingchao Cheng, Weiyi Xia, Zirui Gan, Jing Zhou, Zhenghong Chen, Jinpeng Zhou, Dan Liu, Jingxing Guo, Wei Li and Tao Wang\*

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### Unveiling the adsorption tendency of film-forming additives to enable fast-charging hard carbon anodes with regulated Li plating

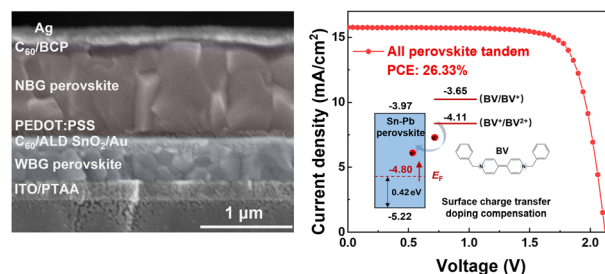
Yongteng Dong, Yuanmao Chen, Xinyang Yue\* and Zheng Liang\*



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### Surface charge transfer doping of narrow-bandgap Sn–Pb perovskites for high-performance tandem solar cells

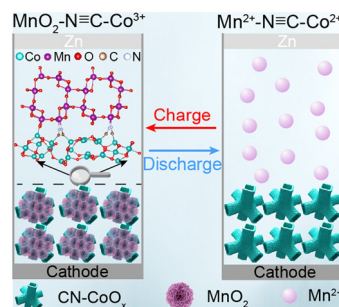
Qiang Sun, Zhiguo Zhang, Haixuan Yu, Junyi Huang, Xiongjie Li, Letian Dai, Qi Wang, Yan Shen\* and Mingkui Wang\*



2521

### A cyano cobalt “electron transfer bridge” boosting the two-electron reaction of a MnO<sub>2</sub> cathode with long lifespan in aqueous zinc batteries

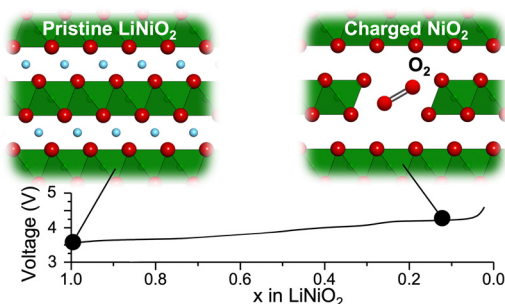
Yaozhi Liu, Lu Lin, Tengsheng Zhang, Zhiqing Xue, Jie Liu, Dongliang Chao\* and Xiaoqi Sun\*



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### Does trapped O<sub>2</sub> form in the bulk of LiNiO<sub>2</sub> during charging?

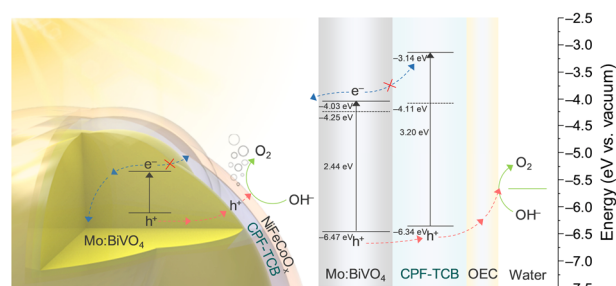
Mikkel Juelsholt, Jun Chen, Miguel A. Pérez-Osorio, Gregory J. Rees, Sofia De Sousa Coutinho, Helen E. Maynard-Casely, Jue Liu, Michelle Everett, Stefano Agrestini, Mirian Garcia-Fernandez, Ke-Jin Zhou, Robert A. House\* and Peter G. Bruce\*



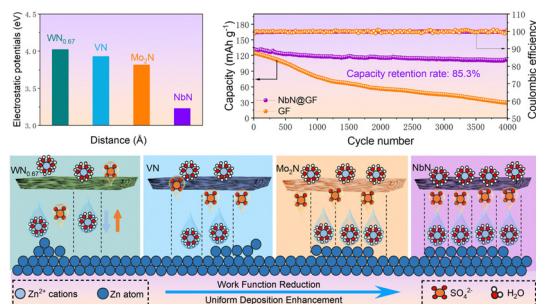
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### High-efficiency unbiased water splitting with photoanodes harnessing polycarbazole hole transport layers

Jin Wook Yang, Su Geun Ji, Chang-Seop Jeong, Jaehyun Kim, Hee Ryeong Kwon, Tae Hyung Lee, Sol A Lee, Woo Seok Cheon, Seokju Lee, Hyungsoo Lee, Min Sang Kwon, Jooho Moon,\* Jin Young Kim\* and Ho Won Jang\*



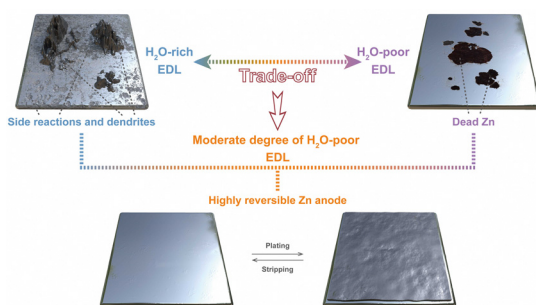
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### Redistributing zinc-ion flux by work function chemistry toward stabilized and durable Zn metal batteries

Qiang Hu, Jisong Hu, Fei Ma, Yunbo Liu, Lincai Xu, Lei Li, Songtao Zhang, Xingquan Liu,\* Jingxin Zhao\* and Huan Pang\*

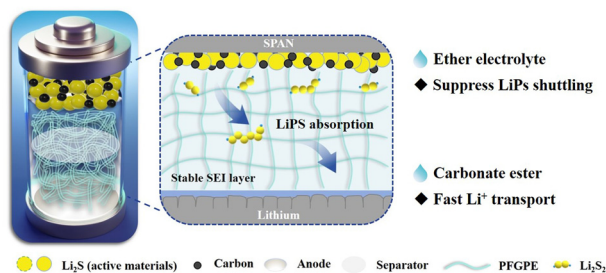
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### Trade-off between H<sub>2</sub>O-rich and H<sub>2</sub>O-poor electric double layers enables highly reversible Zn anodes in aqueous Zn-ion batteries

Kaiwen Qi, Pengrui Liang, Shiqiang Wei, Huaisheng Ao, Xuan Ding, Shiyuan Chen, Zhechen Fan, Chengming Wang, Li Song, Xiaojun Wu,\* Changzheng Wu\* and Yongchun Zhu\*

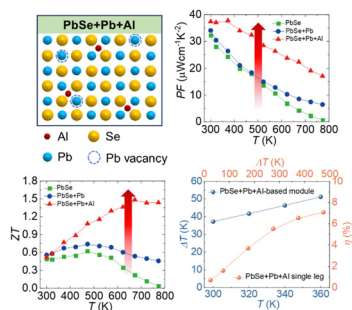
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### Tailoring a multi-system adaptable gel polymer electrolyte for the realization of carbonate ester and ether-based Li-SPAN batteries

Yan Zhang, Zhaokun Wang, Yanrui Pan, Hao Yu, Zuohang Li, Chen Li, Su Wang, Yue Ma,\* Xixi Shi, Hongzhou Zhang, Dawei Song and Lianqi Zhang\*

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### Realizing high-performance thermoelectric modules through enhancing the power factor via optimizing the carrier mobility in n-type PbSe crystals

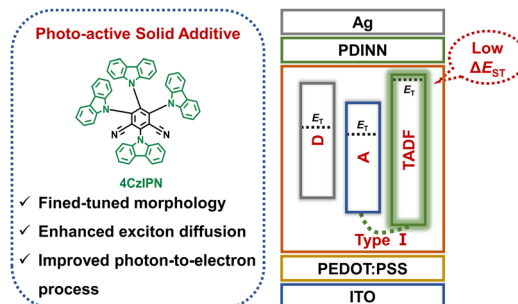
Siqi Wang, Yi Wen, Shulin Bai, Zhe Zhao, Yichen Li, Xiang Gao, Qian Cao, Cheng Chang\* and Li-Dong Zhao\*



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### Synergistically optimizing the optoelectronic properties and morphology using a photo-active solid additive for high-performance binary organic photovoltaics

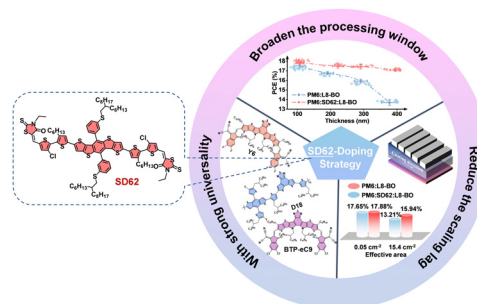
Mengting Wang, Tianyi Chen, Yaokai Li, Guanyu Ding, Zeng Chen, Jikun Li, Chang Xu, Adiljan Wupur, Chenran Xu, Yuang Fu, Jingwei Xue, Weifei Fu, Weiming Qiu, Xi Yang, Dawei Wang, Wei Ma, Xinhui Lu, Haiming Zhu, Xiankai Chen, Xiaoye Wang, Hongzheng Chen\* and Lijian Zuo\*



2610

### Designing dithieno-benzodithiophene-based small molecule donors for thickness-tolerant and large-scale polymer solar cells

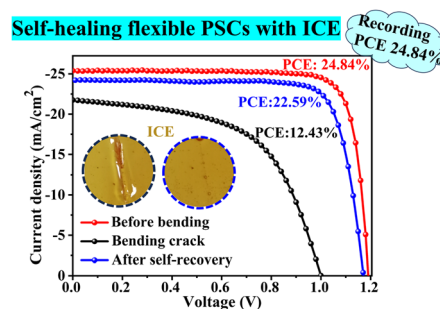
Shanshan Wang, Lin-Yong Xu, Bo Xiao, Mingxia Chen, Meimei Zhang, Wei Gao, Biao Xiao, Alex K.-Y. Jen, Renqiang Yang, Jie Min\* and Rui Sun\*



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### Self-healing ion-conducting elastomer towards record efficient flexible perovskite solar cells with excellent recoverable mechanical stability

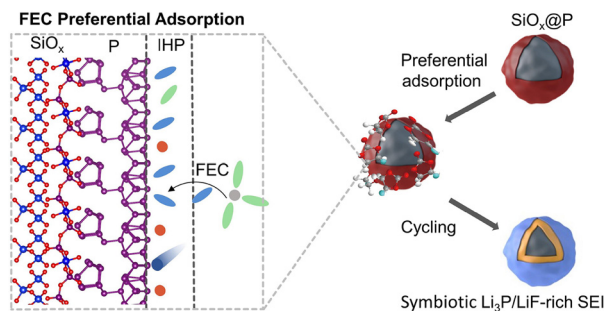
Tangyue Xue, Baojin Fan, Ke-Jian Jiang, Qiang Guo, Xiaotian Hu,\* Meng Su, Erjun Zhou\* and Yanlin Song\*



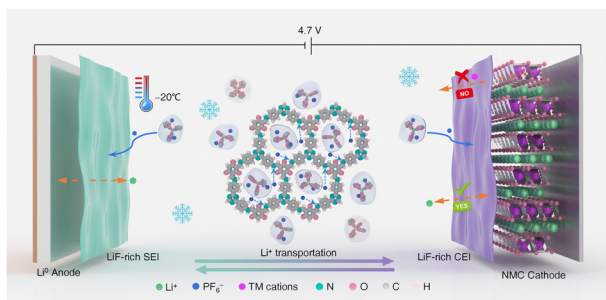
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### Material–electrolyte interfacial interaction enabling the formation of an inorganic-rich solid electrolyte interphase for fast-charging Si-based lithium-ion batteries

Kai Cheng, Shuibin Tu, Bao Zhang, Wenyu Wang, Xiaohong Wang, Yucheng Tan, Xiaoxue Chen, Chunhao Li, Chenhui Li, Li Wang and Yongming Sun\*



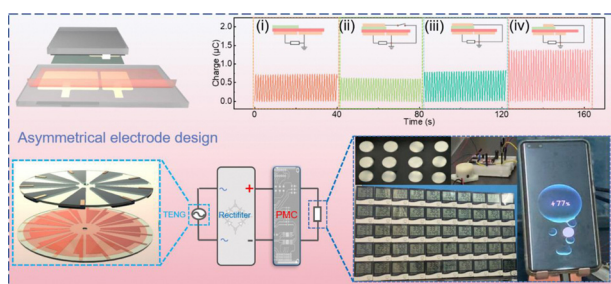
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### A microscopically heterogeneous colloid electrolyte of covalent organic nanosheets for ultrahigh-voltage and low-temperature lithium metal batteries

Weifeng Zhang, Guoxing Jiang, Wenwu Zou, Xilong Chen, Siyuan Peng, Shengguang Qi, Renzong Hu, Huiyu Song, Zhiming Cui, Li Du\* and Zhenxing Liang\*

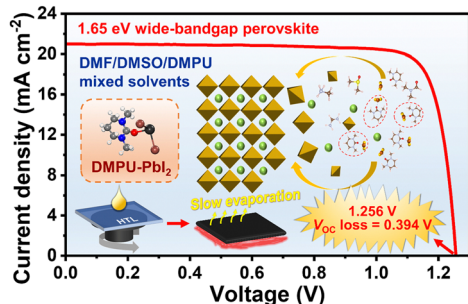
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### Ultra-stability and high output performance of a sliding mode triboelectric nanogenerator achieved by an asymmetric electrode structure design

Gui Li, Jian Wang, Yue He, Shuyan Xu, Shaoke Fu, Chuncai Shan, Huiyuan Wu, Shanshan An, Kaixian Li, Wen Li, Ping Wang\* and Chenguo Hu\*

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### Custom-tailored solvent engineering for efficient wide-bandgap perovskite solar cells with a wide processing window and low $V_{oc}$ losses

Ruohao Wang, Jingwei Zhu, Jiayu You, Hao Huang, Yang Yang, Ruihao Chen, Juncheng Wang, Yuliang Xu, Zhiyu Gao, Jiayue Chen, Bangxin Xu, Bing Wang, Cong Chen,\* Dewei Zhao\* and Wen-Hua Zhang\*

