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IN THIS ISSUE

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Cover

See Minghua Chen, Huang Zhang, Stefano Passerini *et al.*, pp. 3887–3916. Image reproduced by permission of Huihua Li from *Energy Environ. Sci.*, 2025, 18, 3887.



Inside cover

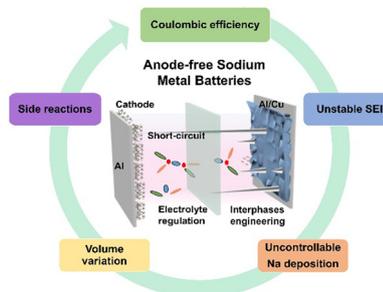
See Tao Wang, Cunpu Li *et al.*, pp. 4053–4067. Image reproduced by permission of Cunpu Li from *Energy Environ. Sci.*, 2025, 18, 4053.

REVIEWS

3887

Anode-free sodium metal batteries: optimisation of electrolytes and interphases

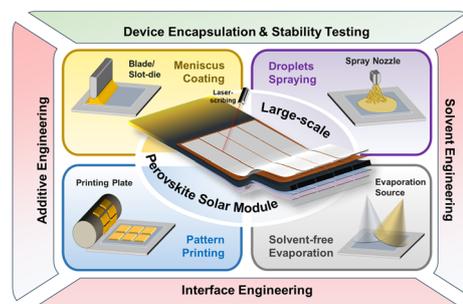
Huihua Li, Fanglin Wu, Jian Wang, Jingxuan Wang, Hongxu Qu, Minghua Chen,* Huang Zhang* and Stefano Passerini*



3917

Emerging strategies for the large-scale fabrication of perovskite solar modules: from design to process

Bochun Kang and Feng Yan*



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Fundamental questions
Elemental answers

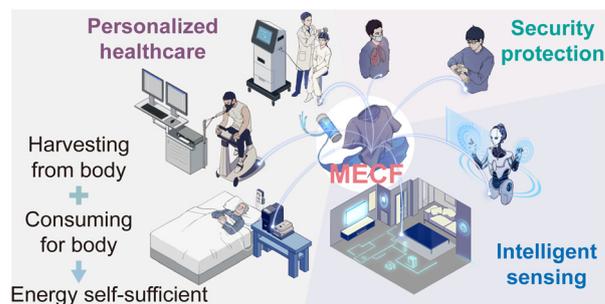


REVIEWS

3955

Revolutionizing wearable sustainable energy enabled by mechano-electric conversion fibers

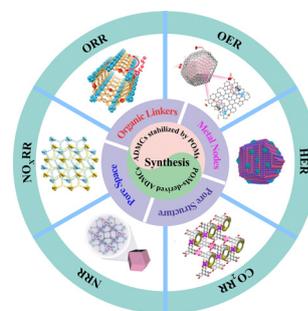
Jizhong Zhao, Xiaoxuan Fan, Hongxiang Xie, Yi Luo, Zhifeng Li, Xiao Peng, Guangming Tao,* Zhong Lin Wang* and Kai Dong*



3986

Porous organic material-based atomically dispersed metal electrocatalysts

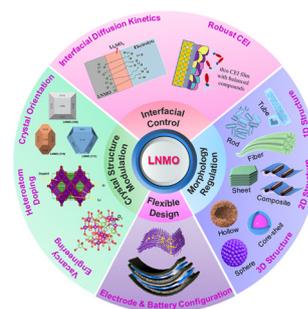
Hao Zhang,* Suwen Wang, Enmin Lv,* Menghui Qi, Chengchao He, Xinglong Dong, Jieshan Qiu, Yong Wang* and Zhenhai Wen*



4010

Strategies toward high-energy-density Co-free lithium nickel manganese oxide: from crystal structure control to flexible configuration design

Jiguo Tu, Yan Li, Bokun Zhang, Xiaoyun Wang, R. Vasant Kumar, Libo Chen and Shuqiang Jiao*

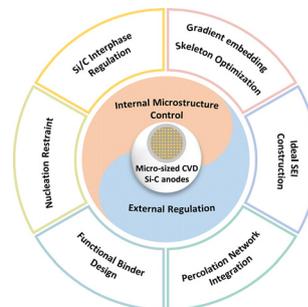


PERSPECTIVE

4037

Micro-sized CVD-derived Si-C anodes: challenges, strategies, and prospects for next-generation high-energy lithium-ion batteries

Zhexi Xiao, Haojun Wu, Lijiao Quan, Fanghong Zeng, Ruoyu Guo, Zekai Ma, Xiaoyu Chen, Jiaqi Zhan, Kang Xu,* Lidan Xing* and Weishan Li



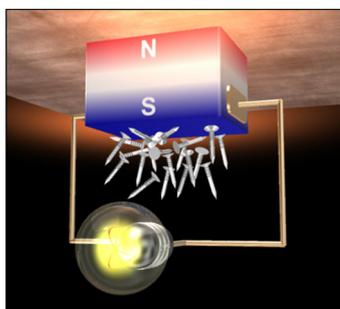
4053



A 405 W h kg⁻¹ Ah-level lithium–sulfur pouch battery stabilized over 200 cycles by an electron-tri-oxide-like GeS₂–NiS₂ heterostructure

Xun Jiao, Li Tan, Xiaoxia Tang, Cheng Tong, Tao Wang,*
Minhua Shao, Bin Liu, Cunpu Li* and Zidong Wei

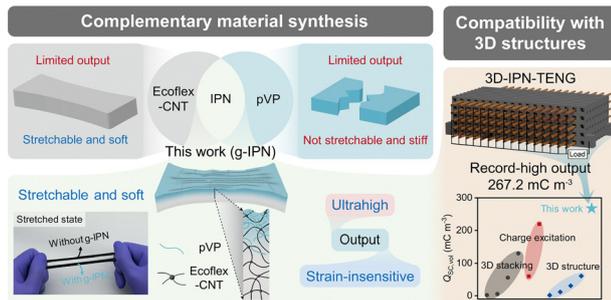
4068



Multifunctional composite magnet realizing record-high transverse thermoelectric generation

Fuyuki Ando,* Takamasa Hirai, Abdulkareem Alasli,
Hossein Sepehri-Amin, Yutaka Iwasaki, Hosei Nagano
and Ken-ichi Uchida*

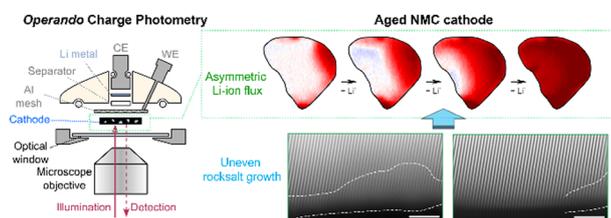
4080



Synthesis of stretchable triboelectric material with strain-compensating ability using gradient interpenetrating polymer networks

Do-Wan Kim, Hyeonwoo Mun, Yeonghun Kang,
Weon-Guk Kim, Dahye Ahn, Seong-Yun Yun,
Jeong-A Han, Do Hoon Lee, Taegoon Lee,
Kihoon Jeong, Jihan Kim, Sung Gap Im* and
Yang-Kyu Choi*

4097



Operando single-particle imaging reveals that asymmetric ion flux contributes to capacity degradation in aged Ni-rich layered cathodes

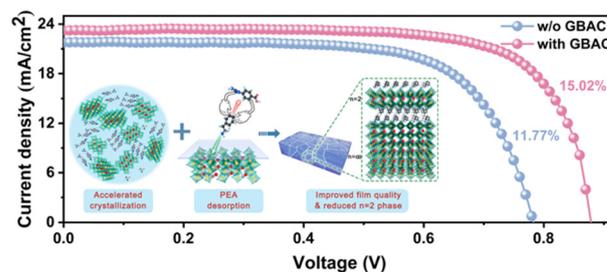
Zhengyan Lun, Alice J. Merryweather,
Amoghavarsha Mahadevegowda, Shrinidhi S. Pandurangi,
Chao Xu, Simon Fairclough, Vikram S. Deshpande,
Norman A. Fleck, Caterina Ducati,
Christoph Schnedermann,* Akshay Rao* and
Clare P. Grey*



4108

Synchronous dimension-crystallization engineering enables highly efficient 2D/3D tin perovskite solar cells

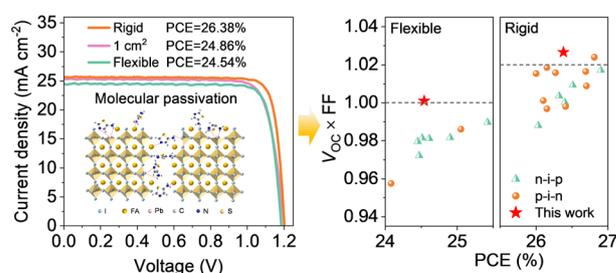
Ziyong Kang, Peng Feng, Kun Wang,* Lu Zhang, Rui Meng, Yali Chen, Jiandong Wu, Feng Yang, Xuewen Zhang, Tianxiang Li, Jingzhi Shang, Yu Tong* and Hongqiang Wang*



4120

High-performance inverted perovskite solar cells and modules via aminothiazole passivation

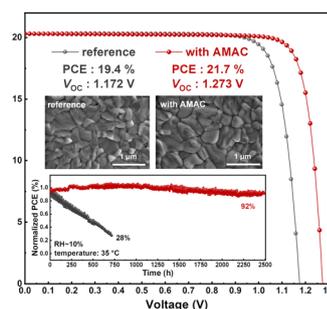
Zewei Zhu, Bingcan Ke, Kexuan Sun, Chengkai Jin, Zhenhua Song, Ruixuan Jiang, Jing Li, Song Kong, Chang Liu,* Sai Bai, Sisi He, Ziyi Ge, Fuzhi Huang,* Yi-Bing Cheng and Tongle Bu*



4130

Comprehensive crystallization retardation of inorganic perovskites for high performance inverted solar cells

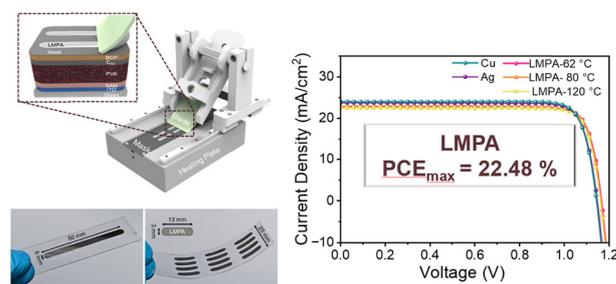
Ze Zhang Wang, Tianfei Xu, Nan Li, Zhen Chang, Jing Shan, Yong Wang, Minfang Wu, Fengwei Xiao, Shengzhong Liu* and Wanchun Xiang*



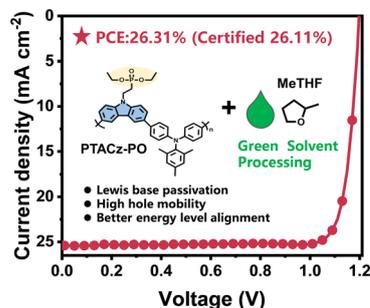
4142

Blade printing of low-melting-point alloys as back electrodes for high-efficiency and stable inverted perovskite solar cells

Bo Jiang, Boyang Yu, Yong Zhang, Weiwei Deng, Baomin Xu* and Xinyan Zhao*



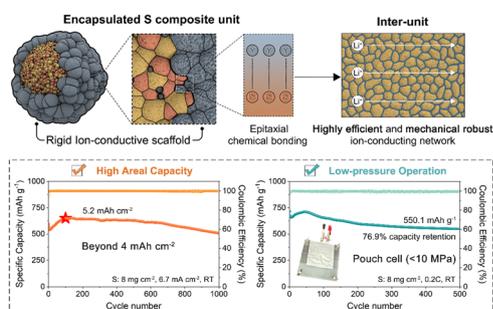
4153



A green-solvent-processable polymer hole transport material for achieving 26.31% efficiency in inverted perovskite solar cells

Sen Yin, Xuanang Luo, Fushen Tang, Zhihui Xiong, Youran Lin, Wenyu Yang, Yuanyuan Shu, Yang Wang and Lei Ying*

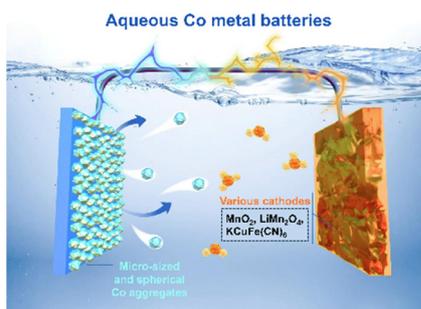
4162



A unitized encapsulation architecture with durable epitaxial ion-conductive scaffolds for ultrastable solid-state sulfur cathode

Minkang Wang, Han Su, Yu Zhong,* Chuming Zhou, Guoli Chen, Xiuli Wang* and Jiangping Tu*

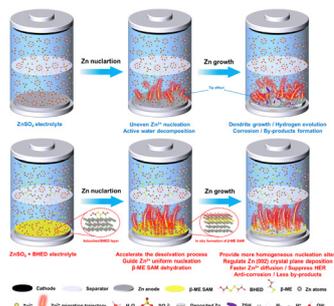
4176



Cobalt metal enables ultrahigh-efficiency, long-life, and dendrite-free aqueous multivalent batteries

Songyang Chang, Wentao Hou, Angelica Del Valle-Perez, Irfan Ullah, Xiaoyu Du, Lisandro Cunci, Gerardo Morell and Xianyong Wu*

4186



Multifunctional additives with dynamic sacrificial S-S bonds for building self-assembled monolayers of Zn-ion batteries with improved stability and longevity

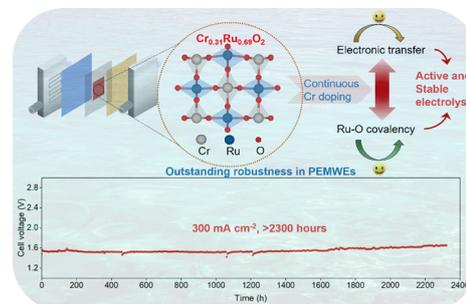
Shuang Han, Minghai Li, Qiyu Fan, Zhuoyi Han, Xuewen Ming, Wen Wang, Wanan Cai* and Haijun Niu*



4200

Optimal selection of RuO₂ for durable oxygen evolution reactions in acidic media by continuous regulation of Ru–O covalency

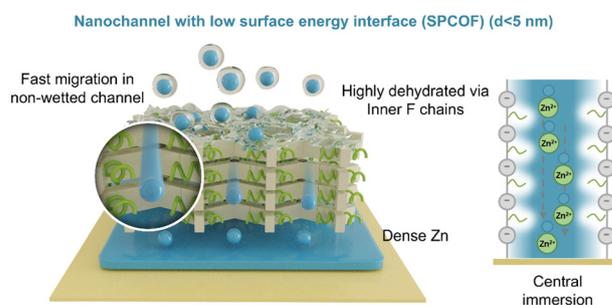
Xintong Li, Guanzhen Chen, Yan Liu, Ruihu Lu, Chao Ma, Ziyun Wang,* Yunhu Han* and Dingsheng Wang



4210

Developing low-resistance ion migration pathways using perfluorinated chain-decorated COFs for enhanced performance in zinc batteries

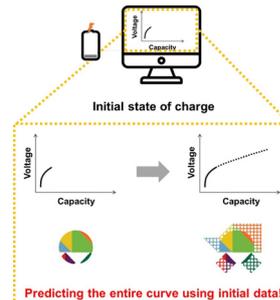
Kun Zhang, Yijia Yuan, Gang Wang, Fangzheng Chen, Li Ma, Chao Wu, Jia Liu, Bao Zhang, Chenglin Li, Hongtian Liu, Changan Lu, Xing Li, Shibo Xi, Keyu Xie,* Junhao Lin* and Kian Ping Loh*



4222

Data-driven insights into the reaction mechanism of Li-rich cathodes

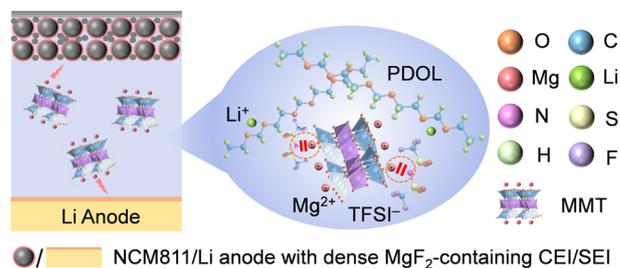
Jieun Kim, Injun Choi, Ju Seong Kim, Hyokkee Hwang, Byoungyong Yu, Sang-Cheol Nam and Inchul Park*



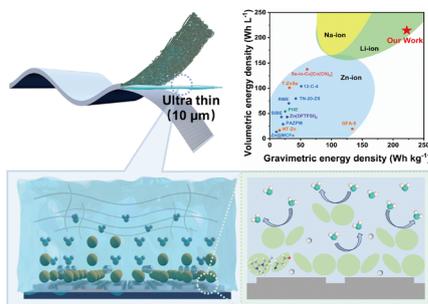
4231

Mg²⁺ initiated *in situ* polymerization of dioxolane enabling stable interfaces in solid-state lithium metal batteries

Hao Xu, Jinshuo Mi,* Jiabin Ma, Zhuo Han, Shun Lv, Likun Chen, Jiameng Zhang, Ke Yang, Boyu Li, Yuhang Li, Xufei An, Yuetao Ma, Shaoke Guo, Hai Su, Peiran Shi,* Ming Liu, Feiyu Kang and Yan-Bing He*



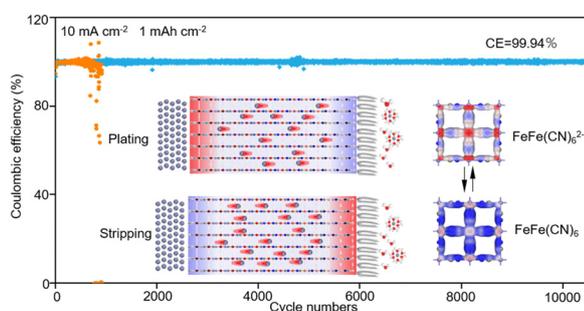
4241



Ultrathin cellulosic gel electrolytes with a gradient hydrophilic interface for stable, high-energy and flexible zinc batteries

Jichao Zhai, Wang Zhao, Lei Wang,* Jianbo Shuai, Ruwei Chen, Wenjiao Ge, Yu Zong, Guanjie He* and Xiaohui Wang*

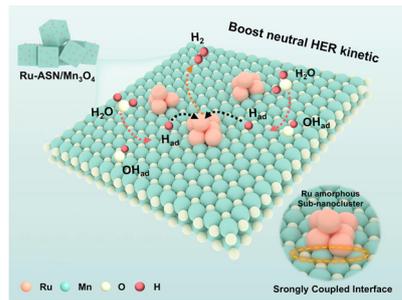
4251



Suppression of interfacial water layer with solid contact using an ultrathin, water-repellent, and Zn²⁺-selective layer for Ah-level zinc metal batteries

Ziwei Xu, Junpeng Li, Yifan Fu, Junjie Ba, Fengxue Duan, Yingjin Wei, Chunzhong Wang,* Kangning Zhao* and Yizhan Wang*

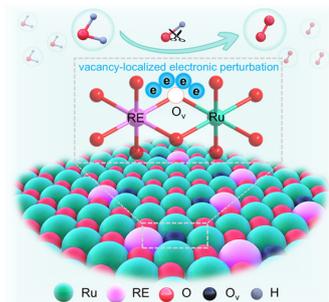
4262



Surface-confined growth of Ru amorphous sub-nanoclusters on reductive Mn₃O₄: a strongly coupled interface engineering for efficient neutral hydrogen production

Li Wan, Haijun Wang, Biao Zeng, Wenwen Wang, Xinzheng Liu, Lixin Cao, Yubin Hu, Zhongyu Cui* and Bohua Dong*

4276



An asymmetric RE–O–Ru unit with bridged oxygen vacancies accelerates deprotonation during acidic water oxidation

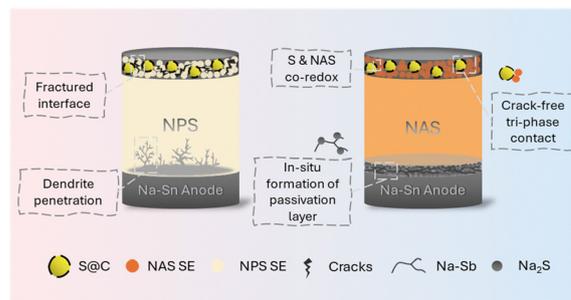
Caikang Wang, Xiangrui Wu, Hao Sun,* Zhe Xu, Chang Xu, Xuan Wang, Meng Li, Yu Wang, Yawen Tang, Jianchun Jiang, Kang Sun* and Gengtao Fu*



4288

Self-sacrifice of sulfide electrolytes facilitating stable solid-state sodium–sulfur batteries

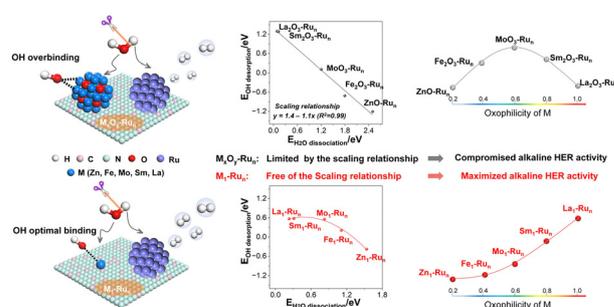
Yi Yuan, Yang Hu, Yi Gan, Zhiliang Dong, Yijia Wang, Enzhong Jin, Mingrui Yang, Frederick Benjamin Holness, Vinicius Martins, Qingsong Tu* and Yang Zhao*



4302

Breaking the H₂O dissociation-OH desorption scaling relationship in alkaline hydrogen evolution by oxophilic single atom M₁-Ru_n electrocatalysts

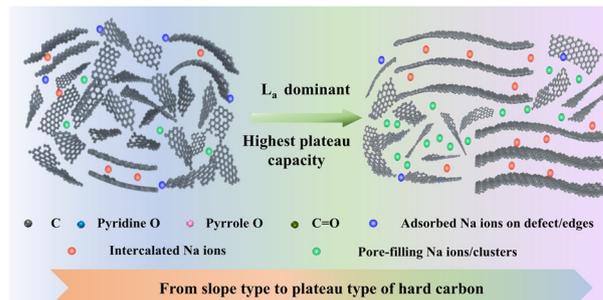
Xinhu Liang, Zhihao Zhang, Zhe Wang, Mingzhen Hu,* Dan Cheng, Yue Jiang, Hao Ren, Fengyi Shen, Shitu Yang, Xiaoxin Yang, Wenkun Jiang, Xianghui Shi, Zihao Ma and Kebin Zhou*



4312

Pushing slope- to plateau-type behavior in hard carbon for sodium-ion batteries via local structure rearrangement

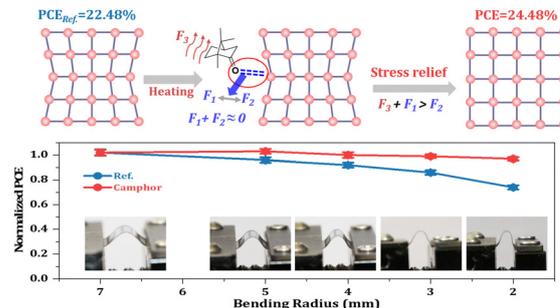
Feng Wang, Lian Chen, Jiaqi Wei, Caozheng Diao, Fan Li, Congcong Du, Zhengshuai Bai, Yanyan Zhang, Oleksandr I. Malyi,* Xiaodong Chen, Yuxin Tang* and Xiaojun Bao*



4324

Stress release via thermodynamic regulation towards efficient flexible perovskite solar cells

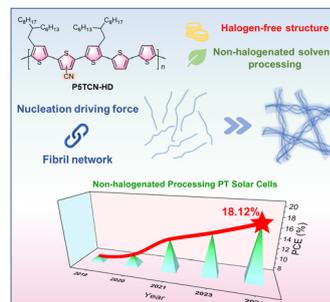
Zhiyang Xu, Runnan Yu,* Tangyue Xue, Qiang Guo, Qianglong Lv, Chen Zhang, Erjun Zhou* and Zhan'ao Tan*



4384

Nucleation driving force-controlled fibril network formation using a non-halogenated solvent enables polythiophene solar cells with over 18% efficiency

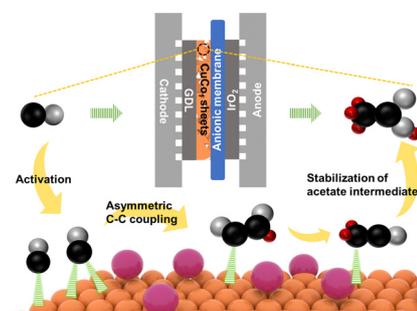
Jianglong Li, Dongsheng Xie, Xiyue Yuan,* Youle Li, Wenkui Wei, Yue Zhang, Haozhe Feng, Xiang Luo, Jiayuan Zhu, Zhao Qin, Jianbin Zhong, Lifu Zhang, Hongxiang Li, Wei Zhang, Yong Zhang,* Fei Huang, Yong Cao and Chunhui Duan*



4396

Single-atom mediated crystal facet engineering for the exceptional production of acetate in CO electrolysis

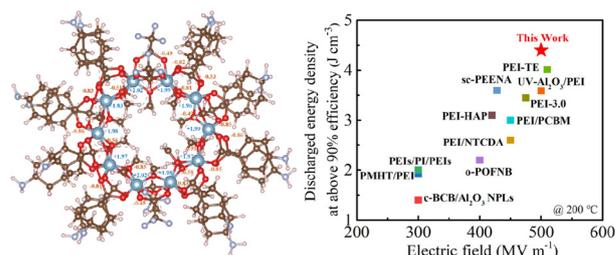
Jiacheng Liu, Yan Wen, Wei Yan, Zhongliang Huang, Xiaozhi Liu, Xuan Huang, Changhong Zhan, Yuqi Zhang, Wei-Hsiang Huang, Chih-Wen Pao, Zhiwei Hu, Dong Su, Shunji Xie, Ye Wang, Jiajia Han,* Haifeng Xiong,* Xiaoqing Huang* and Nanjun Chen*



4405

Aluminum macrocycles induced superior high-temperature capacitive energy storage for polymer-based dielectrics via constructing charge trap rings

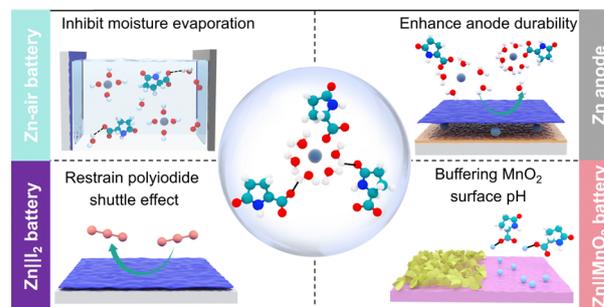
Zhongbin Pan, Yu Cheng, Zhicheng Li, Xi Pang, Peng Wang,* Xu Fan, Hanxi Chen, Jinjun Liu, Junfei Luo,* Jinghong Yu, Minhao Yang,* Jiwei Zhai and Weiping Li*



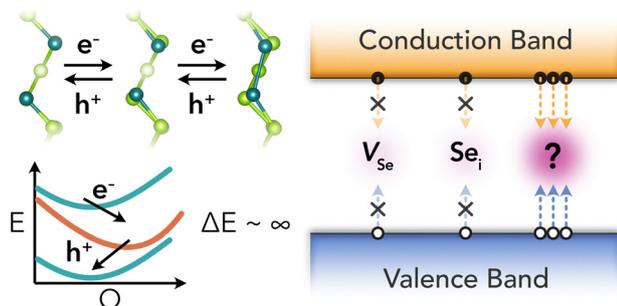
4416

An electrochemically paralleled biomass electrolyte additive facilitates the integrated modification of multi-dimensional Zn metal batteries

Kefeng Ouyang, Sheng Chen, Lidong Yu, Hongyu Qin, Ao Liu, Youfa Liu, Quan Wu, Bingjie Ran, Shubing Wei, Fei Gao, Kun Zhang, Jin Hu and Yan Huang*



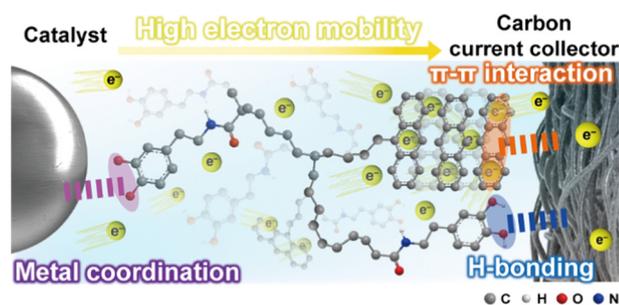
4431



Intrinsic point defect tolerance in selenium for indoor and tandem photovoltaics

Seán R. Kavanagh,* Rasmus S. Nielsen, John L. Hansen, Rasmus S. Davidsen, Ole Hansen, Alp E. Samli, Peter C. K. Vesborg, David O. Scanlon* and Aron Walsh*

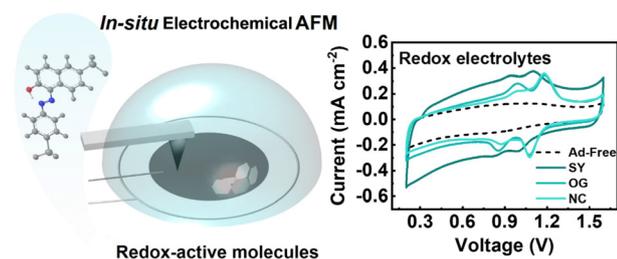
4447



A semi-crystalline polymer binder with enhanced electrical conductivity and strong underwater adhesion in aqueous sodium-air batteries

Jeonguk Hwang, Min Hoon Myung, Jee Ho Ha, Seungwoo Choi, Soon-Jae Jung, Seunghyun Lee, Jinwoo Park, Young-Ryul Kim, Hyo Jin, Nyung Joo Kong, Youngsik Kim, Hyun-Wook Lee, Hyunhyub Ko, Tae Joo Shin, Seok Ju Kang, Myung-Jin Baek* and Dong Woog Lee*

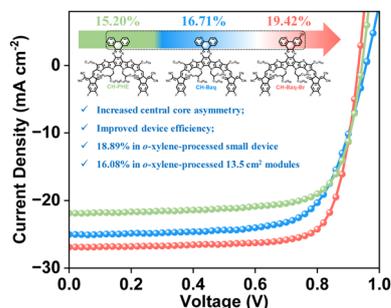
4460



Unraveling the dynamic transformation of azobenzene-driven redox electrolytes for Zn-ion hybrid capacitors

Ming Chen, Li Gong, Igor Zhitomirsky and Kaiyuan Shi*

4470



Fine-tuning central extended unit symmetry via atom-level asymmetric molecular design enables efficient binary organic solar cells

Jian Liu, Ruohan Wang, Longyu Li, Wenkai Zhao, Zhaochen Suo, Wendi Shi, Guankui Long, Zhaoyang Yao, Xiangjian Wan* and Yongsheng Chen*

