

Journal of Materials Chemistry A

Materials for energy and sustainability

rsc.li/materials-a

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.

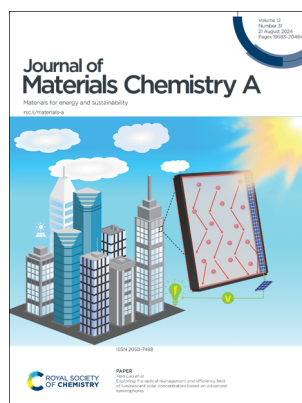
IN THIS ISSUE

ISSN 2050-7488 CODEN JMCAET 12(31) 19583–20484 (2024)



Cover

See Yuanyuan Liu, Yuqiao Wang *et al.*, pp. 19891–19898. Image reproduced by permission of Yuqiao Wang from *J. Mater. Chem. A*, 2024, 12, 19891.



Inside cover

See Xiao Luo *et al.*, pp. 19899–19909. Image reproduced by permission of Qi Nie, Wenqing Li, Kuilin Li and Xiao Luo from *J. Mater. Chem. A*, 2024, 12, 19899.

EDITORIAL

19604

Design and characterization of flexible electrode materials

Xiu Song (George) Zhao,* Hui Ying Yang* and Qiang Li*

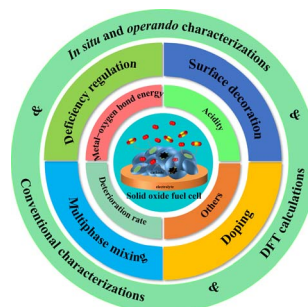


REVIEWS

19606

CO₂-tolerant perovskite cathodes for enhanced solid oxide fuel cells: advancements, challenges, and strategic perspectives

Zilin Ma, Qirui Ye, Huaqing Ye, Feifei Dong,* Meng Ni* and Zhan Lin



Environmental Science journals

One impactful portfolio for
every exceptional mind

Harnessing the power of interdisciplinary
science to preserve our environment

rsc.li/envsci

Fundamental questions
Elemental answers

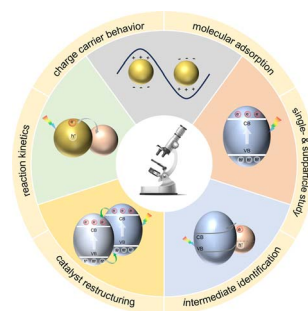


REVIEWS

19627

Single-molecule fluorescence imaging of photocatalytic nanomaterials

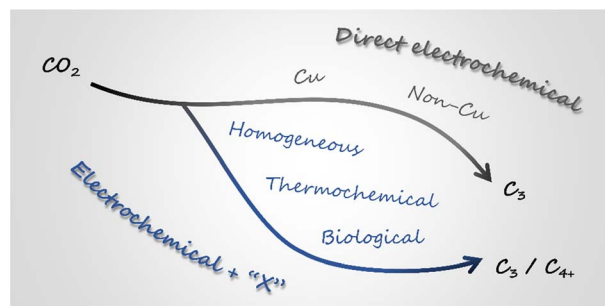
Shuchi Zhang, Deqi Fan, Qingdian Yan, Yi Lu, Donglei Wu, Bing Fu and Ming Zhao*



19663

Recent advances in upgrading CO₂ to C₃₊ products via electrochemical and complementary engineering

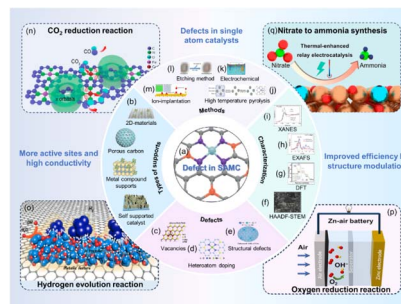
Xian Zhong, Hong-Jie Peng, Chuan Xia* and Xinyan Liu*



19685

Tailoring single-metal atom catalysts: a strategic defect engineering approach for electrochemical reduction reactions

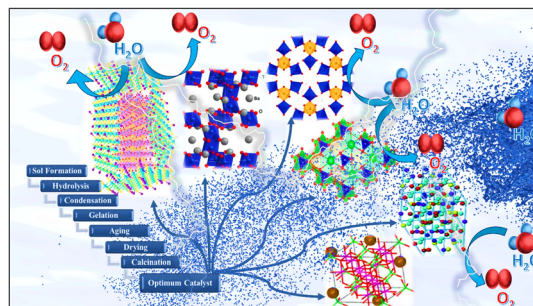
Nitin Goyal, Fei Li* and Yi-bo Hu*



19720

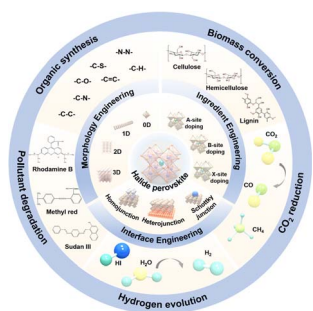
Sol-gel-derived nanostructured electrocatalysts for oxygen evolution reaction: a review

Aditi De, Min Seo Kim, Arindam Adhikari, Rajkumar Patel* and Subrata Kundu*



REVIEWS

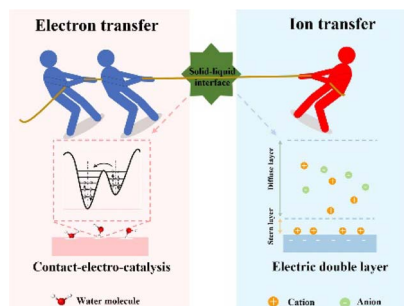
19757



Halide perovskite for enhancing photocatalytic efficiency: basic characteristics, nanostructure engineering and applications

Yuxin Zhang, Zhihao Yu,^{*} Ming Zhang, Runyu Liu, Jian Xiong, Yina Qiao and Xuebin Lu^{*}

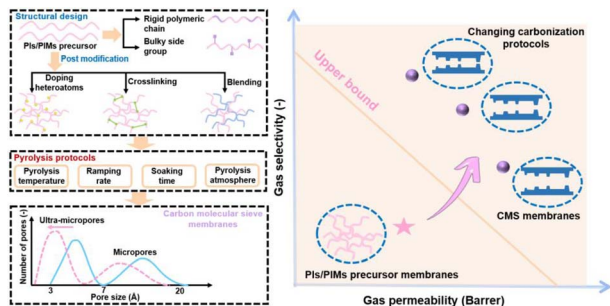
19783



Contact-electro-catalysis under natural and industrial conditions: mechanisms, strategies, and challenges

Xinnan Li and Wangshu Tong^{*}

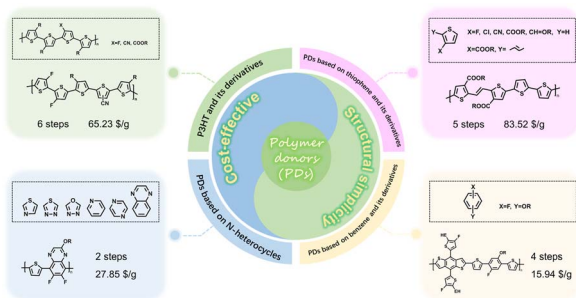
19806



Next-generation carbon molecule sieve membranes derived from polyimides and polymers of intrinsic microporosity for key energy intensive gas separations and carbon capture

Min Deng, Jing Wei, Yulei Ma, Zikang Qin, Jia Song, Lin Yang, Lu Yao, Wenju Jiang, Shouliang Yi,^{*} Nanwen Li^{*} and Zhongde Dai^{*}

19839



Cost-effective polymer donors with simple structure for organic solar cells

Xue Zhou, Chuantao Gu,^{*} Chunying Zheng, Bing Liu, Yong Tian, Huan Yang, Jiping Ma and Xichang Bao^{*}

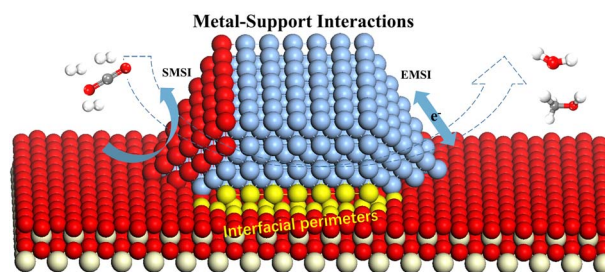


REVIEWS

19861

Catalyst architecture for metal–support interactions and its effects on heterogeneous reactions

Bin Yang, Xiaochen Chen, Limin Guo and Lingxia Zhang*

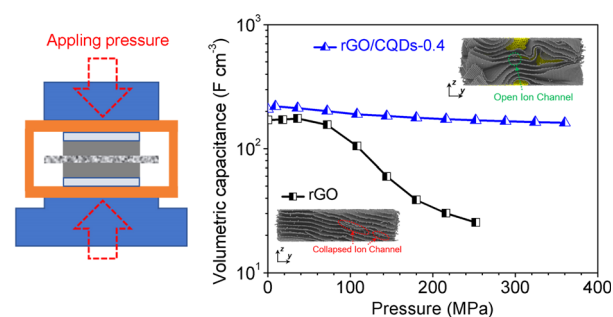


COMMUNICATION

19885

Carbon quantum dots-embedded reduced graphene oxide compact films for highly pressure-tolerant electrodes

Dou Lin, Ziyang Zhou, Ronghao Shi,* Bin Chen, Zhulin Huang, Haibin Tang,* Jun Wang, Xiaoguang Zhu, Cheng Shao and Fangming Han*

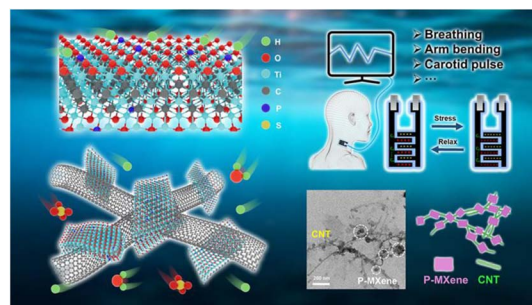


PAPERS

19891

Carbon nanotube cross-linked phosphorus-doped MXene for capacitive pressure microsensors

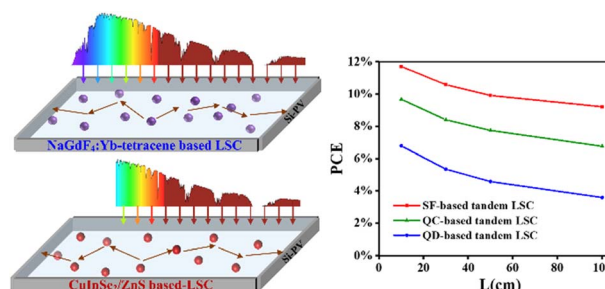
Wenshuai Yang, Shifan Zhu, Chenyang Hao, Tailong Ji, Yuanyuan Liu* and Yuqiao Wang*



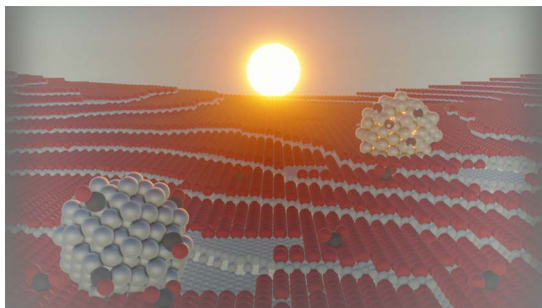
19899

Exploring the optical management and efficiency limit of luminescent solar concentrators based on advanced luminophores

Qi Nie, Wenqing Li, Kuilin Li and Xiao Luo*



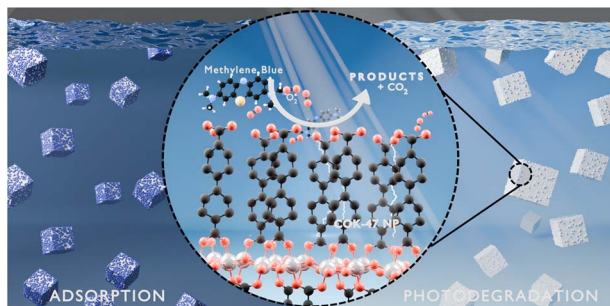
19910



Non-oxidative calcination enhances the methane dry reforming performance of Ni/CeO_{2-x} catalysts under thermal and photo-thermal conditions

Kristijan Lorber, Vasyl Shvalya, Janez Zavašnik, Damjan Vengust, Iztok Arčon, Matej Huš, Andraž Pavličič, Janvit Teržan, Uros Cvelbar, Blaž Likozar and Petar Djinić*

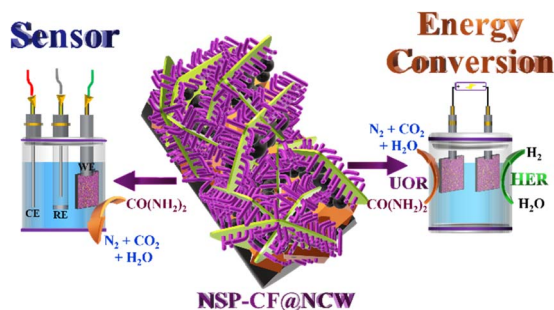
19924



Harnessing a Ti-based MOF for selective adsorption and visible-light-driven water remediation

Stephen Nagaraju Myakala, Magdalena Ladisich, Pablo Ayala, Hannah Rabl, Samar Batool, Michael S. Elsaesser, Alexey Cherevan* and Dominik Eder*

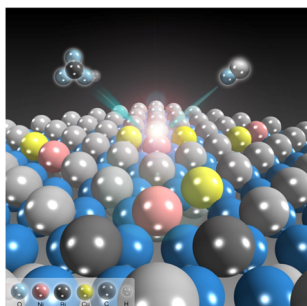
19935



Microstructural and electron framework-engineered 3D NiSeP-integrated CuFe composites as trifunctional electrocatalysts for sensing and urea-assisted water-splitting applications

Ameer Farithkhan, N. S. K. Gowthaman,* Raju Suresh Kumar, Krishnapandi Alagumalai, Wei Sea Chang* and Sankaran Meenakshi*

19950



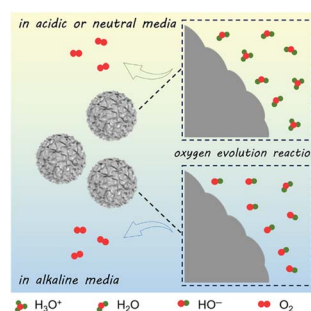
Designing atomic Ni/Cu pairs on a reactive BiOCl surface for efficient photo-chemical HCO₃⁻-to-CO conversion

Da Ke, Bingjie Sun, Yanjun Zhang, Fan Tian, Yu Chen, Qingwen Meng, Yixuan Zhang, Zhangyi Hu, Hongzhou Yang, Chenyu Yang, Xuyang Xiong* and Tengfei Zhou*

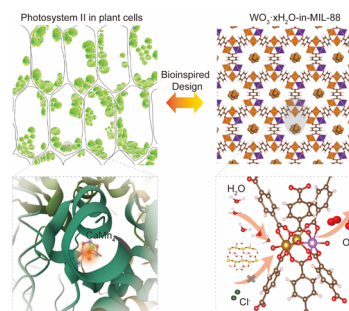


PAPERS

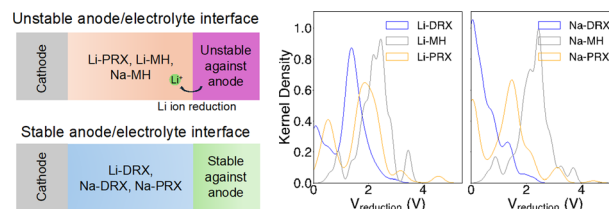
19958

Wrinkled Ir-MnO_x nanospheres as pH-universal electrocatalysts for oxygen evolution reactionLi Quan, Yirong Cao, Jinlong Liu,^{*} Bao Yu Xia, Xin Zhao^{*} and Bo You^{*}

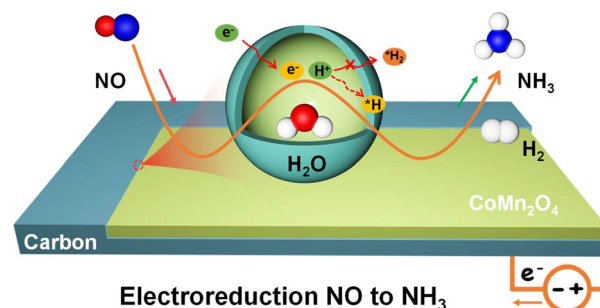
19968

Tungstic acid integrated metal-organic frameworks for efficient oxygen evolution reactionZicheng Huang, Wenjie Shao, Yijuan Zheng, Junyu Wang, Mao Wang, Shuang Li, Xiaohui Xu,^{*} Chong Cheng^{*} and Changsheng Zhao^{*}

19979

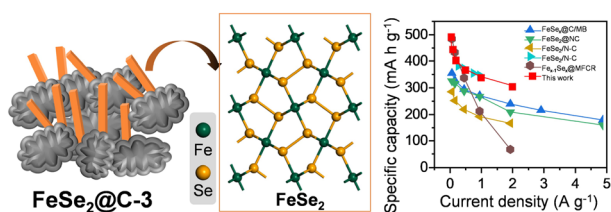
Design principles for anode stable solid-state electrolytesTan-Lien Pham, Lin Wang and Bin Ouyang^{*}

19988

Efficient electrocatalytic nitric oxide reduction to ammonia using manganese spinel oxidesZhaodong Niu, Shiyong Fan and Xinyong Li^{*}

PAPERS

19995

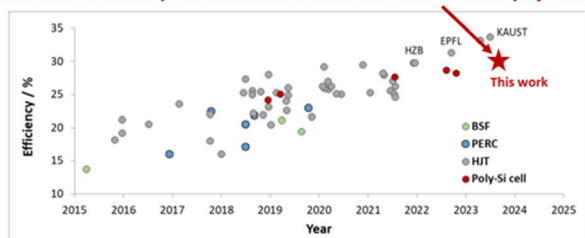


Constructing FeSe₂ nanorods supported on ketjenblack with superior cyclability for potassium-ion batteries

Bi-Cui Chen, Xian Lu, Hou-Yang Zhong, Pei-Weng Huang, Ya-Nan Wu, Si-Yu Xu, Xue-You Tan* and Xiao-Hui Wu*

20006

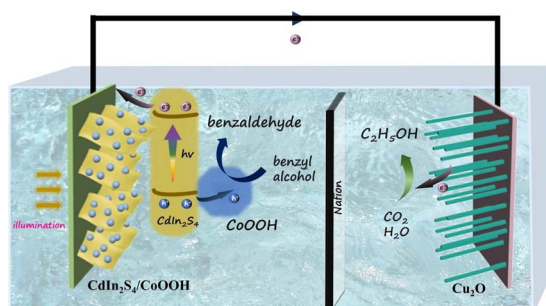
Over 29% monolithic perovskite/silicon tandem solar cells based on poly-Si cells



Over 29%-efficient, stable n-i-p monolithic perovskite/silicon tandem solar cells based on double-sided poly-Si/SiO₂ passivating contact silicon cells

Leiping Duan, Sieu Pheng Phang, Di Yan, Josua Stuckelberger, Daniel Walter, Yihui Hou, Wei Wang, Nathan Chang, Anh Dinh Bui, Azul Osorio Mayon, Lichun Chang, Di Kang, The Duong, Rabin Basnet, Hieu Nguyen, Thomas White, James Bullock, Klaus Weber, Daniel MacDonald,* Kylie Catchpole* and Heping Shen*

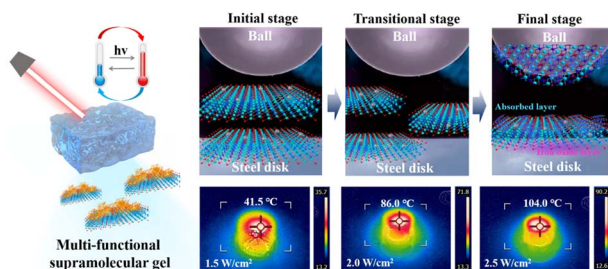
20017



CoOOH/CdIn₂S₄ film photoanodes driving unbiased tandem cells towards simultaneous efficient oxidation of benzyl alcohol and selective generation of ethanol from CO₂ reduction

Yiqing Wei, Huichao He,* Shuyuan Yang, Yongcai Zhang, Xin Zhou,* Zhigang Zou and Yong Zhou*

20025



Enhanced lubrication and photothermal conversion via dynamically reversible supramolecular oil gels filled with MXene@mGLM composites

Yuhong Cui, Tiantian Wang, Guangkai Jin, Shiyuan Wang, Shujuan Liu, Qian Ye,* Feng Zhou and Weimin Liu

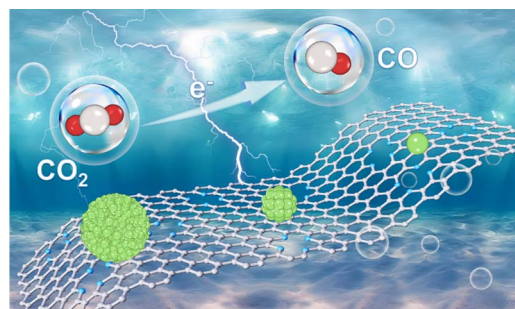


PAPERS

20035

Size effect of nickel from nanoparticles to clusters to single atoms for electrochemical CO₂ reduction

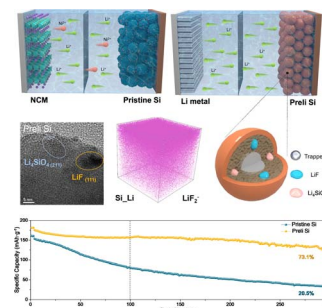
Qin Pan, Yang Chen,* Hui Li, Guanghuan Ma, Shuoshuo Jiang, Xin Cui, Lei Zhang, Yuxin Bao and Tianyi Ma*



20045

Essence of electrochemical prelithiation of the silicon anode: from the interface to the bulk phase

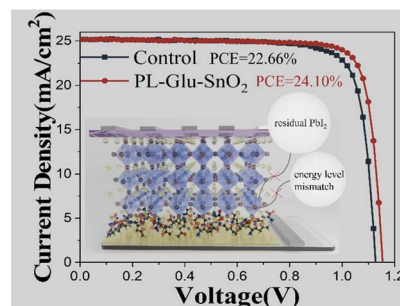
Yuchen Li, Linze Lv, Rui Liang, Longfei Wang, Yan Wang, Qunting Qu,* Ming Shen and Honghe Zheng*



20056

Amino acid salt induced PbI₂ crystal orientation optimization for high-efficiency perovskite solar cells with long-term stability

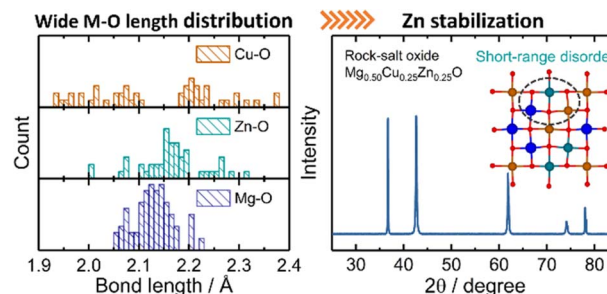
Jiangying Lu, Yulin Wu, Shan Wu, Jing Zhao, Jinyao Wang, Runkang Lin, Huayi Zou, Shudi Lu, Kong Liu, Shizhong Yue,* Zhijie Wang, Liya Zhou* and Shengchun Qu*



20064

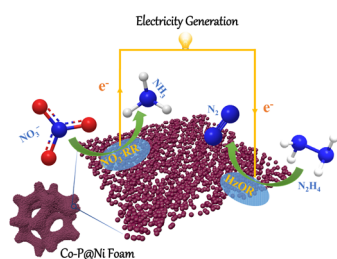
Short-range disorder mediated stability of Zn in rock-salt MgO beyond configurational entropy

Shengnan Sun,* Jun Zhou, Shibo Xi, Hui Ru Tan, Fengxia Wei, Debbie Hwee Leng Seng, Wei Ying Lieu, Yi Ren, Shijie Wang* and Zhi Wei Seh*



PAPERS

20077

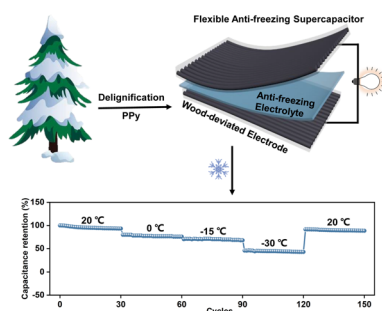


- ✓ j_{NH_3} of 2 A cm⁻² at -0.3 V with FE_{NH_3} of 91%
- ✓ High stability of j over 800 mA cm⁻² for 82h

Electrochemical reduction of nitrate to ammonia on ultra-stable amorphous Co–P electrocatalyst

Jin-Long Fan, Sheng-Bo Liu, Ming-Liang Chen, Zhangxiong Wu, Sheng-Peng Sun* and Yao-Yin Lou*

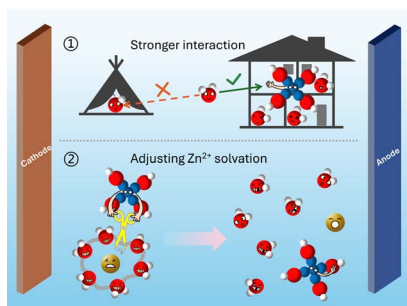
20088



Wood-derived flexible supercapacitors for anti-freezing green power sources

Hongting Ma, Qian Zhao, Peihao Cheng, Xiaodong Geng, Huannuo Tao, Zhouxiaolong Zhang, Yue Jiang, Junlin Ma, Kai Yang, Quanli Liu, Hanwen Zhang, Zhida Liang, Jian Li,* Tianlu Wang,* Mianqi Xue* and Nan Zhu*

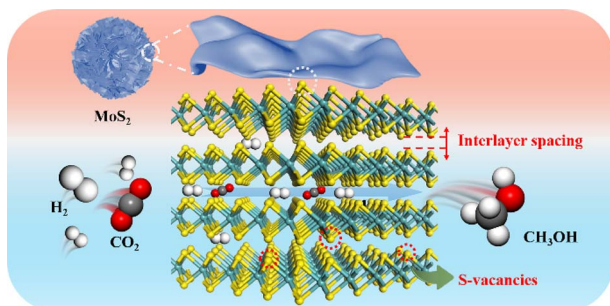
20097



Breaking hydrogen-bonds in aqueous electrolytes towards highly reversible zinc-ion batteries

Yilong Zhu, Qianru Chen, Junnan Hao* and Yan Jiao*

20107



Enhancing CO₂ hydrogenation to methanol via the synergistic effect of MoS₂ interlayer spacing and sulfur vacancies

Langlang Qin, Yunfei Gao,* Caiyun Han, Minghui Zhu and Shuang Wang*

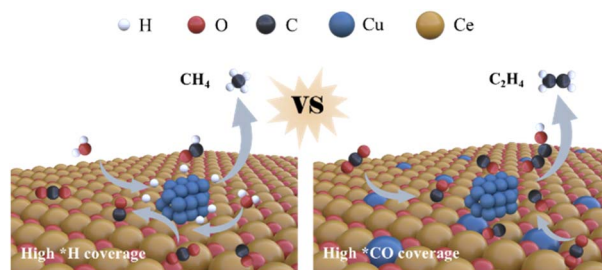


PAPERS

20115

Customized CO₂ electroreduction to methane or ethylene by manipulating *H and *CO adsorption on Cu/CeO_x catalysts

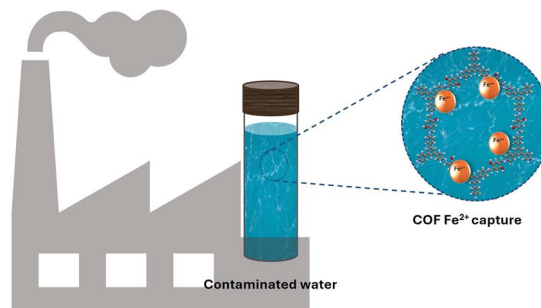
Tinghui Yang, Yingbing Zhang, Zichao Huang, Jianping Yang* and Min Kuang*



20121

Imine-based covalent organic framework gels for efficient removal of Fe²⁺ from contaminated water

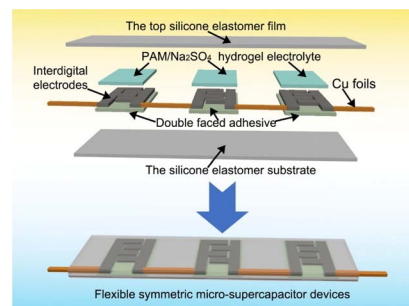
Cristina Arqueros, Lorena Welte, Carmen Montoro* and Félix Zamora*



20129

Dual design of electrodes and electrolytes ensures flexible symmetric micro-supercapacitors with high energy density

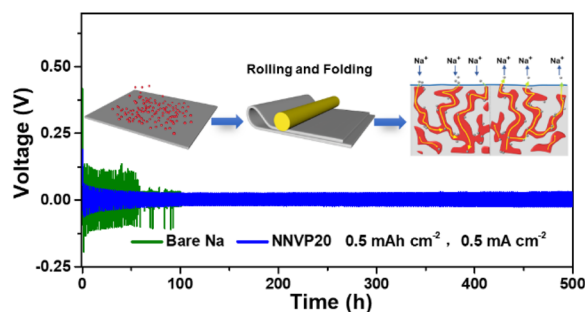
Zhiqian Cao,* Jingzhi Tao and Yudong Wu*



20137

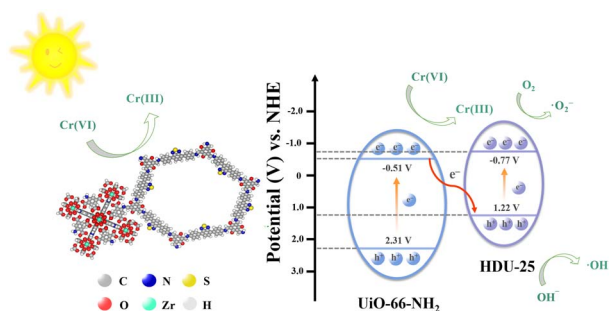
Constructing sodiophilic interconnected ion-transport channels towards a stable Na-metal anode

Yi Ding, Min Guo,* Yawei Zhang, Song Lu,* Jiadi Ying, Yeqing Wang, Tiancun Liu and Zhixin Yu*



PAPERS

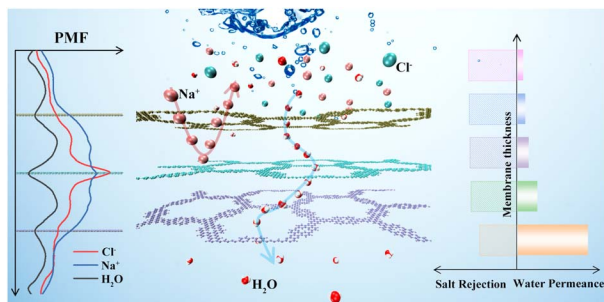
20149



High-efficiency photocatalytic reduction of Cr(VI) by Z-scheme electron transfer in UiO-66-NH₂@HDU-25 heterojunctions

Wen Lu, Chen Wang, Wenhui Song, Zhixiong Zhang, Chengde Xie and Jianjun Wang*

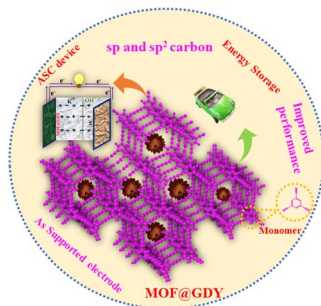
20160



High-performance desalination through tortuous pathways in multilayer ABC-stacked large-pore covalent organic frameworks: a theoretical study

Wenfeng Wu, Yixiang Li, Yong-Qiang Li, Mingwen Zhao, Weifeng Li* and Yuanyuan Qu*

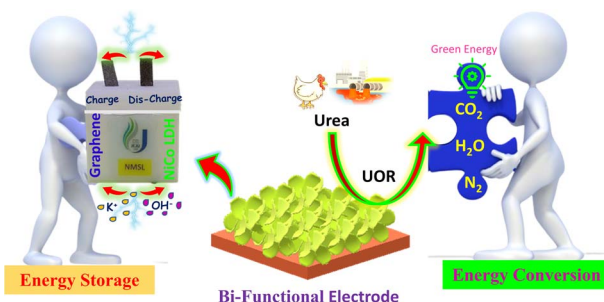
20170



Crumpled fibrous graphdiyne network decorated metal-organic framework: a promising heterostructure for improved energy storage performance

Zahir Abbas, Nissar Hussain and Shaikh M. Mobin*

20179



Unveiling the effect of growth time on bifunctional layered hydroxide electrodes for high-performance energy storage and green energy conversion

Jyoti Prakash Das, Swapnil Shital Nardekar, Dhanasekar Kesavan, Kousik Bhunia, Vishwanathan Ravichandran and Sang-Jae Kim*

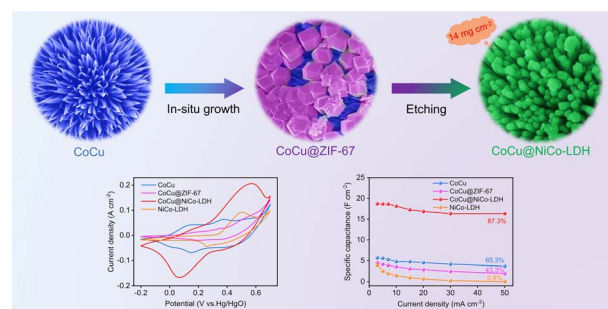


PAPERS

20191

A ZIF-67 derived NiCo-LDH nanosheet–nanourchin 3D hierarchical nanostructure for high-performance supercapacitors

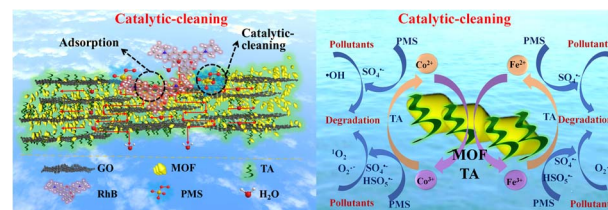
Hongtao Zhou, Xuefeng Sha, Fan Zeng, Xueli Wu, Minghao Yu, Zhidan Shi, Xingang Zhang,* Xianyin Song* and Changzhong Jiang*



20202

Constructing a highly permeable bioinspired rigid-flexible coupled membrane with a high content of spindle-type MOF: efficient adsorption separation of water-soluble pollutants

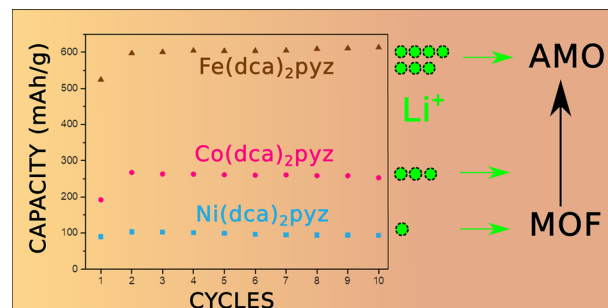
Ruilong Zhang, Jun Zhao,* Xiaohua Tian, Jian Ye, Lulu Wang, Ifunanya Rejoice Akaniro, Jianming Pan* and Jiangdong Dai*



20215

Electrochemical performance of M(dca)₂pyz (M = Fe, Co and Ni) MOFs as sustainable anodes in lithium-ion batteries

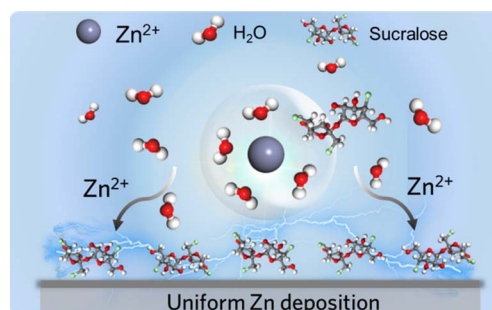
Isabel Ciria-Ramos, Alberto García-Fernández, Álvaro Mayoral, Alodia Orera, Emilio J. Juárez-Perez* and Marta Haro*



20229

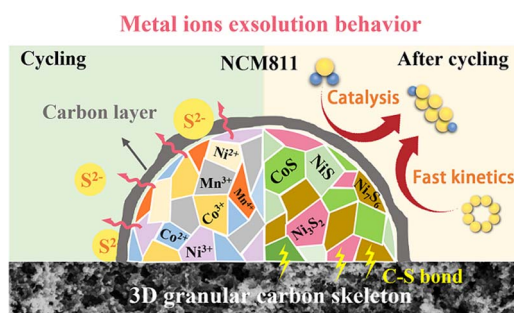
Sucralose with bifunctional groups as a functional additive enhancing the interfacial stability of zinc metal anodes *via* interfacial molecular chemistry regulation

Huan Liu, Zijun Xin, Bin Cao,* Di Zhang, Jie Lu, Yiwen Zhang, Zhijing Xu, Hongjuan Lai, Mengjiao Du and Zirong Guo



PAPERS

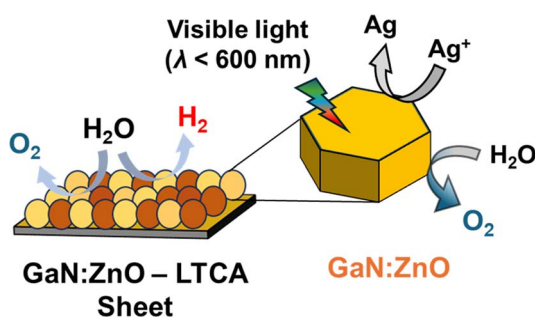
20238



Metal-ion exsolution effect to accelerate the reaction kinetics in Li–S batteries

Hongxu Zhou, Weichen Han, Hongquan Chai, Hao Huang, Jingang Zheng, Han Zhang,* Lixiang Li, Weimin Zhou, Baigang An and Chengguo Sun*

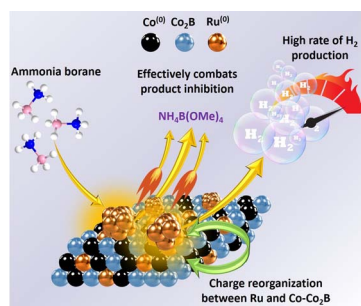
20247



Long-wavelength photoresponsive gallium zinc oxynitride for efficient oxygen evolution and Z-scheme water splitting reactions

Natsutogi Iwasa, Hiroka Sandaiji, Swarnava Nandy, Mamiko Nakabayashi, Tsuyoshi Takata, Takashi Hisatomi* and Kazunari Domen*

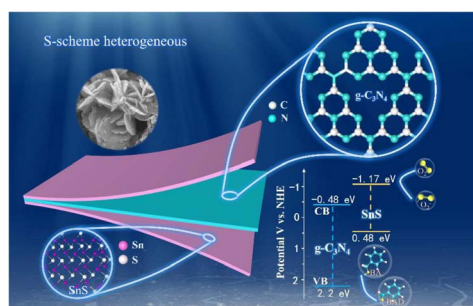
20256



A Ru atomic cluster-installed Co–Co₂B nanocatalyst remarkably combats product inhibition while sustaining high turnover frequency of hydrogen production

Rajani Kumar Borah, Priti Singh, Mudit Dixit and Amit A. Vernekar*

20270



Stannum vacancies at precise interface of 2D/2D g-C₃N₄/SnS S-scheme heterojunction boost up photocatalysis

Huiming Shi, Quanquan Shi,* Sanwal Piracha and Gao Li*

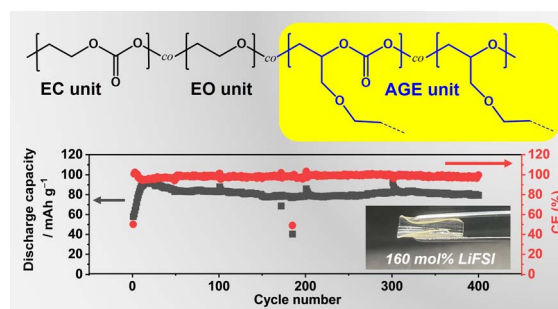


PAPERS

20278

A highly salt concentrated ethylene carbonate-based self-standing copolymer electrolyte for solid-state lithium metal batteries

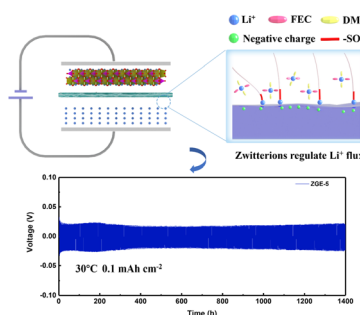
Nantapat Soontornnon, Kento Kimura and Yoichi Tominaga*



20288

The role of zwitterionic crosslinks in facilitating ion conduction, lithium deposition, and stable interface formation for polymer electrolyte-based lithium metal batteries

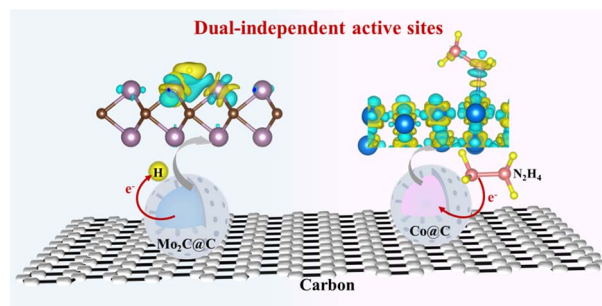
Liang Chai, Zhiheng Zou, Zhengsheng Yang and Guang Yang*



20300

Dual-independent active sites for efficient hydrogen production

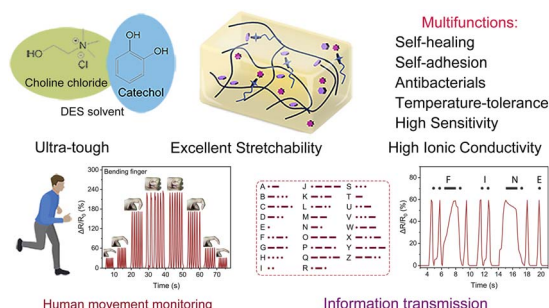
Yangyang Feng,* Yongxin Guan,* Lei Wen and Yunxia Liu



20307

Physically entangled multifunctional eutectogels for flexible sensors with mechanically robust

Qianwen Lu, Hengfeng Li* and Zhijian Tan*





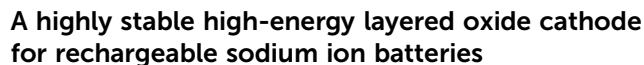
20327



20337



20348



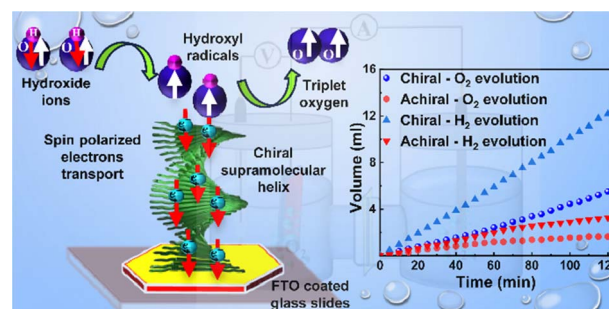
Ting Li, Yangyang Zhang, Yushuo Zhang, Xingde Xiang,*
Song Liu* and Chunxia Chen*

PAPERS

20354

Chiral supramolecular polymer functionalized two-dimensional transition metal-based catalyst for enhancing the electrochemical water splitting via spin-polarized charge transfer

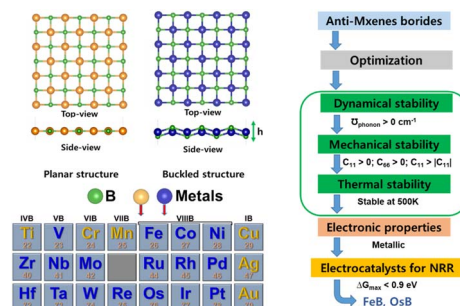
Utkarsh Utkarsh, Sai Rachana Pramatha, Anujit Balo, Utpal Kumar Gosh, Kotagiri Venkata Rao* and Koyel Banerjee Ghosh*



20364

2D anti-MXene boride monolayers: unveiling a promising new family of catalysts for the nitrogen reduction reaction

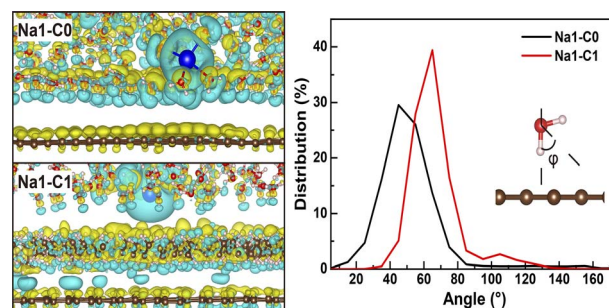
Viet Q. Bui* and Dinh Quang Khieu



20378

Effect of alkane adsorption on the electrochemical properties of graphene

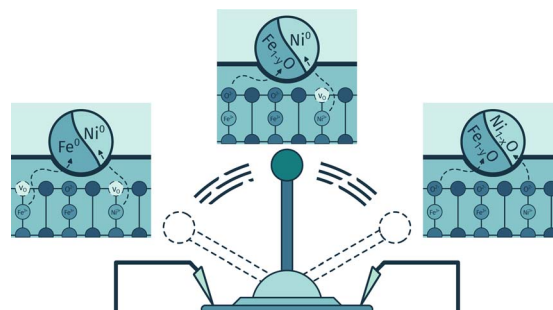
Jie Tian, Yifeng Zhang, Xueqing Zuo, Chengwei Li, Zeng Fan* and Lujun Pan*



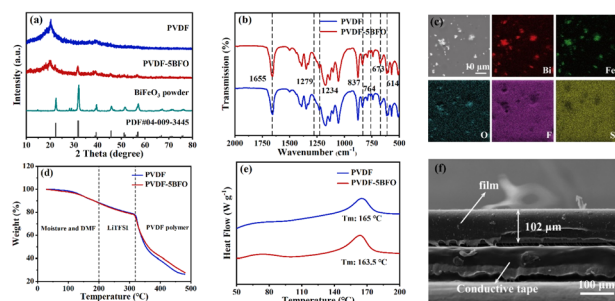
20386

Electro-tuned catalysts: voltage-controlled activity selection of bimetallic exsolution particles

Harald Summerer,* Kirsten Rath, Andreas Nenning, Thomas Schachinger, Michael Stöger-Pollach, Christoph Rameshan and Alexander K. Opitz



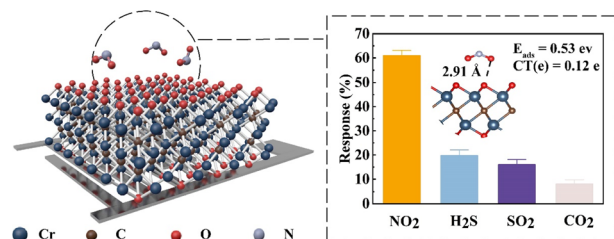
20403



Ferroelectric BiFeO₃ modified PVDF-based electrolytes for high-performance lithium metal batteries

Yanmei Wu, Hong Zhang, Yilin Xu, Zhiruo Tang and Zhicheng Li*

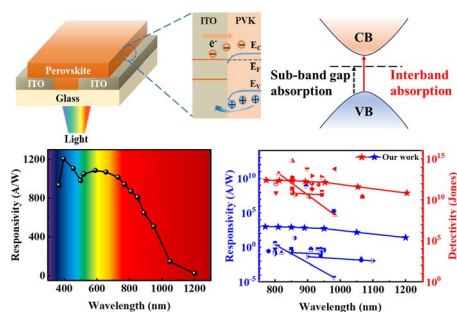
20414



Defective Cr₂CT_x-based sensors with high sensitivity for NO₂ detection at room temperature

Liangchao Guo, Haoran Han, Junke Wang, Peng Wang, Chunyu Du, Bo Wang, Qilong Yuan, Yongbiao Zhai* and Chao Zhang*

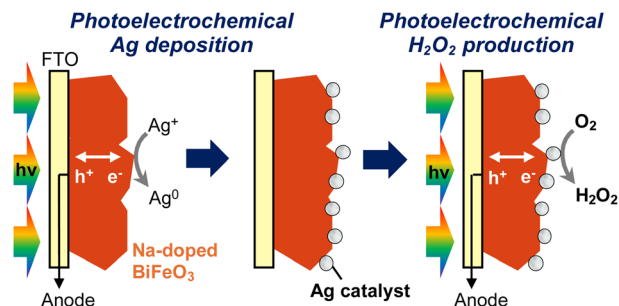
20425



Regulating energy band alignment for high-performance broadband perovskite photodetectors

Jun Wu, Yuchen Miao, Xiaorong Qi, Liu Yang, Xu Wang, Fei Zheng, Feiyu Zhao, Zhenfu Zhao, Shareen Shafique, Houcheng Zhang and Ziyang Hu*

20437



Atomic doping to enhance the p-type behavior of BiFeO₃ photoelectrodes for solar H₂O₂ production

Daye Seo, Andrew Grieder, Andjela Radmilovic, Sophya F. Alamudun, Xin Yuan, Yuan Ping* and Kyoung-Shin Choi*

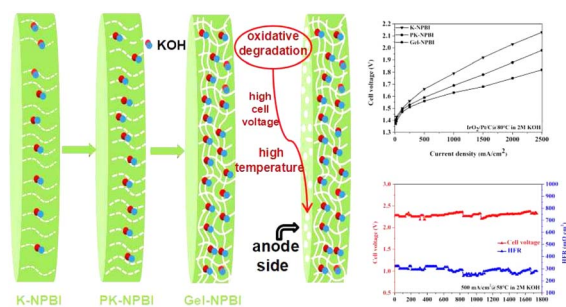


PAPERS

20449

Highly ion conductive ion solvating membranes for durable alkaline water electrolysis at low temperature and voltage

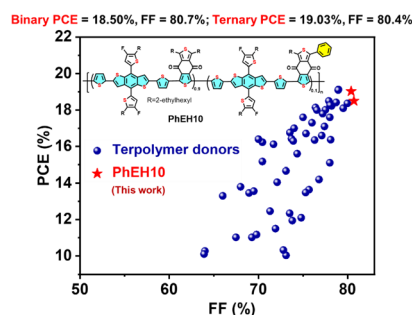
Bin Hu, Zhongyan Li, Lei Liu,* Min Liu, Yingda Huang, Tiegen Guo, Rong Zhang, Kang Geng* and Nanwen Li*



20459

Monophenyl-featured side-chain-random terpolymers for organic solar cells with an efficiency beyond 19%

Deng Zhou, Lingchen Kong, Lianjie Zhang,* Jiafeng Zhang, Mingqing Chen, Xinkang Wang, Xunchang Wang, Dongge Ma, Renqiang Yang* and Junwu Chen*



20469

Influence of microstructure evolution on the discharge properties of the Al–Mg–Sn–Ga–In anode for Al–air batteries

Xuehong Xu, Jin Zhang, Wei Jiang and Yunlai Deng*

