

# Journal of Materials Chemistry A

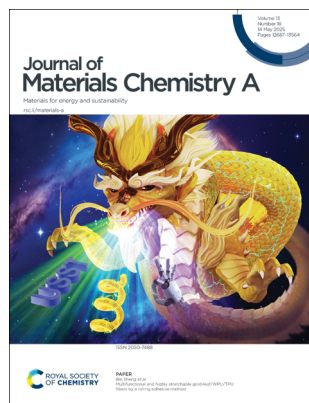
Materials for energy and sustainability

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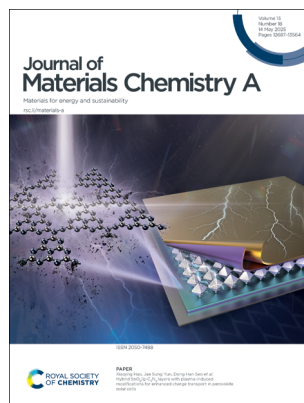
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## IN THIS ISSUE

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See Xiaojing Hao, Jae Sung  
Yun, Dong Han Seo *et al.*,  
pp. 12949–12956. Image  
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*Chem. A*, 2025, **13**, 12949.

## EDITORIAL

12709

### Introduction to 'Nanomaterials for a sustainable future: from materials to devices and systems'

Guohua Jia,\* Hongxia Wang,\* Xuyong Yang,\* Lina Quan\*  
and Yun Liu\*

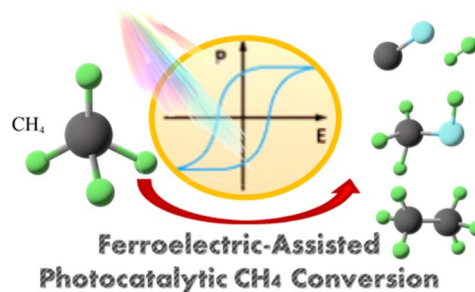


## REVIEWS

12712

### A review on photocatalytic methane conversion systems: from fundamental mechanisms to the emerging role of ferroelectric materials

Yiming Lei, Xavier Sala, Jordi García-Antón  
and Jose Muñoz\*



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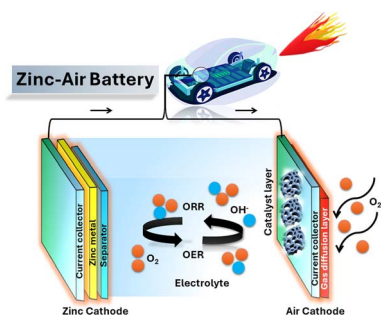
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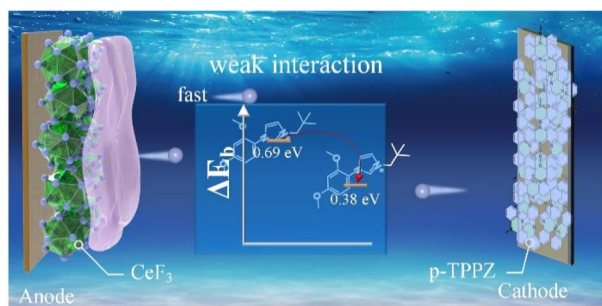
12855



### From lab to market: the future of zinc–air batteries powered by MOF/MXene hybrids

Tholkappiyan Ramachandran,\* Ramesh Kumar Raji and Moh'd Rezeq\*

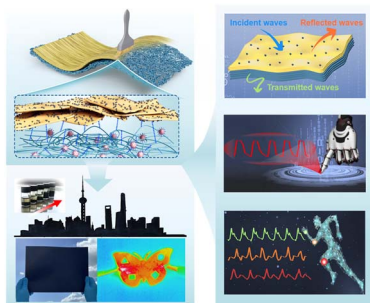
12891



### Design and synthesis of a weakly solvated electrolyte for high-performance fluoride-ion batteries

Jia Xiang, Wei Zou, Ying Lei, Hua-Jun Shawn Fan,\* Rongwen Lu\* and Shufen Zhang

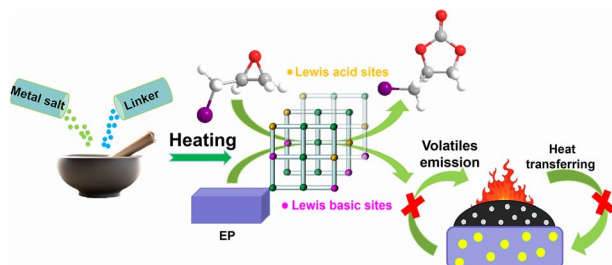
12900



### Robust integration of p-MXene ink with a bacterial cellulose-reinforced polymer enables dynamic interaction of superior electromagnetic shielding and sensing

Danyu Liu, Pan Xue, Jingli Zhang, Yingjia Tong, Yixuan Zhang, Yajing Yu, Qingda Zhang, Mengfei Huang, Yiheng Gao, Jie Li, Qufu Wei and Pengfei Lv\*

12911



### Green and rapid synthesis of a two-dimensional Zn-MOF with Lewis acid–base sites via a solvent-free strategy

Quanyou Sun, Zunbin Duan, Hua Deng, Rui Li\* and Jian-Rong Li\*

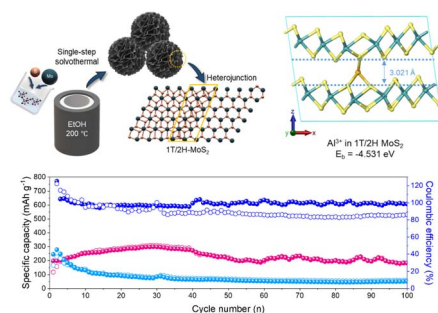


## COMMUNICATIONS

12917

### Synergistic 1T/2H-MoS<sub>2</sub> hybrid phases enable exceptional aluminum-ion battery performance with high capacity and stability

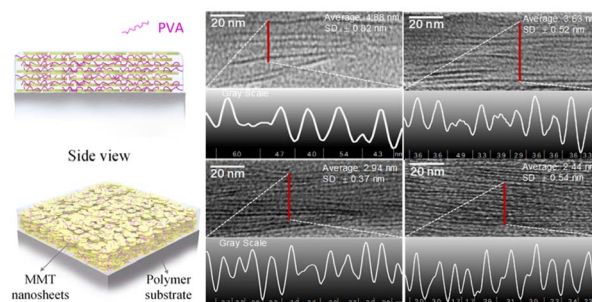
Seohyeon Yeo, Moonsu Kim, Changhoon Heo, Yunji Jeong and Gibaek Lee\*



12926

### Self-assembly of anisotropic nano-sheets to impede charge injection into polymer dielectrics

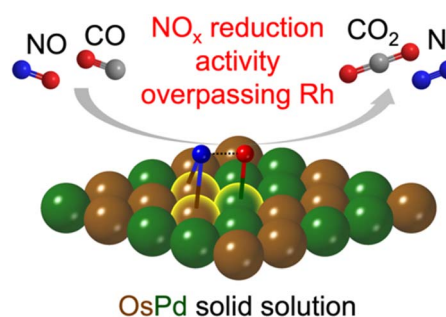
Ying Zhou, Anna M. LaChance, Qian Wang, Yanfeng Gao, Jierui Zhou, Bangdou Huang, Kuangyu Shen, Zaili Hou, Ting Lei, Ningzhen Wang, Zhou Zuo, Shan Liu, Leonard A. Dissado, Tao Shao, Xidong Liang,\* Yang Cao,\* Luyi Sun\* and Chao Wu\*



12932

### Creation of an immiscible OsPd solid solution as a Rh-free catalyst with NO<sub>x</sub> reduction performance exceeding that of Rh

Bo Huang,\* Ying Qin, Junyun Gao, Zhe Tan\* and Hong Zheng\*

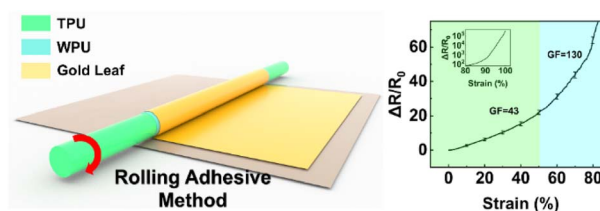


## PAPERS

12938

### Multifunctional and highly stretchable gold-leaf/WPU/TPU fibers by a rolling adhesive method

Shunlei Pan, Jingyu Zhou, Linling Xiang, Ziqi Wen, Dawei Zhang and Bin Sheng\*

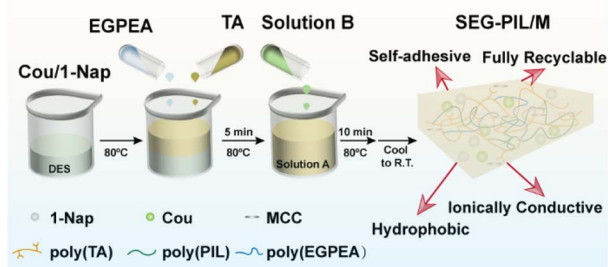




12988

### Hydrophobic, ionically conductive, self-adhesive and fully recyclable eutectogels for stretchable wearable sensors and triboelectric nanogenerators

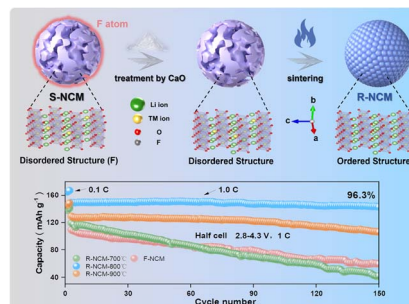
Ren'ai Li, Hongtian Zhang, Lizi Li,\* Biqiang Zhang, Xianyong Du, Weiyong Shao, Xueren Qian, Yunfeng Cao and Zhulan Liu\*



12998

### Regeneration of spent NCM622: reconstructing the rich lattice oxygen surface for enhanced stability

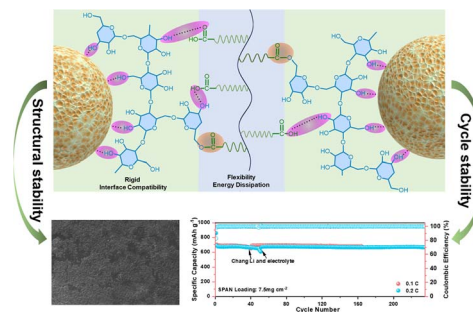
Bin Wang, Chao Zhu, Hai Lei, Hanyu Zhou, Wei Sun, Yue Yang and Peng Ge\*



13010

### A Rigid-flexible binder for sulfurized polyacrylonitrile cathodes for rechargeable lithium batteries

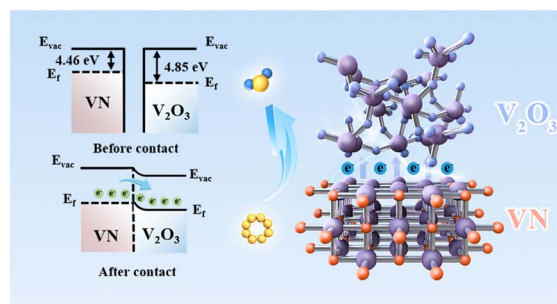
Qihang Wang, Jiqiong Liu, Huichao Lu, Shuo Liu, Liangyu Wang, Chenran Hao, Jing Han, Jun Yang, Yanna NuLi and Jiulin Wang\*



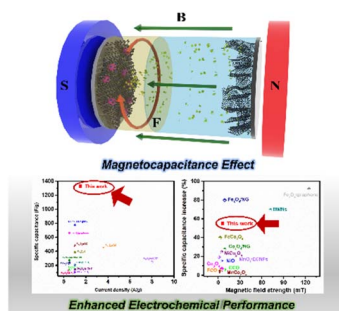
13020

### Boosting catalytic activity by using the interfacial electric field of VN-V<sub>2</sub>O<sub>3</sub> heterogeneous nanoparticles for efficient lithium polysulfide conversion

Yuxin Fan, Yongzheng Zhu, Zheng Wei, Huibing He and Jinliang Zhu\*



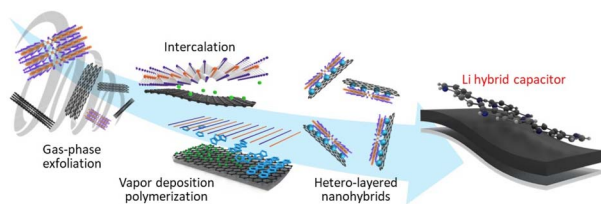
13028



### Superior magnetocapacitance in ferro/ferrimagnetic $\text{Fe}_3\text{O}_4/\text{Fe}/\text{Fe}_3\text{C}$ integrated N-doped carbon hybrid nanostructures under mild magnetic fields

Gwan Hyeon Park, Junbeom Maeng, Tanwir Ansari, Jungseub Ha, Suresh Pittala, Jaehyun Heo, Subin Kim, Jae Hyeong Yu, Sandya Rani Mangishetti\* and Won Bae Kim\*

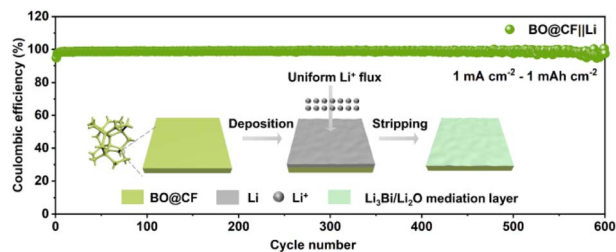
13037



### All-gas-phase preparation of organic/inorganic heterolayered multifunctional electrodes for hybrid-type energy storage

Minseong Ju, Changjun Kim, Jisun Lee, Sangmin Kim, Thi Thuong Thuong Nguyen, Cuong Van Le, Haney Lee, Mincheol Chang and Hyeonseok Yoon\*

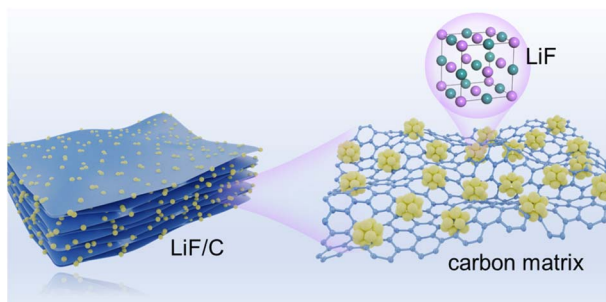
13048



### Stabilizing lithium metal anodes with bismuth oxide-coated 3D copper foams *via* an *in situ* bifunctional mediation layer

Yida Wang, Juntao Si, Yiran Zhu, Kuo Cao, Sihang Zeng, Yunyong Hu, Bicai Pan and Chunhua Chen\*

13058



### Ultrastable LiF/carbon nanocomposites as sacrificial additives for enhancing the lifespan of anode-free lithium metal batteries

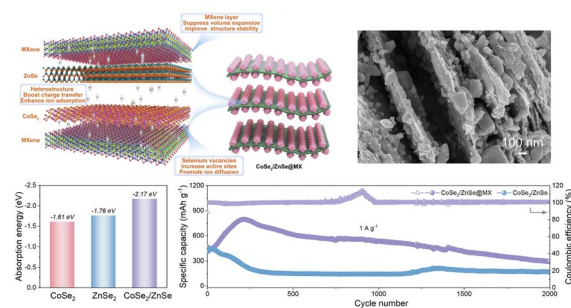
Xiaoyu Tang, Miao Bai, Aihu Shao, Zhiqiao Wang, Helin Wang, Min Zhang and Yue Ma\*



13070

## Interface engineering of 0D–2D CoSe<sub>2</sub>/ZnSe@MXene heterostructured electrodes for high-performance lithium-ion batteries

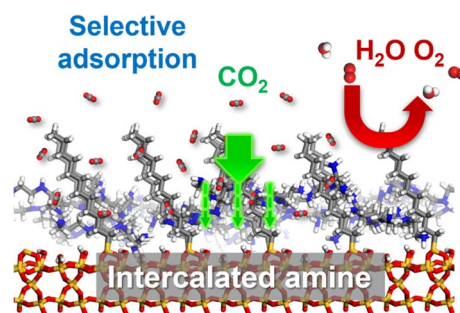
Fayun Wei, Fanghua Liang, Yanrui Zhao, Zhuyu Ji, Tingting Yan,\* Ruiqing Li, Hui Liu,\* Youchao Kong, Honggang He, Weichuan Huang, Chunyan Cao, Wei Zhang, Bin Fei\* and Mingzheng Ge\*



13081

## Polyethyleneimine intercalated into alkyl layer for superhydrophobic interface: low-energy and O<sub>2</sub> & H<sub>2</sub>O-resistant CO<sub>2</sub> sorbent

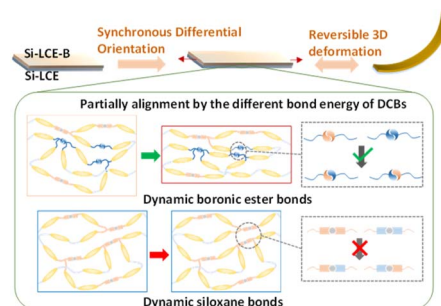
Shuailong Song, Zhinan Wu, Tong Zhou, Yunxia Wen, Wei Cao, Han Lin, Xiaohua Lu, Tuo Ji\* and Jiahua Zhu\*



13091

## Synchronous differential orientation of liquid crystal elastomers based on dual dynamic covalent bonds

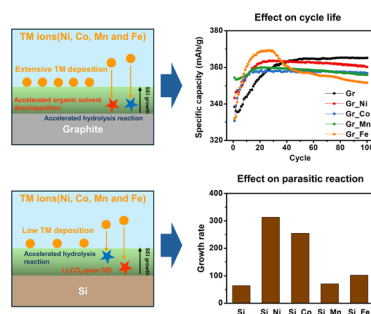
Zhentian Xu,\* Yangyang Zhu, Yun Ai, Zhongyi Yuan, Chunquan Li, Dan Zhou and Lie Chen\*



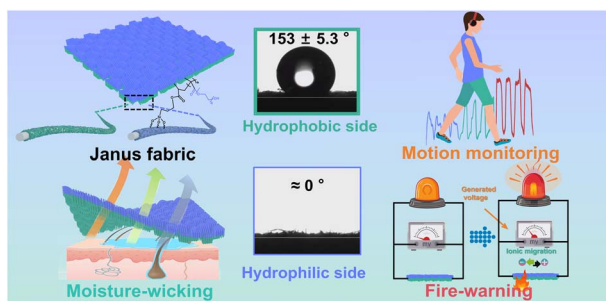
13100

## Investigating transition metal crosstalk on SEI stability as a function of anode chemistry

Sunggyu Yoon, Sung-Jin Chang, Kangwoo Ahn\* and Minkyu Kim\*



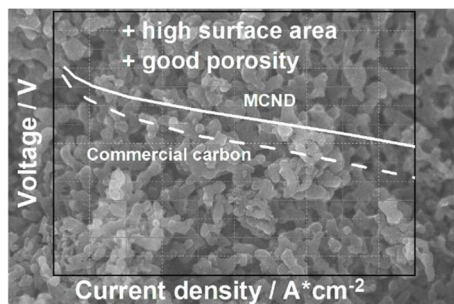
13114



### Janus fabric sensor with integrated moisture-wicking, wearable monitoring and thermoelectric capabilities for fire warning

Kai Yan,<sup>\*</sup> Jun Wang, Yan Zong, Qunna Xu, Fei Xu and Tongtong Wang

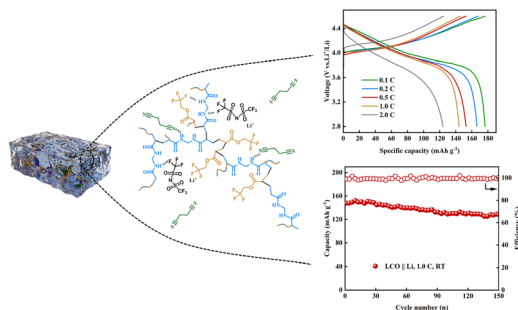
13126



### High surface area mesoporous carbon nanodendrites – detonation synthesis, characterization and use as a novel electrocatalyst support material

Thomas Merzdorf, An Guo, Pierre Schröer, Elisabeth Hornberger, Sebastian Ott, Laurin Riebel, Jessica Hübner, Liang Liang, Malte Klingenhof, Matthias Kroschel, Marleen Hußmann, Siegfried Eigler, Alisa Kozhushner, Lior Elbaz and Peter Strasser<sup>\*</sup>

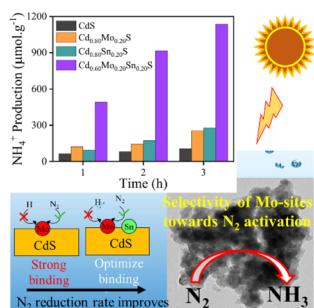
13135



### An *in situ* polymerizable deep eutectic solvent electrolyte based on TFEA-co-MBA for high-safety and high-voltage lithium metal batteries

Junhao Cheng, Xiaochun Wang, Rui Huang, Lirong Xiang, Zihan Jiang, Hanyu Zhao and Minghui He<sup>\*</sup>

13145



### Synergistic effect of Mo and Sn in a quaternary metal sulphide to activate N<sub>2</sub> adsorption for selective solar-driven ammonia production

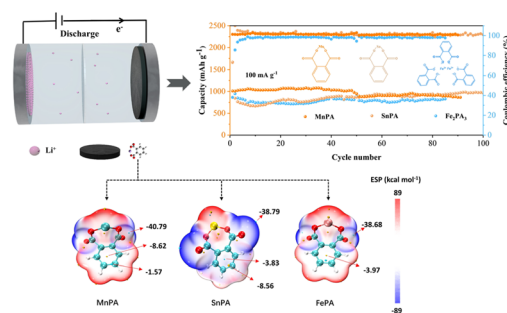
Srija Ghosh, Tanu Bagaria, Ashadul Adalder, Jaysree Pan,<sup>\*</sup> Anuradha Amabalkar, Uttam Kumar Ghorai,<sup>\*</sup> Anustup Sadhu<sup>\*</sup> and Bharati Debnath<sup>\*</sup>



13157

### Regulating the local electronic structure to design a reliable dual-active site organic anode compatible with high-performance lithium-ion batteries

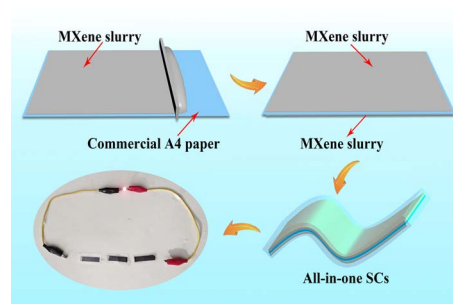
Changjian Zhang, Chengwei Li, Yun Huang,\*  
Yunhe Zhang, Jie Xiao, Caixia Li, Yanzhou Wang,  
Xichang Wang, Xing Li, Mingshan Wang, Yuanhua Lin  
and Haijun Cao\*



13175

### Scalable assembly of flexible ultrathin all-in-one MXene-based supercapacitors

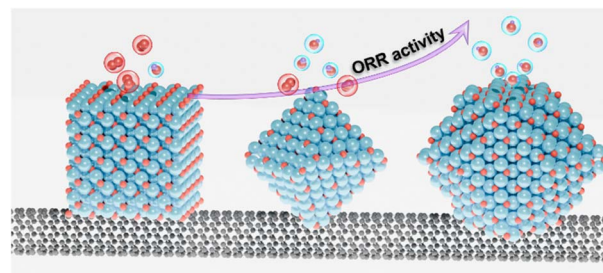
Zifang Zhao, Zhilong Xu, Yalei Wang,\* Weifeng Huang,  
Yinfeng Cheng and Wai-Yeung Wong\*



13186

### Specific Cu<sub>2</sub>O surfaces for electrocatalytic oxygen reduction reaction

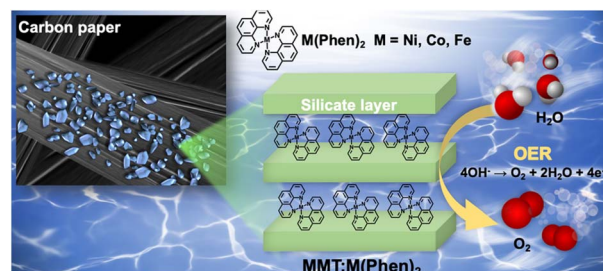
Chih-Chun Chang, Jui-Cheng Kao, Yu-Chieh Lo,\*  
Jyh-Pin Chou,\* Shang-Cheng Lin, Chun-Chia Wen  
and Michael H. Huang\*



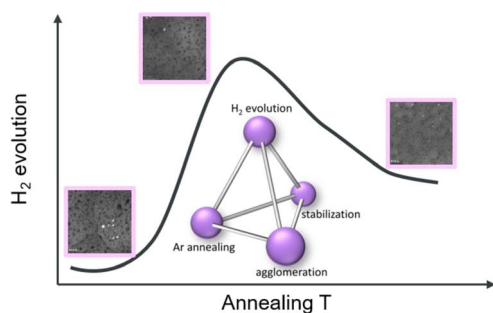
13195

### Transition metal–phenanthroline intercalated montmorillonite as efficient electrocatalysts for the oxygen evolution reaction

In Seon Lee, Jae Ryeol Jeong, Cu Dang Van  
and Min Hyung Lee\*



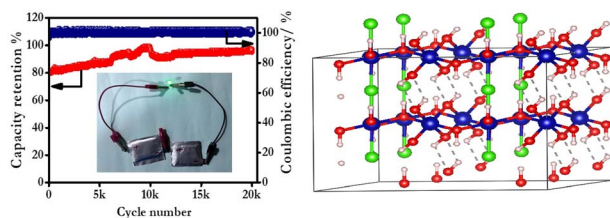
13205



### Thermally-induced agglomeration tailors the stability of Pt SAs on TiO<sub>2</sub> and use in photocatalytic H<sub>2</sub> generation

Johannes Will,\* Nikita Denisov, Shanshan Qin, Mingjian Wu, Yue Wang, Hyesung Kim, Nicolas Karpstein, Martin Dierner, Patrik Schmuki\* and Erdmann Speicker

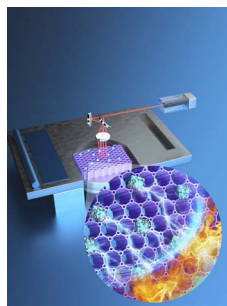
13218



### Co<sub>2</sub>(OH)<sub>3</sub>Cl/WC for improved high-energy aqueous asymmetric supercapacitors

Krishnamoorthy Abhishek, Madeshwaran Mohanraj, Adithya S. Kamath and Mani Ulaganathan\*

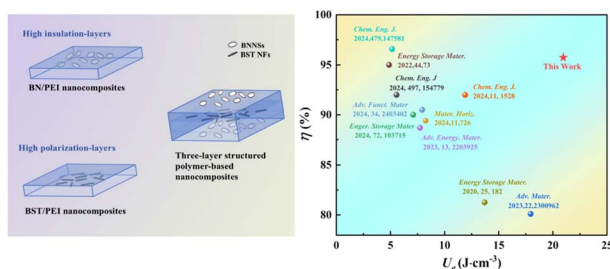
13230



### 3D printing of MOF reinforced flame-retardant PA12 composites with customizable structures

Nannan Wang, Can Wei, Feng Wei, Hao Huang, Fangdi Huang, Ding Chen,\* Chunze Yan\* and Yanqiu Zhu\*

13248



### Superior high-temperature energy-storage performance of multilayer PEI-based nanocomposites via functional filler integration

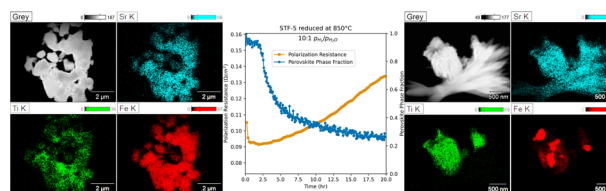
Xiangying Li, Haibo Yang,\* Yanlong Ma and Ying Lin\*



13255

### Mapping phase instability to electrochemical degradation in $\text{SrTi}_{1-x}\text{Fe}_x\text{O}_{3-\delta}$ under solid oxide cell fuel-electrode conditions

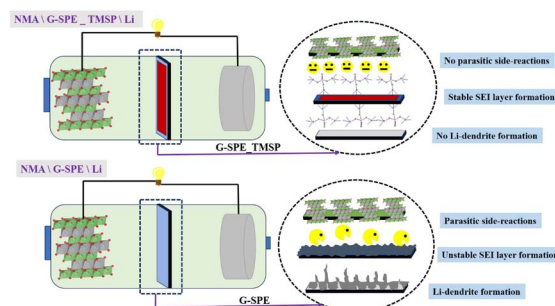
Jakob M. Reinke\* and Scott A. Barnett



13262

### In situ transformation of a liquid electrolyte into a solid polymer electrolyte: influence of TMSP in a layered $\text{LiNi}_{0.82}\text{Mn}_{0.12}\text{Al}_{0.06}\text{O}_2$ cathode

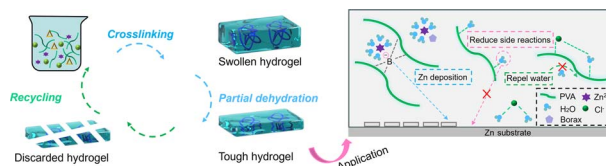
Sreekumar Sreedeeep, Yun-Sung Lee\* and Vanchiappan Aravindan\*



13276

### Tough and recyclable hydrogel electrolytes with continuous ion migration pathways for dendrite-free zinc-ion batteries under harsh conditions

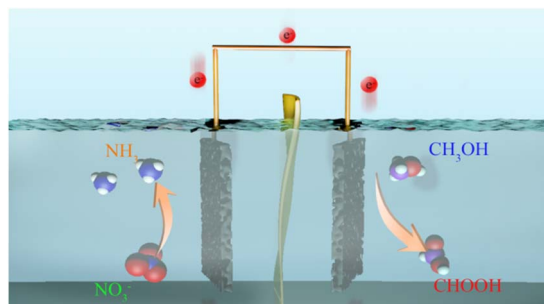
Mengjue Cao, Yaquan Wang,\* Yuan Zhang, Mengjiao Yu, Qi Zhao, Joe Briscoe, Yao Lu\* and Jianfeng Yao\*



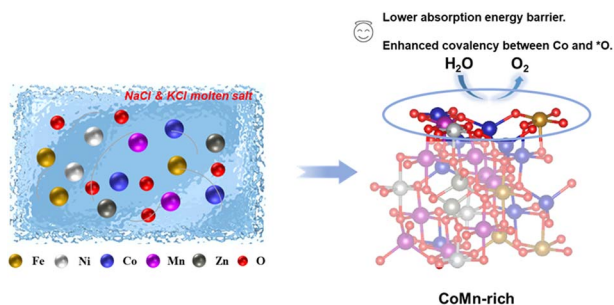
13286

### Sustainable ammonia production from nitrate reduction assisted by methanol oxidation using $\text{Co}@CF$ bifunctional electrocatalysts

Xunniu Cheng, Zixuan Xie, Shilin Zha, Qiuhua Xu, Suqin Ci\* and Zhenhai Wen\*



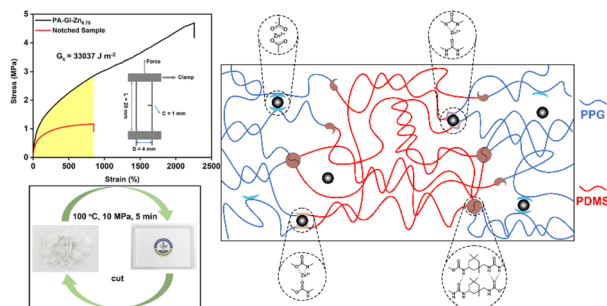
13295



### Optimizing d–p orbital hybridization by tuning high-entropy spinel oxides for enhanced alkaline OER efficiency

Dongyuan Song, Xueda Liu, Yingkai Wu, Quan Quan, Yuta Tsuji, Xiaoge Liu, Hikaru Saito, Shiro Ihara, Liyuan Dai, Xiaoguang Liang, Takeshi Yanagida, Johnny C. Ho\* and SenPo Yip\*

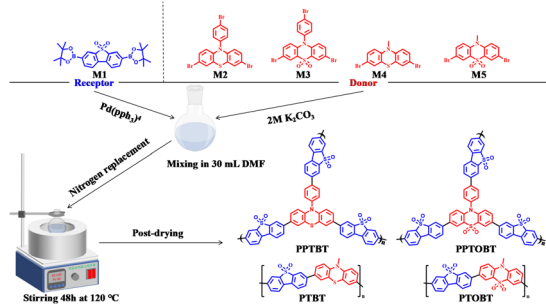
13305



### Tough silicone-based elastomers enhanced by synergistic Zn(II)–carboxylate interactions and weak hydrogen bonds between incompatible soft segments

Yangjiao Han, Kaixin Xi, Chengshu Zhang, Wenpin Wang\* and Zhibo Li\*

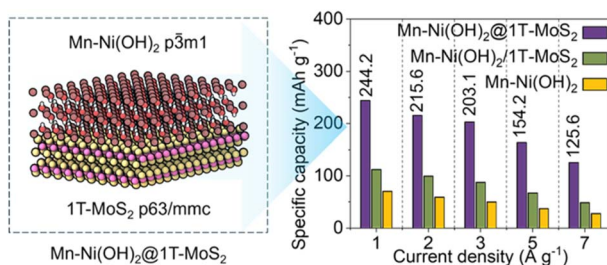
13316



### The competitive influence of the intramolecular electric field and hydrophilic active sites of D–A conjugated porous polymers on photocatalytic hydrogen evolution performance

Yongzhen Yang, Fei Zhao, Xinyi Feng, Jinsheng Zhao\* and Zhen Xu\*

13327



### Heterostructure design of Mn–Ni(OH)<sub>2</sub>@1T–MoS<sub>2</sub> for enhanced aqueous asymmetric electrochemical capacitors

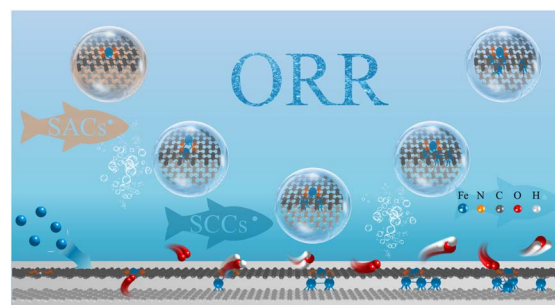
Qingyun Liu,\* Yi Wang, Tianzhao Hu, Shaorui Chen, Yaozu Wang, Hui Zhao, Wu Zhang, Zhigang Yuan, Yulian Wang, Zhenhua Sun and Feng Li\*



13337

### Multilayer graphene effects on Fe–N–C catalysts: elucidating atomic aggregation and oxygen reduction reaction activity

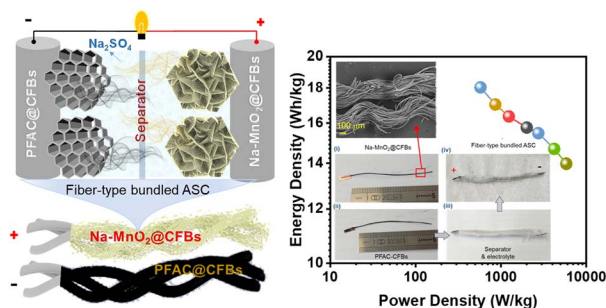
Xiuli Hu, Xiang Li and Neil Qiang Su\*



13354

### High-performance aqueous sodium-ion storage using bundled fiber-based electrodes

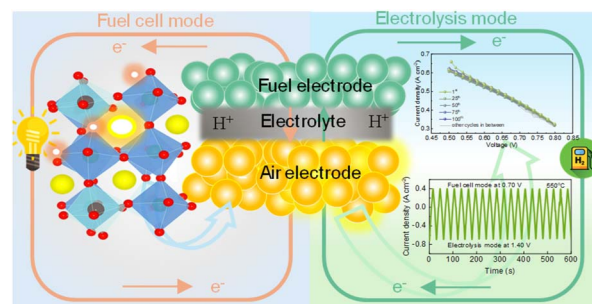
Mohan Reddy Pallavolu, Sateesh Panuganti, Vishwanath Hiremath, Bhargav Akkinapally, Goli Nagaraju,\* Jaesool Shim\* and Sang Woo Joo\*



13368

### Tuning electrochemical performance and interfacial compatibility of oxygen electrodes in proton-conducting solid oxide electrolysis cells

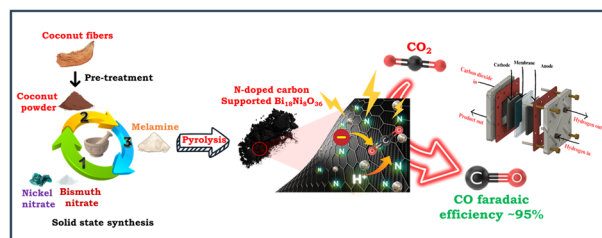
Saroj Karki, Shuanglin Zheng, Idris Temitope Bello, Allison Le and Hanping Ding\*



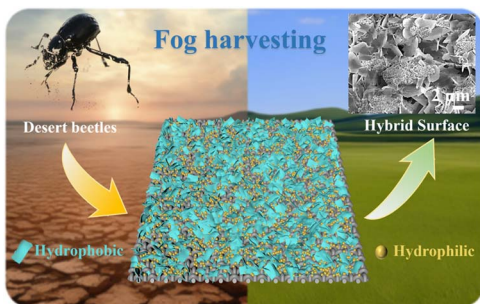
13378

### An exclusive CO<sub>2</sub>-to-CO converting single-stack electrolyzer driven by a biomass-derived N-doped carbon-based bimetallic electrocatalyst

Vaibhav Trivedi, Siddarth Jain, Rathindranath Biswas, Saptarshi Ghosh Dastider, Krishnakanta Mondal, Sankar Bhattacharya,\* Vikram Vishal\* and Arnab Dutta\*



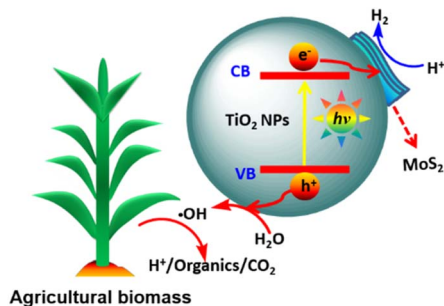
13391



### Hyperphilic/hydrophobic hybridized surfaces for efficient fog harvesting

Qiong Wang, Guangyi Tian, Huayang Zhang, Yuxuan He and Zhiguang Guo\*

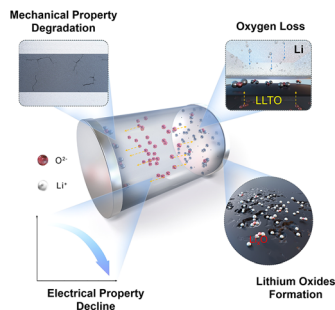
13402



### Solar driven conversion of agricultural biomass to H<sub>2</sub> over few-layer MoS<sub>2</sub> modified ultra-small TiO<sub>2</sub> nanoparticle photocatalysts

Yun-Hui Hu, Jia-Hao Wang, Yan Chen, Ji-Ping Tang, Zi-Yi Wang and Yong-Jun Yuan\*

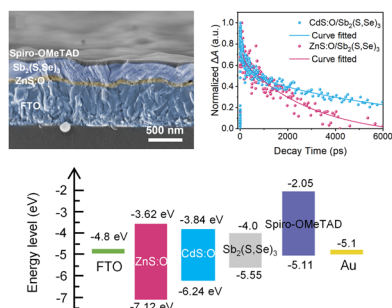
13410



### Revealing the interface instability between a lithium metal anode and perovskite solid-state electrolyte

Cong Gao, Run Yu, Xiaopeng Cheng, Tao Sun, Chengyu Li, Xuefeng Zhou, Dandan Wang, Chenjie Lou, Peiyang Mu, Xiang Gao,\* Wenge Yang, Dongliang Chao and Yongjin Chen\*

13417



### Comparative study of molecular beam epitaxy-deposited ZnS:O and CdS:O as electron-transporting materials in Sb<sub>2</sub>(S,Se)<sub>3</sub> solar cells

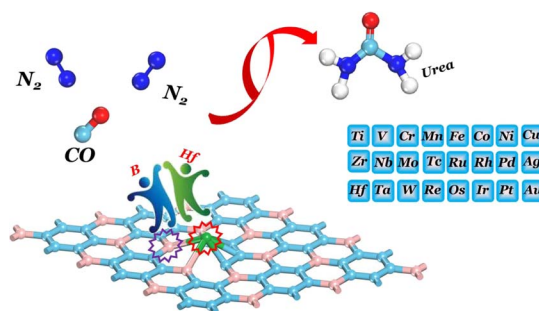
Ke Li, Zhihao Yan, Yawu He, Haolin Wang, Dan Liu, Jiabin Dong, Yi Zhang, Rongfeng Tang, Xiuxun Han\* and Tao Chen\*



13428

### Designing high-performance catalysts for urea electrosynthesis: synergy between single atoms and BC<sub>3</sub> monolayers

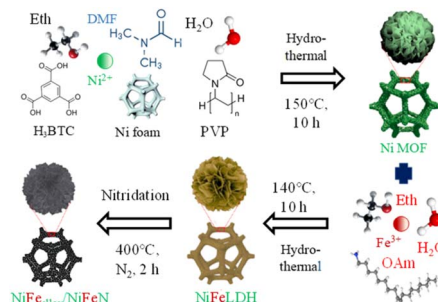
Wanying Guo, Yuwei Yan, Zhenghaoyang Zhu, Yuejie Liu\* and Jingxiang Zhao\*



13440

### Nitrogen-induced deep reconstruction and formation of a high-valent nickel species $\gamma$ -NiOOH surface layer on NiFe<sub>alloy</sub>/NiFeN pre-catalysts for efficient water oxidation

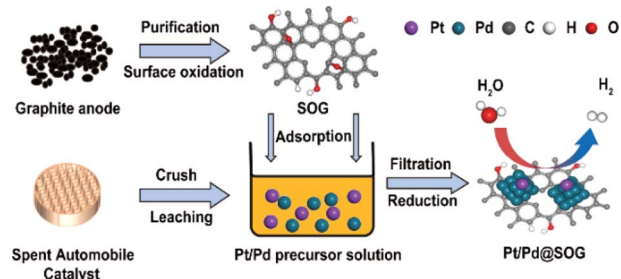
Gouda Helal, Zhenhang Xu, Wei Zuo, Jun Qian, Gongzhen Cheng\* and Pingping Zhao\*



13457

### Synergistic upcycling of Pt/Pd and graphite from city mines for highly efficient seawater hydrogen evolution catalysis

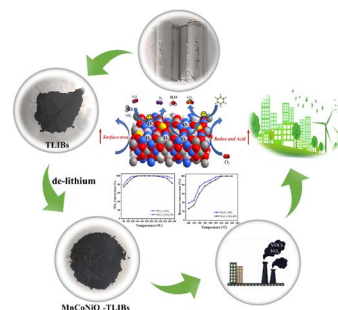
Wenhan Cheng, Shuichang Liu,\* Qingsong Jiang, Songhe Yang, Yangzi Shangguan, Jian Hu, Jiabin Liang, Shengyao Jin, Weixu Zhong, Xiangyang Lou and Hong Chen\*



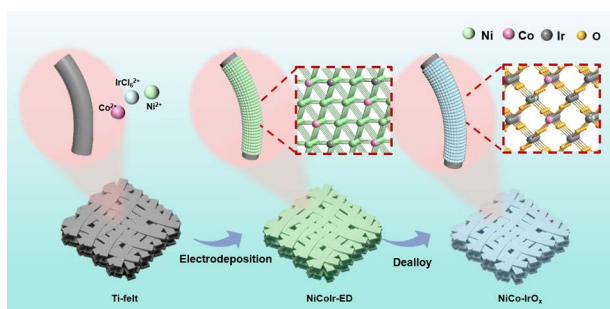
13469

### Performance-enhanced catalysts derived from spent ternary lithium-ion batteries for simultaneous removal of NO<sub>x</sub> and VOCs

Qiao Zhang, Yu Zheng, Wenli Wang, Yaping Wang, Gang Xue\* and Cairong Gong



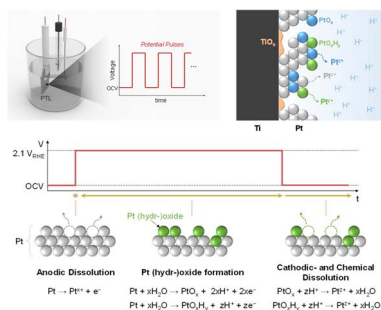
13482



### Customized structural reconstruction for an IrO<sub>x</sub> catalyst using Ni–Co dual coordination towards enhanced water electrolysis in PEM electrolyzers

Yusheng Fang, Xiaobing Wu, Yingxue Liao, Muhammad Imran Abdullah, Meiqi Hu, Wai Yin Wong, Xu Lu, Youkun Tao,\* Jing Shao\* and Haijiang Wang

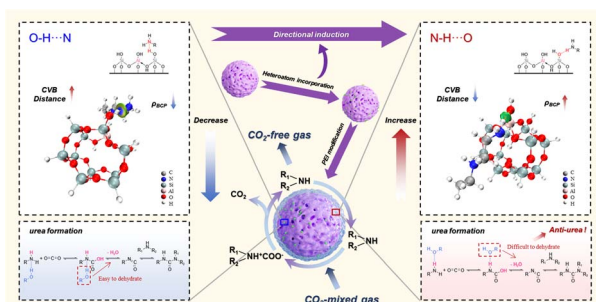
13495



### Accelerated degradation of Pt-coated Ti porous transport layers under dynamic potential pulses in PEMWEs

Jeongah Lee, Seongwoo Nam, Hyunseung Kim, Pilyoung Lee, Soobin Yoon, Young-June Park\* and WooChul Jung\*

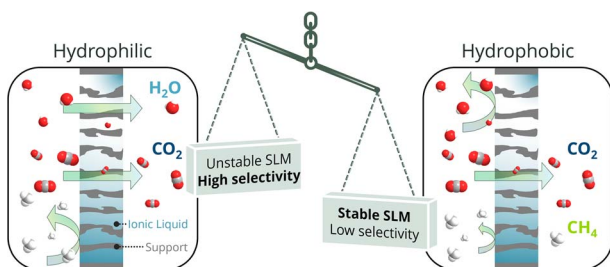
13503



### Directionally induced hydrogen bonding interactions of heteroatom-incorporated amine adsorbents for promoting steady CO<sub>2</sub> capture

Li Lin, Yuan Meng, Jinglin Li, Kailun Chen, Endian Hu, Jingwen Chang, Yuchen Gao and Jianguo Jiang\*

13518



### The hydrophilic nature trade-off of supported ionic liquid membranes on CO<sub>2</sub>/CH<sub>4</sub> separation performance

Pablo López-Porfiri,\* Perla Gavagni, Benjamin S. Moore, María González-Miquel, Patricia Gorgojo, Maria-Chiara Ferrari and María Pérez-Page\*

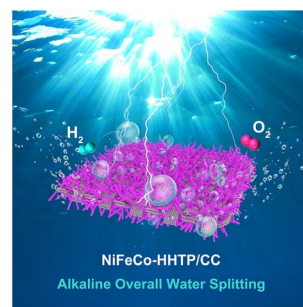


## PAPERS

13532

### Tailoring active sites in trimetallic conductive metal–organic frameworks for highly efficient water splitting

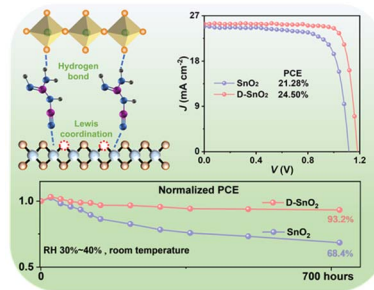
Wanting Shu, Fuhe Le,<sup>\*</sup> Haibin Yao, Pengfei Hu, Xue Yang and Wei Jia<sup>\*</sup>



13542

### Interface modification and crystallization control of efficient and stable perovskite solar cells using dicyandiamide

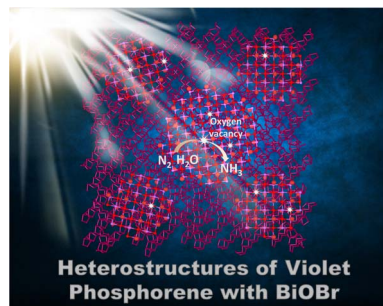
Ruicheng Tao, Tiao Wu, Wenxi Ji, Qiaoyun Chen, Zelong Zhang, Dong Rui, Bin Dong, Yi Zhou<sup>\*</sup> and Bo Song<sup>\*</sup>



13551

### Electron donation of violet phosphorene nanosheets to sustain the oxygen vacancies of BiOBr for excellent photocatalytic nitrogen fixation

Tianqi Wang, Rui Zhai, Zhengyi Liu, Siyuan Liu, Yonghong Cheng and Jinying Zhang<sup>\*</sup>



## CORRECTIONS

13560

### Correction: Comprehensive overview of machine learning applications in MOFs: from modeling processes to latest applications and design classifications

Yutong Liu, Yawen Dong and Hua Wu<sup>\*</sup>



## CORRECTIONS

13561

**Correction: An electrochemical oscillator for harvesting near room temperature waste heat**

Basanta Ghimire, Mihir Parekh,\* Herbert Behlow, Morteza Sabet, Sriparna Bhattacharya, Nawraj Sapkota, Pankaj Singh Chauhan, Abha Misra and Apparao M. Rao\*

13562

**Correction: Thermoelectric properties of the aliovalent half-Heusler alloy  $Zn_{0.5}Ti_{0.5}NiSb$  with intrinsic low thermal conductivity**

Blair F. Kennedy, Simon A. J. Kimber, Stefano Checchia, A. K. M. Ashiquzzaman Shawon, Alexandra Zevalkink, Emmanuelle Suard, Jim Buckman and Jan-Willem G. Bos\*

