

Journal of Materials Chemistry A

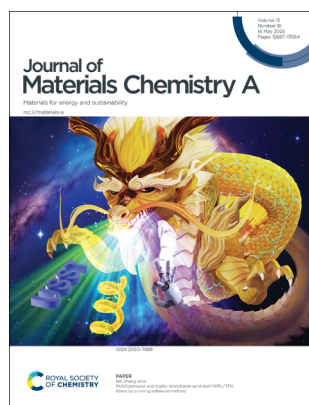
Materials for energy and sustainability

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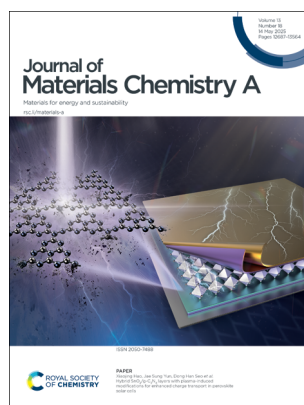
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Inside cover

See Xiaojing Hao, Jae Sung Yun, Dong Han Seo *et al.*, pp. 12949–12956. Image reproduced by permission of Dong Han Seo from *J. Mater. 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*

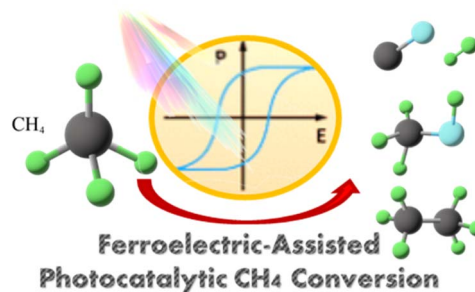


REVIEWS

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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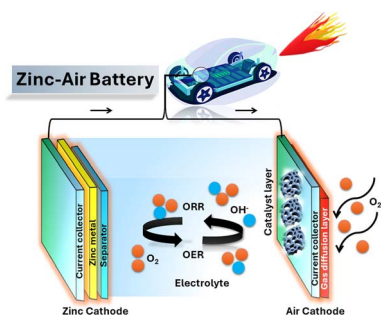
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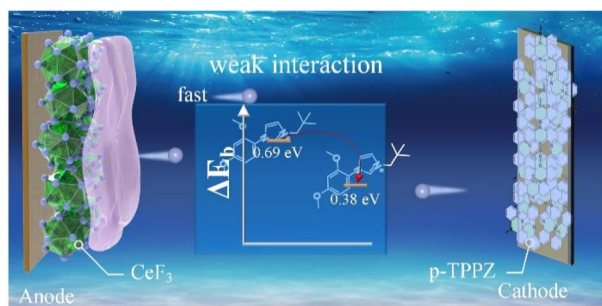
12855



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

Tholkappiyan Ramachandran,^{*} Ramesh Kumar Raji and Moh'd Rezeq^{*}

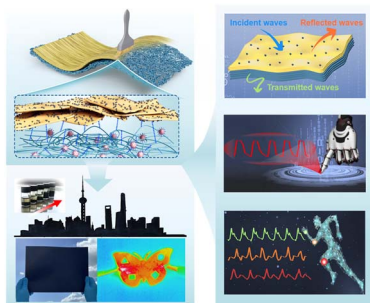
12891



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

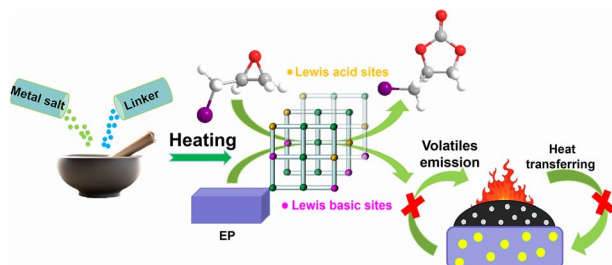
12900



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^{*}

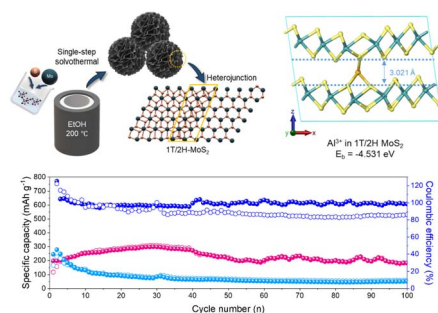


COMMUNICATIONS

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Synergistic 1T/2H-MoS₂ hybrid phases enable exceptional aluminum-ion battery performance with high capacity and stability

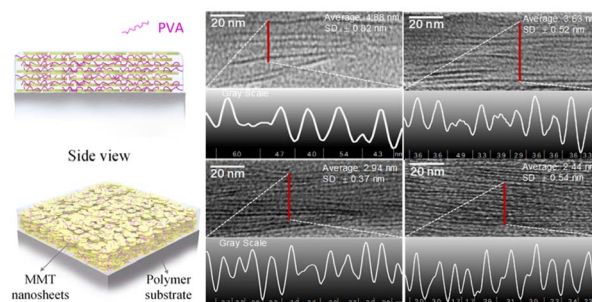
Seohyeon Yeo, Moonsu Kim, Changhoon Heo, Yunji Jeong and Gibaek Lee*



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

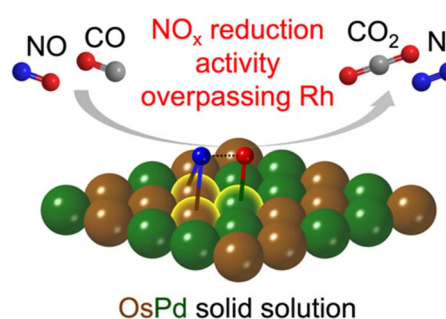
Ying Zhou, Anna M. LaChance, Qian Wang, Yanfeng Gao, Jierui Zhou, Bangdou Huang, Kuangyu Shen, Zaili Hou, Ting Lei, Ningzhen Wang, Zhou Zuo, Shan Liu, Leonard A. Dissado, Tao Shao, Xidong Liang,* Yang Cao,* Luyi Sun* and Chao Wu*



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Creation of an immiscible OsPd solid solution as a Rh-free catalyst with NO_x reduction performance exceeding that of Rh

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

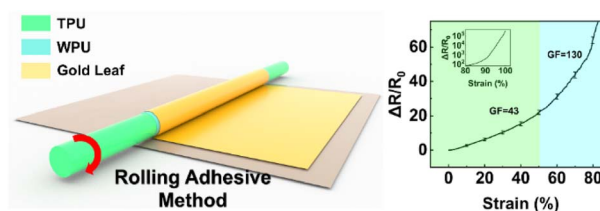


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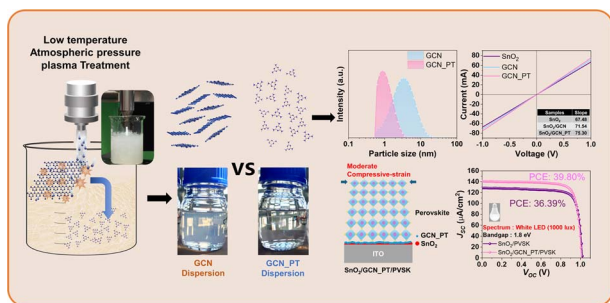
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Multifunctional and highly stretchable gold-leaf/WPU/TPU fibers by a rolling adhesive method

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



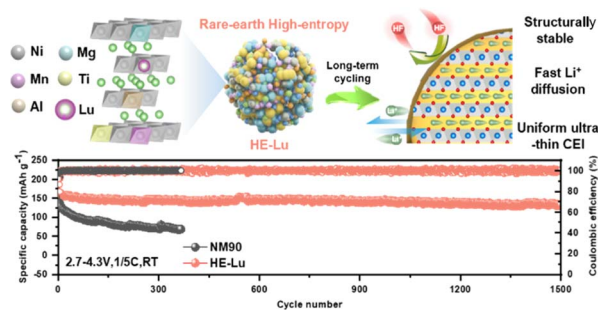
12949



Hybrid SnO₂/g-C₃N₄ layers with plasma-induced modifications for enhanced charge transport in perovskite solar cells

Minwoo Lee, Elisa Yun Mei Ang, William Toh, Peng Cheng Wang, Teng Yong Ng, So Young Lee, Sun-woo Kim, Martin A. Green, Xiaojing Hao,* Jae Sung Yun* and Dong Han Seo*

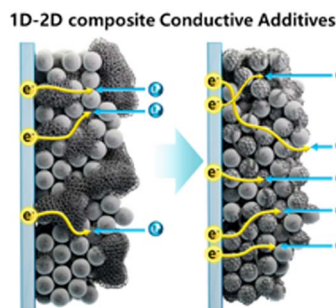
12957



High-rate rare-earth-based high-entropy Co-free high-Ni cathodes for high-performance lithium-ion batteries

Yang Liu, Yan Xin, Bijiao He, Fang Zhang, Wenbo Liu and Huajun Tian*

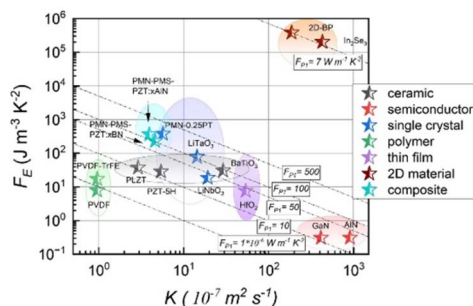
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Synergistic electrochemical properties of conductive additives with 1D–2D carbon networks

Seon Lee, Seongjae Oh, Chae-Lin Park, Young-Chul Song, Hyun Kim, Keon Jung Kim, Kwang Won Kim, Seo Won Song, Joonmyung Choi, Xinghao Hu, Ki Ro Yoon, Youngbok Lee* and Shi Hyeong Kim*

12977



New pyroelectric figures of merit for harvesting dynamic temperature fluctuations

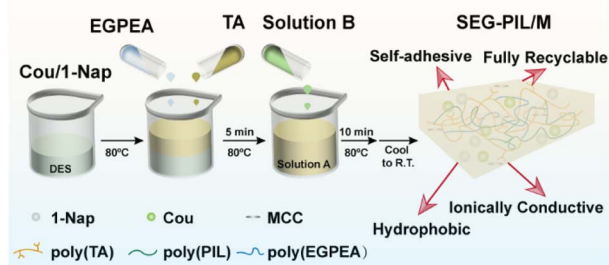
Bastola Narayan, Qingping Wang,* James Roscow, Chaoying Wan and Chris Bowen



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

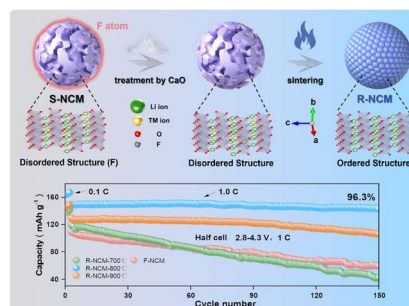
Ren'ai Li, Hongtian Zhang, Lizi Li,* Biqiang Zhang, Xianyong Du, Weiyong Shao, Xueren Qian, Yunfeng Cao and Zhulan Liu*



12998

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

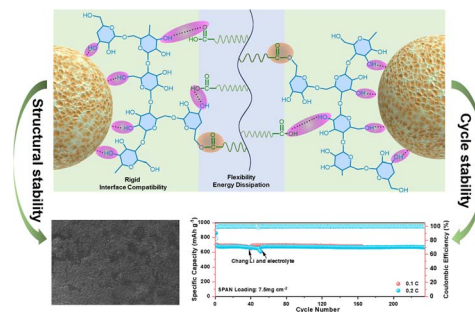
Bin Wang, Chao Zhu, Hai Lei, Hanyu Zhou, Wei Sun, Yue Yang and Peng Ge*



13010

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

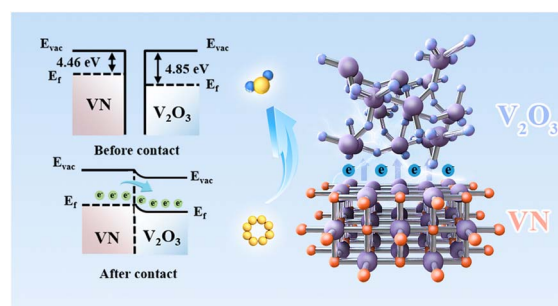
Qihang Wang, Jiqiong Liu, Huichao Lu, Shuo Liu, Liangyu Wang, Chenran Hao, Jing Han, Jun Yang, Yanna NuLi and Jiulin Wang*



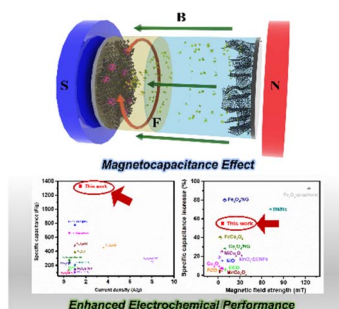
13020

Boosting catalytic activity by using the interfacial electric field of VN–V₂O₃ heterogeneous nanoparticles for efficient lithium polysulfide conversion

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



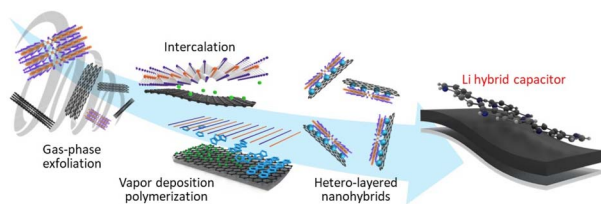
13028



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*

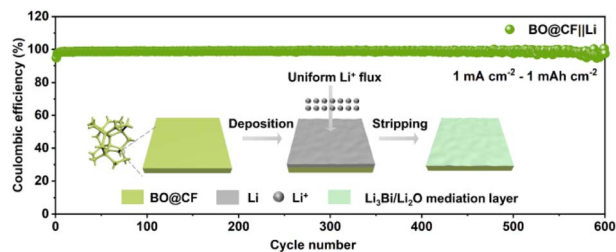
13037



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*

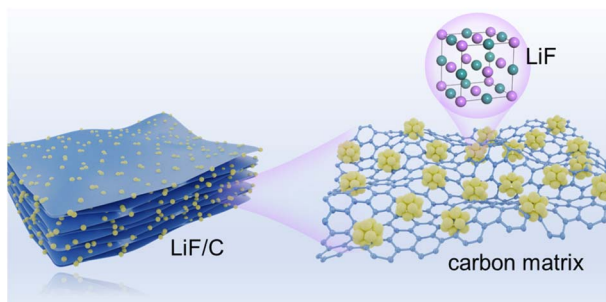
13048



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, Sihan Zeng, Yunyong Hu, Bicao Pan and Chunhua Chen*

13058



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

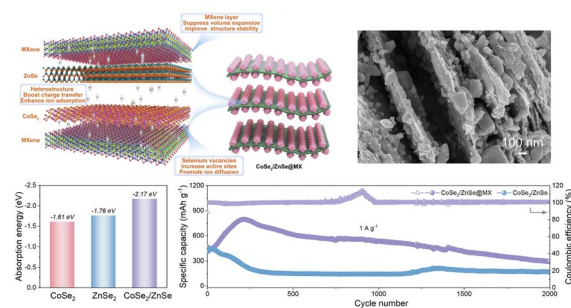
Xiaoyu Tang, Miao Bai, Aihu Shao, Zhiqiao Wang, Helin Wang, Min Zhang and Yue Ma*



13070

Interface engineering of 0D–2D CoSe₂/ZnSe@MXene heterostructured electrodes for high-performance lithium-ion batteries

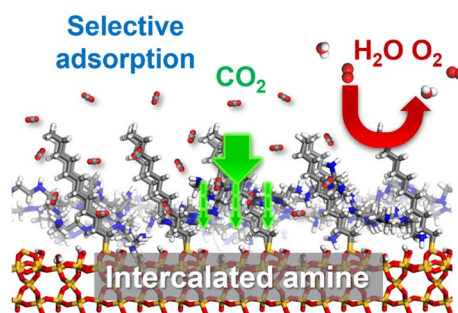
Fayun Wei, Fanghua Liang, Yanrui Zhao, Zhuyu Ji, Tingting Yan,* Ruiqing Li, Hui Liu,* Youchao Kong, Honggang He, Weichuan Huang, Chunyan Cao, Wei Zhang, Bin Fei* and Mingzheng Ge*



13081

Polyethyleneimine intercalated into alkyl layer for superhydrophobic interface: low-energy and O₂ & H₂O-resistant CO₂ sorbent

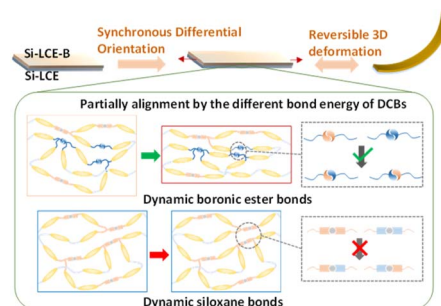
Shuailong Song, Zhinan Wu, Tong Zhou, Yunxia Wen, Wei Cao, Han Lin, Xiaohua Lu, Tuo Ji* and Jiahua Zhu*



13091

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

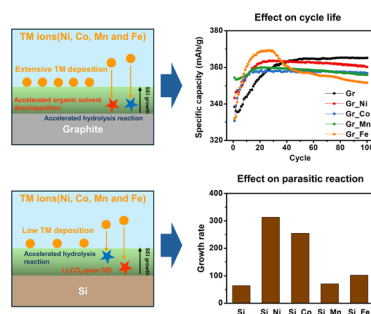
Zhentian Xu,* Yangyang Zhu, Yun Ai, Zhongyi Yuan, Chunquan Li, Dan Zhou and Lie Chen*



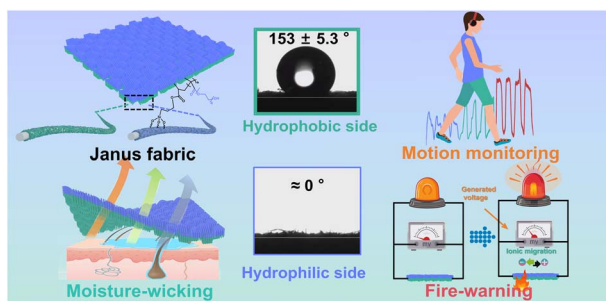
13100

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

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



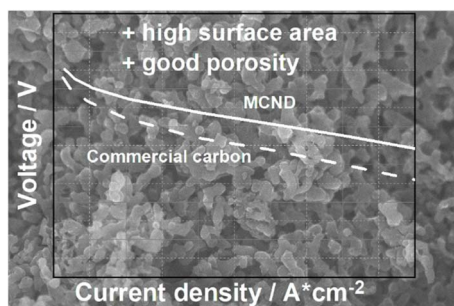
13114



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

Kai Yan,^{*} Jun Wang, Yan Zong, Qunna Xu, Fei Xu and Tongtong Wang

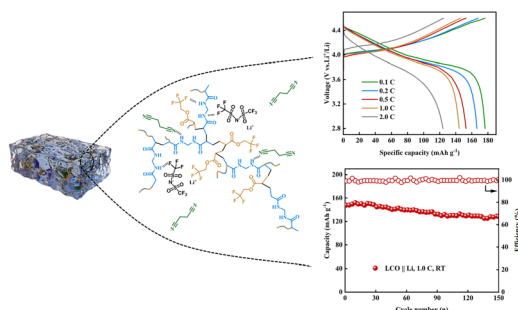
13126



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^{*}

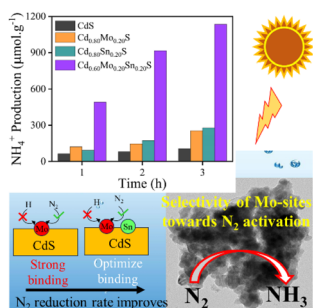
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An *in situ* polymerizable deep eutectic solvent electrolyte based on TFEA-co-MBA for high-safety and high-voltage lithium metal batteries

Junhao Cheng, Xiaochun Wang, Rui Huang, Lirong Xiang, Zihan Jiang, Hanyu Zhao and Minghui He^{*}

13145



Synergistic effect of Mo and Sn in a quaternary metal sulphide to activate N₂ adsorption for selective solar-driven ammonia production

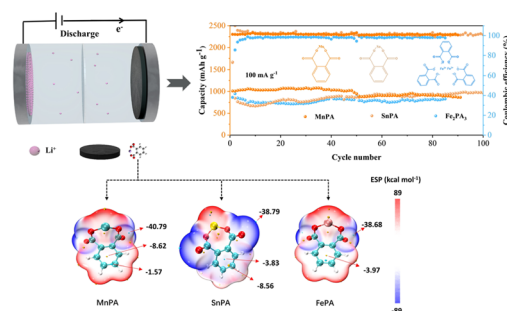
Srija Ghosh, Tanu Bagaria, Ashadul Adalder, Jaysree Pan,^{*} Anuradha Amabalkar, Uttam Kumar Ghorai,^{*} Anustup Sadhu^{*} and Bharati Debnath^{*}



13157

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

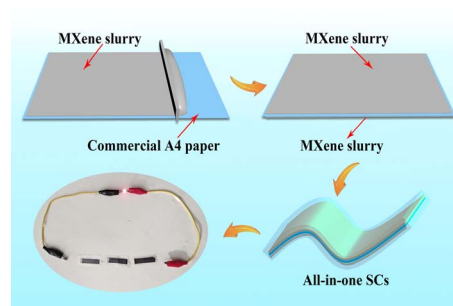
Changjian Zhang, Chengwei Li, Yun Huang,*
Yunhe Zhang, Jie Xiao, Caixia Li, Yanzhou Wang,
Xichang Wang, Xing Li, Mingshan Wang, Yuanhua Lin
and Haijun Cao*



13175

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

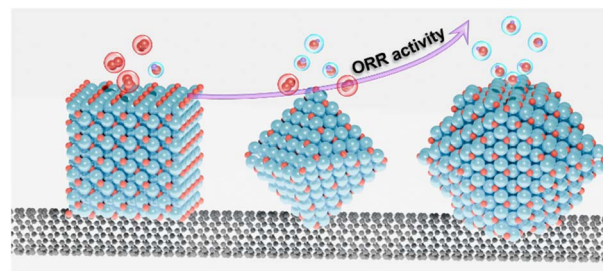
Zifang Zhao, Zhilong Xu, Yalei Wang,* Weifeng Huang,
Yinfeng Cheng and Wai-Yeung Wong*



13186

Specific Cu₂O surfaces for electrocatalytic oxygen reduction reaction

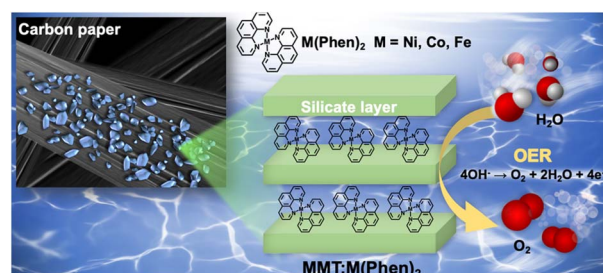
Chih-Chun Chang, Jui-Cheng Kao, Yu-Chieh Lo,*
Jyh-Pin Chou,* Shang-Cheng Lin, Chun-Chia Wen
and Michael H. Huang*



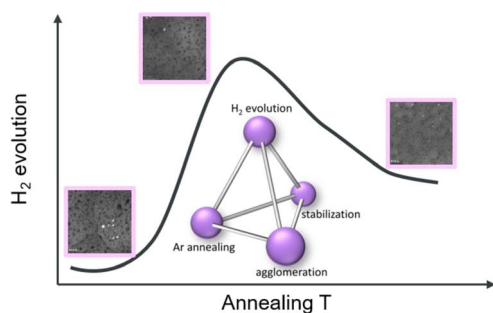
13195

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*



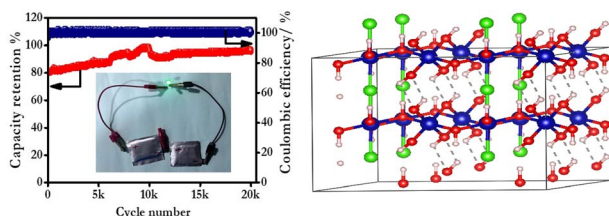
13205



Thermally-induced agglomeration tailors the stability of Pt SAs on TiO₂ and use in photocatalytic H₂ generation

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

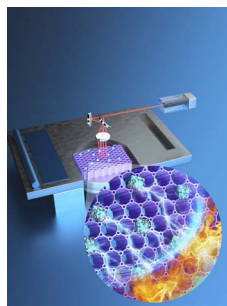
13218



Co₂(OH)₃Cl/WC for improved high-energy aqueous asymmetric supercapacitors

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

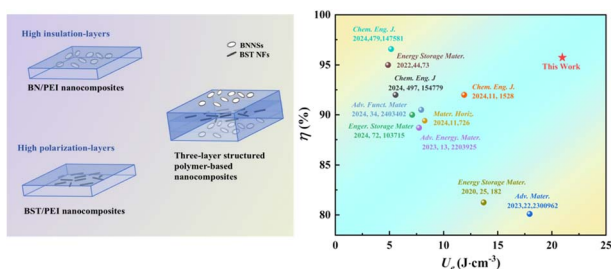
13230



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

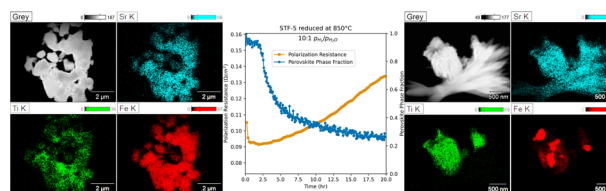
Xiangying Li, Haibo Yang,* Yanlong Ma and Ying Lin*



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

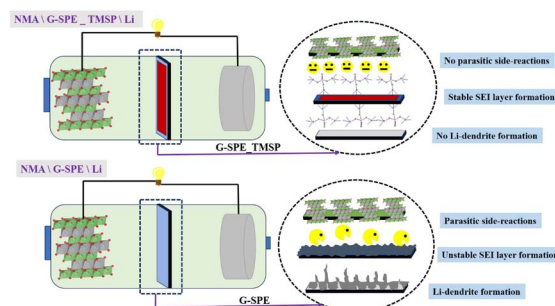
Jakob M. Reinke* and Scott A. Barnett



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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

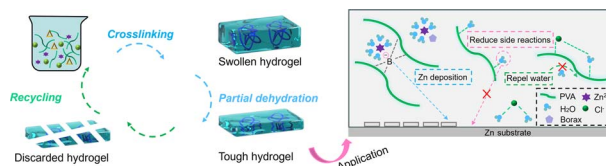
Sreekumar Sreedeeep, Yun-Sung Lee* and Vanchiappan Aravindan*



13276

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

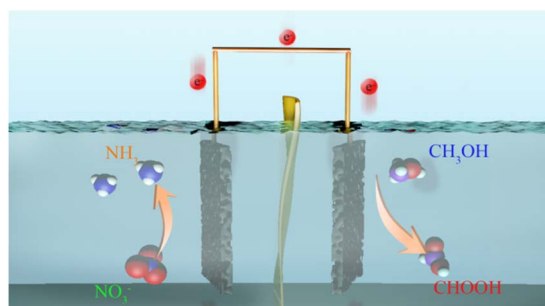
Mengjue Cao, Yaquan Wang,* Yuan Zhang, Mengjiao Yu, Qi Zhao, Joe Briscoe, Yao Lu* and Jianfeng Yao*



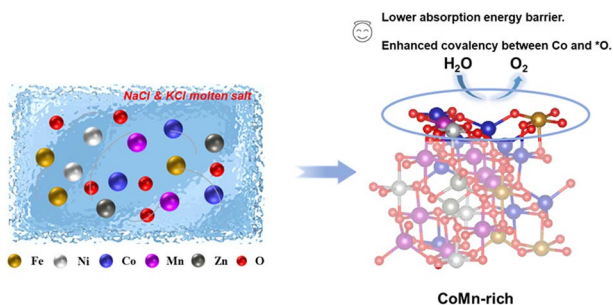
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Sustainable ammonia production from nitrate reduction assisted by methanol oxidation using $\text{Co}@CF$ bifunctional electrocatalysts

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



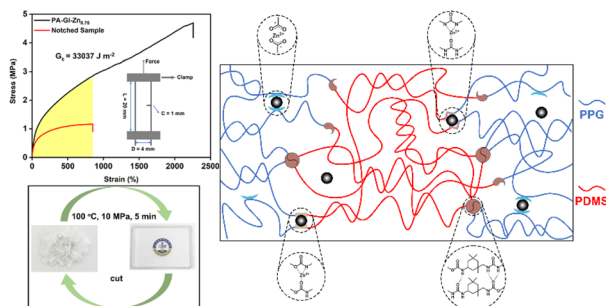
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Optimizing d–p orbital hybridization by tuning high-entropy spinel oxides for enhanced alkaline OER efficiency

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*

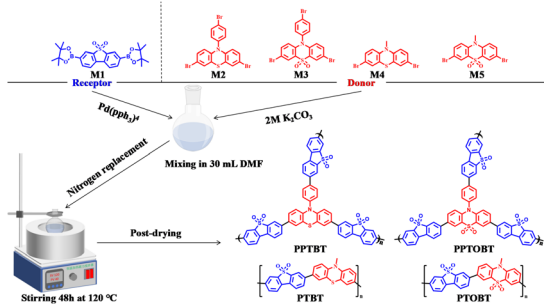
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Tough silicone-based elastomers enhanced by synergistic Zn(II)–carboxylate interactions and weak hydrogen bonds between incompatible soft segments

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

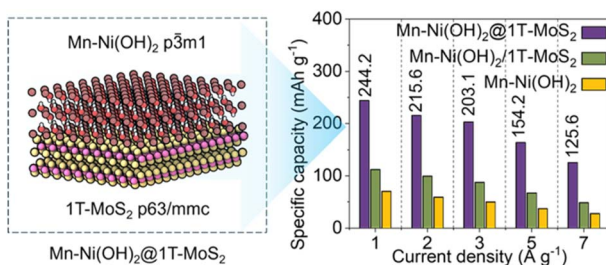
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The competitive influence of the intramolecular electric field and hydrophilic active sites of D–A conjugated porous polymers on photocatalytic hydrogen evolution performance

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

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Heterostructure design of Mn–Ni(OH)₂@1T–MoS₂ for enhanced aqueous asymmetric electrochemical capacitors

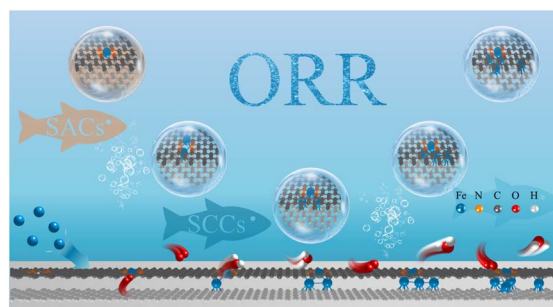
Qingyun Liu,* Yi Wang, Tianzhao Hu, Shaorui Chen, Yaozu Wang, Hui Zhao, Wu Zhang, Zhigang Yuan, Yulian Wang, Zhenhua Sun and Feng Li*



13337

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

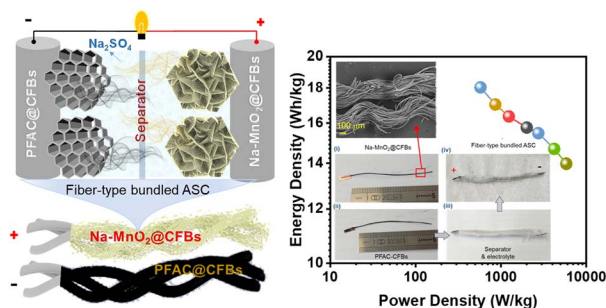
Xiuli Hu, Xiang Li and Neil Qiang Su*



13354

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

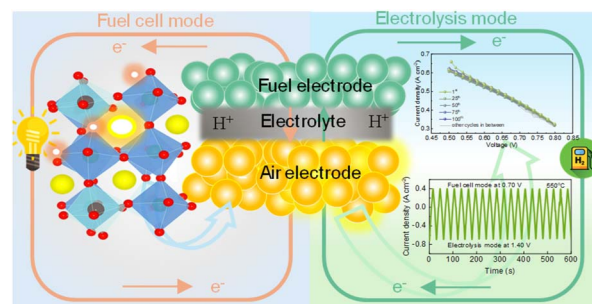
Mohan Reddy Pallavolu, Sateesh Panugamti, Vishwanath Hiremath, Bhargav Akkinepally, Goli Nagaraju,* Jaesool Shim* and Sang Woo Joo*



13368

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

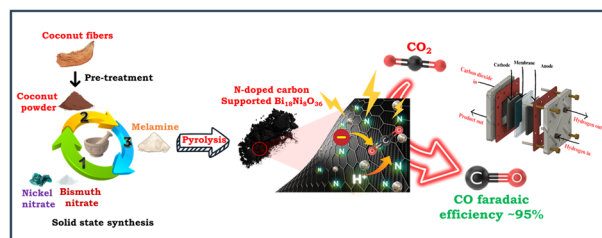
Saroj Karki, Shuanglin Zheng, Idris Temitope Bello, Allison Le and Hanping Ding*



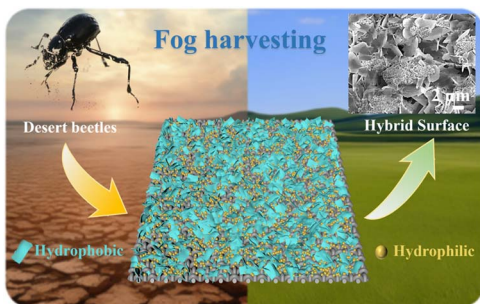
13378

An exclusive CO₂-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*



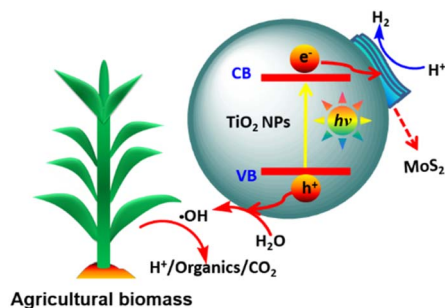
13391



Hyperphilic/hydrophobic hybridized surfaces for efficient fog harvesting

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

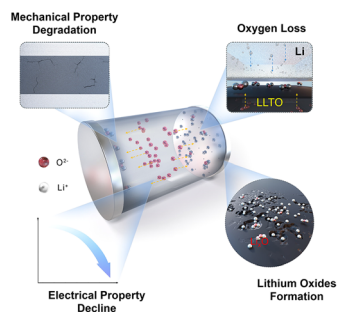
13402



Solar driven conversion of agricultural biomass to H_2 over few-layer MoS_2 modified ultra-small TiO_2 nanoparticle photocatalysts

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

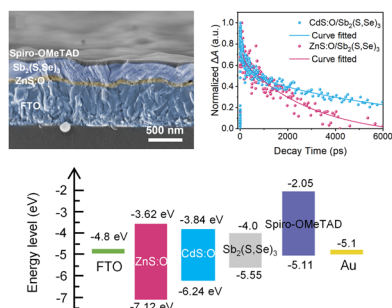
13410



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 $\text{Sb}_2(\text{S,Se})_3$ solar cells

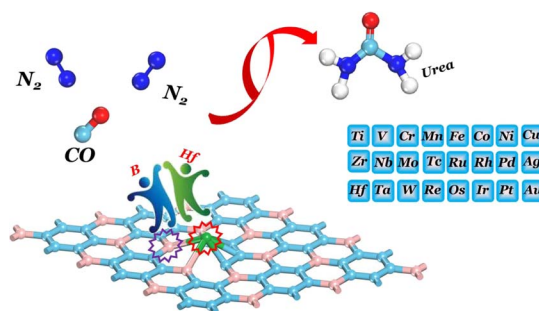
Ke Li, Zhihao Yan, Yawu He, Haolin Wang, Dan Liu, Jiabin Dong, Yi Zhang, Rongfeng Tang, Xiuxun Han* and Tao Chen*



13428

Designing high-performance catalysts for urea electrosynthesis: synergy between single atoms and BC₃ monolayers

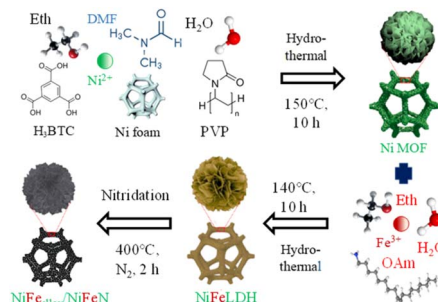
Wanying Guo, Yuwei Yan, Zhenghaoyang Zhu, Yuejie Liu* and Jingxiang Zhao*



13440

Nitrogen-induced deep reconstruction and formation of a high-valent nickel species γ -NiOOH surface layer on NiFe_{alloy}/NiFeN pre-catalysts for efficient water oxidation

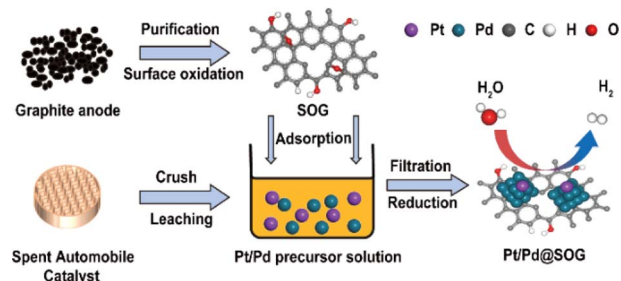
Gouda Helal, Zhenhang Xu, Wei Zuo, Jun Qian, Gongzhen Cheng* and Pingping Zhao*



13457

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

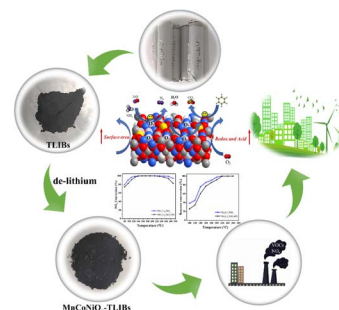
Wenhan Cheng, Shuichang Liu,* Qingsong Jiang, Songhe Yang, Yangzi Shanguan, Jian Hu, Jiabin Liang, Shengyao Jin, Weixu Zhong, Xiangyang Lou and Hong Chen*



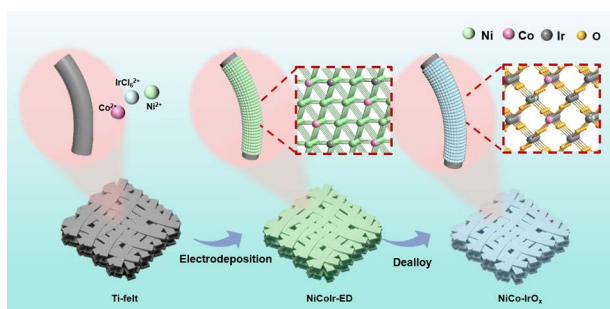
13469

Performance-enhanced catalysts derived from spent ternary lithium-ion batteries for simultaneous removal of NO_x and VOCs

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



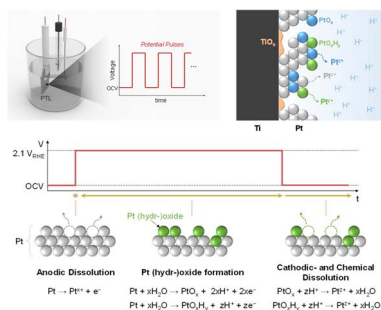
13482



Customized structural reconstruction for an IrO_x 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

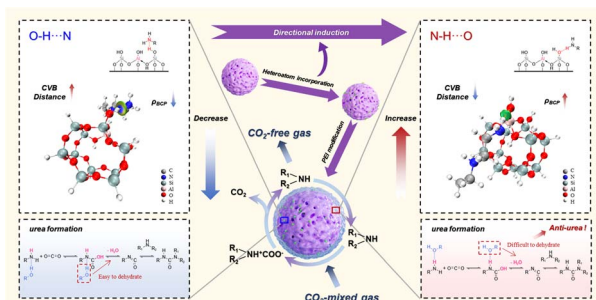
13495



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*

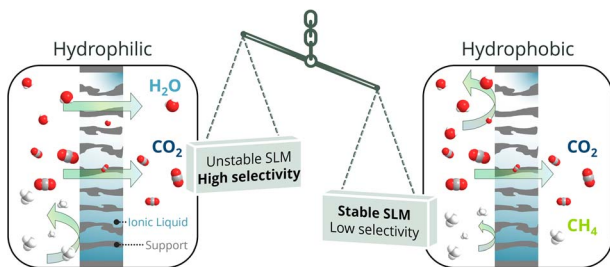
13503



Directionally induced hydrogen bonding interactions of heteroatom-incorporated amine adsorbents for promoting steady CO₂ 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 CO₂/CH₄ separation performance

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

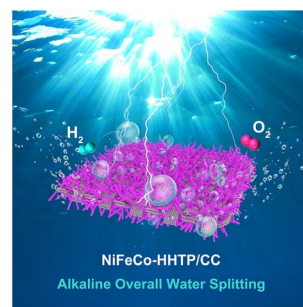


PAPERS

13532

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

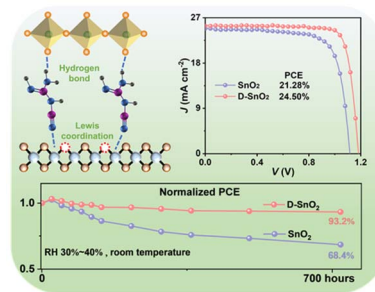
Wanting Shu, Fuhe Le,^{*} Haibin Yao, Pengfei Hu, Xue Yang and Wei Jia^{*}



13542

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

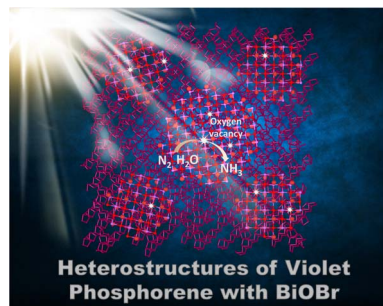
Ruicheng Tao, Tiao Wu, Wenxi Ji, Qiaoyun Chen, Zelong Zhang, Dong Rui, Bin Dong, Yi Zhou^{*} and Bo Song^{*}



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^{*}



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^{*}



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*

