

Journal of Materials Chemistry A

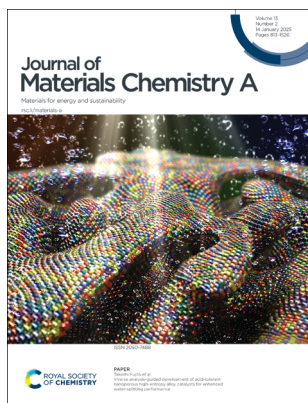
Materials for energy and sustainability

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.

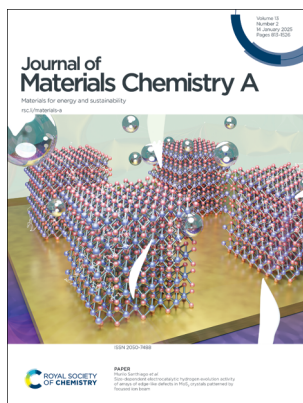
IN THIS ISSUE

ISSN 2050-7488 CODEN JMCAET 13(2) 813–1526 (2025)



Cover

See Takeshi Fujita *et al.*, pp. 940–950. Image reproduced by permission of Takeshi Fujita from *J. Mater. Chem. A*, 2025, **13**, 940.



Inside cover

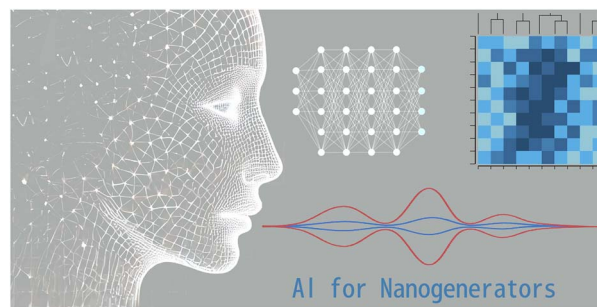
See Murilo Santhiago *et al.*, pp. 951–960. Image reproduced by permission of Murilo Santhiago from *J. Mater. Chem. A*, 2025, **13**, 951.

REVIEWS

832

Artificial intelligence assisted nanogenerator applications

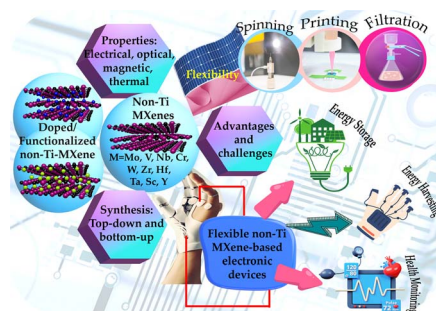
Shumao Xu, Farid Manshahi, Xiao Xiao and Jun Chen*



855

Doped and functionalized non-Ti-MXenes for flexible and wearable electronic devices

Shrabani De and Bishnu Prasad Bastakoti*



**GOLD
OPEN
ACCESS**

EES Solar

**Exceptional research on solar
energy and photovoltaics**

Part of the EES family

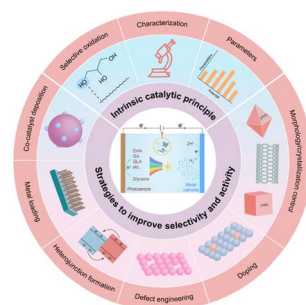
**Join
in** | Publish with us
rsc.li/EESolar

REVIEWS

889

Efficient strategies for designing photoanodes toward selective photoelectrochemical glycerol upgrading: a review

Guoquan Ma, Na Jiang, Dandan Song, Bo Qiao, Zheng Xu, Suling Zhao* and Zhiqin Liang*

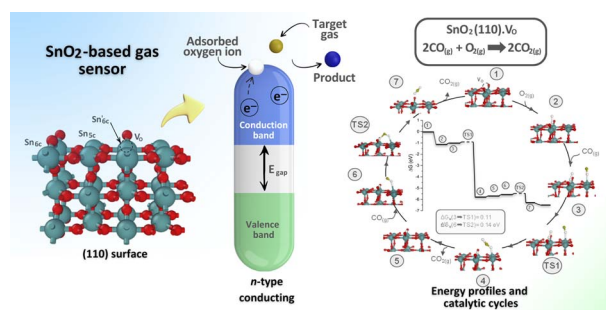


COMMUNICATIONS

918

Effective sensing mechanisms of O₂ and CO on SnO₂ (110) surface: a DFT study

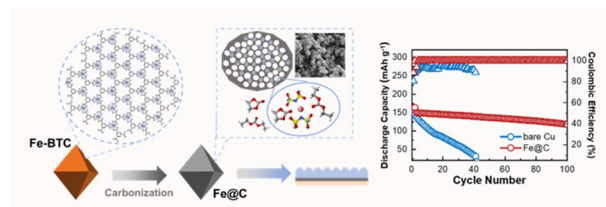
Felipe Lipsky,* Amanda F. Gouveia, Fabrício R. Sensato, Mônica Oliva, Elson Longo, Miguel A. San-Miguel and Juan Andrés*



928

Modulating electrolyte solvation structures with Fe-embedded carbon matrix substrates for robust lithium-metal plating

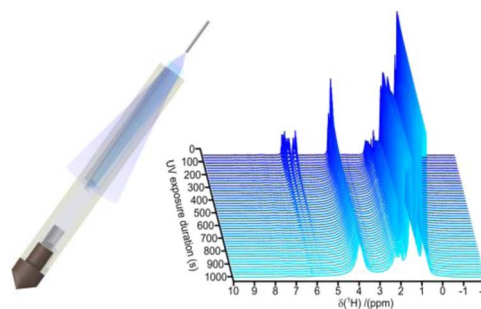
Jiayue Peng,* Jinghan Wang, Xiangjun Pu and Jia Xie*



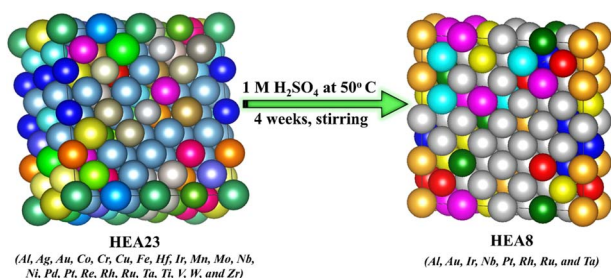
933

High-resolution *in situ* photo-irradiation MAS NMR: application to the UV-polymerization of *n*-butyl acrylate

Thomas J. N. Hooper,* Rodrigo de Oliveira-Silva and Dimitrios Sakellariou



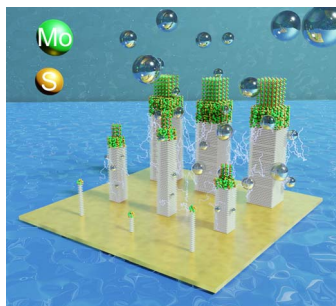
940



Inverse analysis-guided development of acid-tolerant nanoporous high-entropy alloy catalysts for enhanced water-splitting performance

Saikat Bolar, Chunyu Yuan, Samuel Jeong, Yoshikazu Ito and Takeshi Fujita*

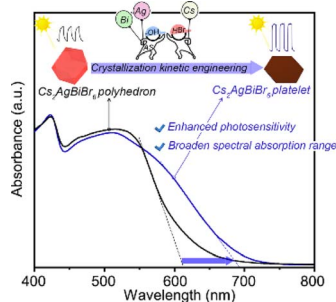
951



Size-dependent electrocatalytic hydrogen evolution activity of arrays of edge-like defects in MoS₂ crystals patterned by focused ion beam

Cláudia de Lourenço, Ana B. S. de Araújo, Leonardo H. Hasimoto, Isaque A. A. Feitosa, Matheus F. F. das Neves, Jefferson Bettini, Tarcisio M. Perfecto, Túlio C. R. Rocha, Thiago J. A. Mori, Edson R. Leite and Murilo Santhiago*

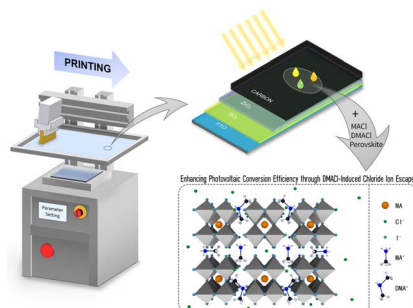
961



Crystallization kinetic engineering for growth of thin metal halide perovskite platelets

Dong Ding, Bo Zhou, Xiaoteng Li, Jiaqi Duan, Kaiyan Wu, Bin Hou, Honglei Fan, Hongliang Liu* and Lei Jiang

971



Tailoring lattice chlorine in perovskite through dual-additive engineering for enhanced photovoltaic performance

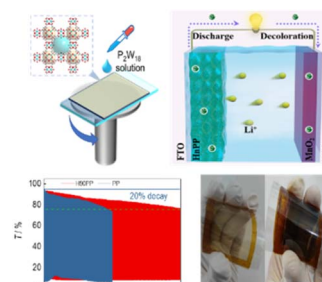
Dun Ma, Jingwen He, Jie Sheng, Wu Shao, Zhihao Deng, Ronghao Cen, Yufei Fu and Wenjun Wu*



985

Room-temperature spin-coatable polyoxometalate composites for high-contrast, large-area electrochromic capacitive films

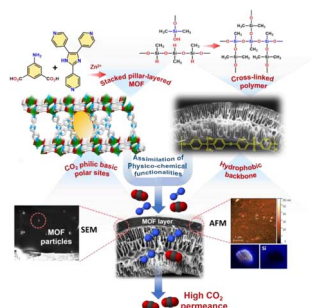
Shi-Ming Wang,* Kai-Hua Wang, Lu Zhou, Tianyang Lu, Eunkyong Kim,* Zhengbo Han,* Jun Liang Lin, Lin Liu and Guodong Li



1000

Unlocking advanced CO₂ separation via a scalable and nitrogen-rich MOF-cross-linked polydimethylsiloxane hollow fiber hybrid membrane

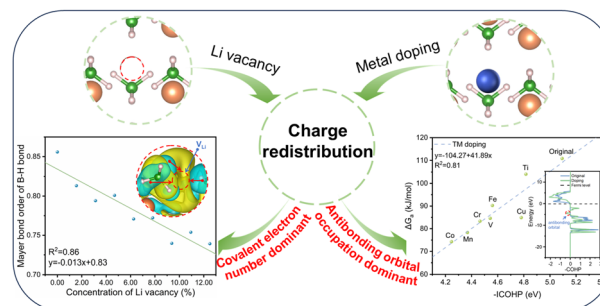
Nayan Nandha, Partha Pratim Mondal, Utpal Thummar, Ranadip Goswami, Pranay Kumar, Subhadip Neogi* and Puyam S. Singh*



1014

Promotion mechanisms of LiBH₄ dehydrogenation dominated by charge redistribution

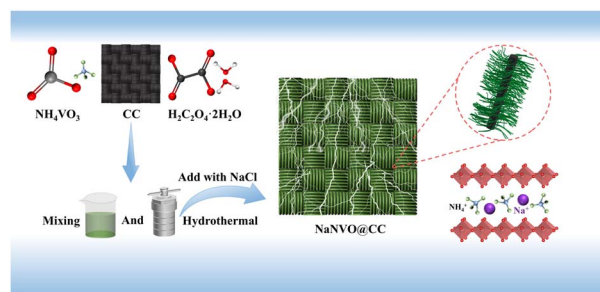
Weijie Yang,* Han Ge, Tongao Yao, Qiyong Chen, Feiyang Liu, Mingye Huang, Junwei Sun, Shuai Dong, Yanfeng Liu and Zhengyang Gao



1023

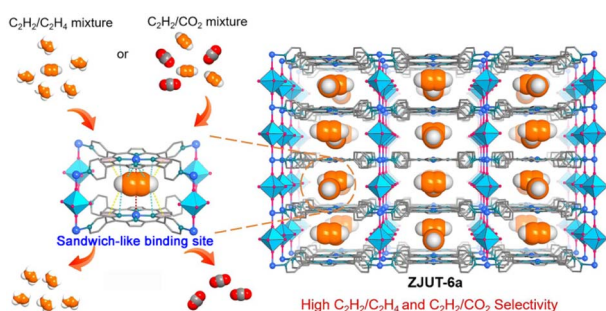
In situ grown Na⁺-doped NH₄V₄O₁₀ nano-arrays on carbon cloth with ultra-high specific capacity for high-performance aqueous ammonium ion hybrid supercapacitors

Yangwang Zhou, Fei Long, Yixin Hou, Xinying Lin, Li Sun, Shuyi Mo, Fei Long* and Yihua Gao*



PAPERS

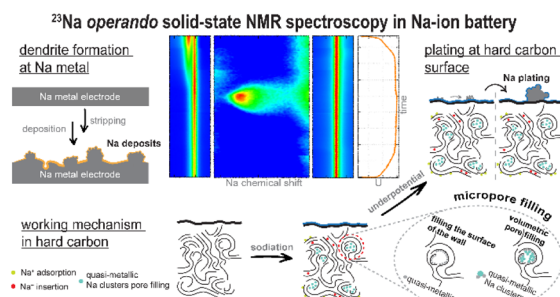
1034



Highly efficient separation of C_2H_2 from CO_2 and C_2H_4 enabled by an anion-pillared metalloporphyrin MOF with sandwich-like binding sites

Miaoyu Liu, Xiao-Wen Gu, Chenyan Lin, Baixue Dong, Zhongjie He, Bo Xie, Xu Zhang, Bin Li, Hui-Min Wen* and Jun Hu

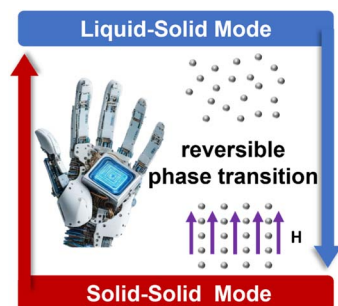
1042



Probing sodium structures and dynamics in hard carbon for Na-ion batteries using ^{23}Na operando solid-state NMR spectroscopy

Matej Gabrijelčič, Blaž Tratnik, Gregor Kapun, Elena Tchernychova, Nataša Žabukovec Logar, Andraž Krajnc, Robert Dominko and Alen Vizintin*

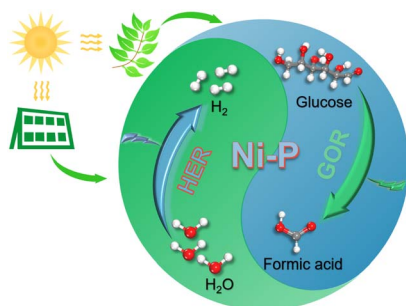
1057



A magnetorheological fluid based infinitely-regulatable triboelectric tactile sensor

Xin Chong, Zhenqiu Gao, Zifan Jiang, Ao Wang, Jia Shi, Lanyue Shen, Zhen Wen* and Xuhui Sun*

1067



Efficient electrocatalytic glucose oxidation coupled water electrolysis driven by Ni-foam supported Ni-P nanowire arrays

Hengwei Lou, Yikai Yang, Xiuming Bu, Haoxin Fan, Duo Weng, Jian Zhang, Wei Gao* and Dan Wen*

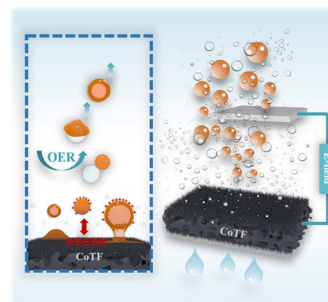


PAPERS

1074

***In situ* microbubble electroflotation enhanced emulsion separation and membrane antifouling ability for durable oil-in-water emulsion separation**

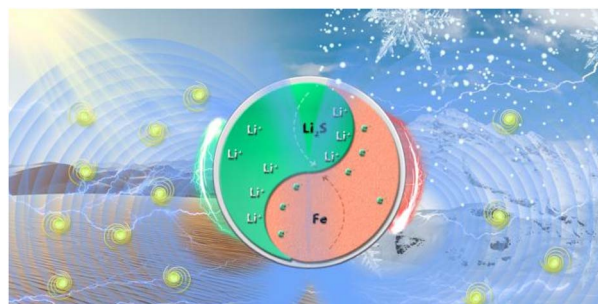
Binyang Liu, Peng Liu, Jiahui Ye, Yuqing Chen, Xuesong Liu, Wen Tian and Junyi Ji*



1086

Mechanistic insights into capacity discrepancies of conversion-type transition-metal compounds in wide-temperature-range lithium-ion batteries

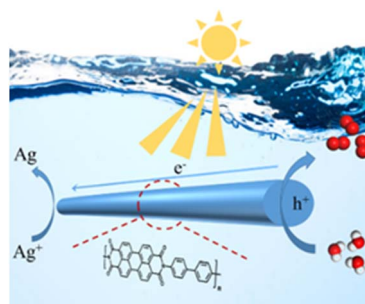
Meisheng Han, Kunxiong Zheng, Jie Liu, Zhiyu Zou, Yongbiao Mu, Hengyuan Hu, Fenghua Yu, Wenjia Li, Lei Wei, Lin Zeng* and Tianshou Zhao*



1095

Linear PDI-based conjugated polymers with directional charge transport driving photocatalytic water oxidation

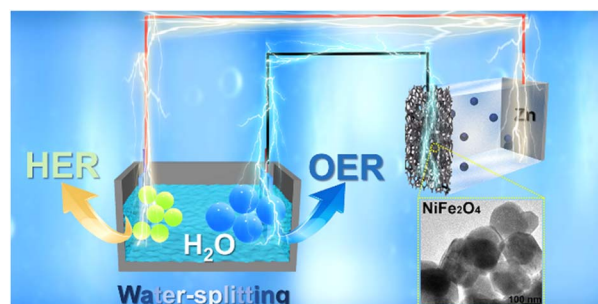
Jiajie Chen, Wan Lin, Jing Lin and Yaobing Wang*



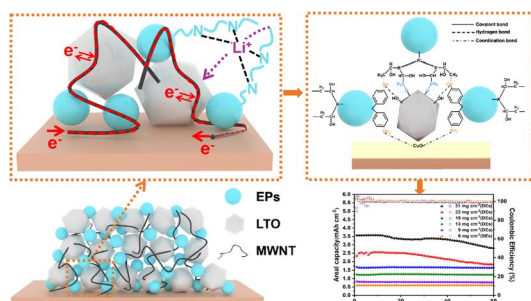
1102

One-step synthesized iron foam-based NiFe₂O₄ applied for self-powered water splitting hydrogen production

Juan Jian, Yufeng Zhang, Zhuo Wang, Xinxin Zheng, Ping Nie, Wanting Yang, Tianhui Zhang and Limin Chang*



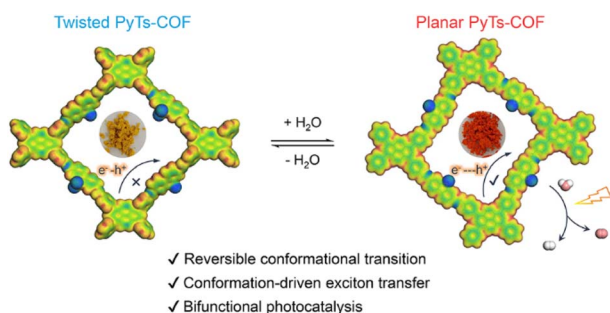
1109



Solvent-free lithium-ion battery electrodes with ultrahigh loading using a reactive epoxy nanobinder

Pingwei Zhu, Siqi Liu, Lei Zhao, Li Liu, Yudong Huang, Jun Li* and Fujun Li*

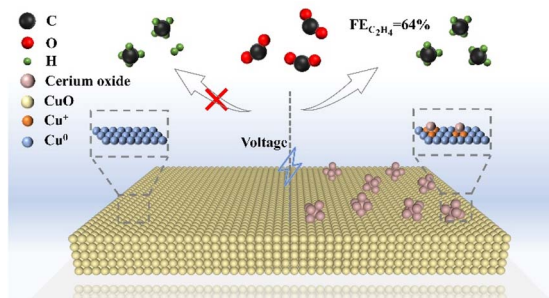
1123



Conformation-driven exciton transfer in pyrene-sulfone covalent organic frameworks for bifunctional photocatalysis

Mengxu Ran, Xiang Zhang, Jing Lin, Rahul Anil Borse, Linlin Zhang* and Yaobing Wang*

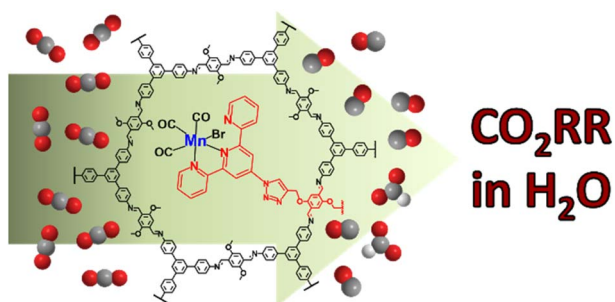
1135



Surface modification of copper oxide nanosheets with CeO₂ for enhanced CO₂ reduction to C₂H₄

Shuaibing Yang, Fanfei Sun, Rong Cao and Minna Cao*

1142



Post-synthetic modification of covalent organic frameworks with active manganese centers for electrocatalytic CO₂ reduction in water

Elena Gala, Geyla C. Dubed Bandomo, Mattia Vettori, Sergio Royuela, Marcos Martínez-Fernández, José I. Martínez, Elena Salagre, Enrique G. Michel, Félix Zamora, Julio Lloret-Fillol* and José L. Segura*

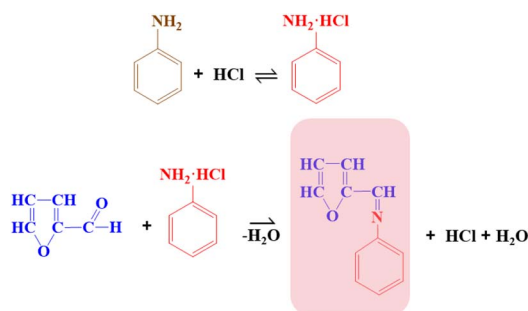


PAPERS

1153

An ultra-sensitive covalent organic framework based smoldering sensor for early warning of a granary fire

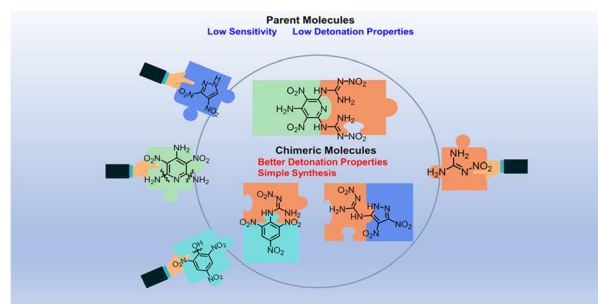
Yunlu Luan, Jing Zhan,* Xiaojuan Ye and Xiaowei Mu*



1164

An effective strategy for balancing energy and sensitivity: design, synthesis, and properties of chimeric energetic molecules

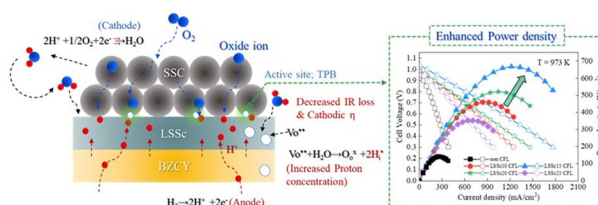
Yujia Shan, Shi Huang, Tianyu Jiang, Ye Cao, Jinxin Wang, Yuteng Cao and Wenquan Zhang*



1172

A high power metal-supported protonic ceramic fuel cell using increased proton conductivity in the cathode functional layer of La_{1-x}Sr_xScO₃ (LSSc, x = 0.1–0.25)

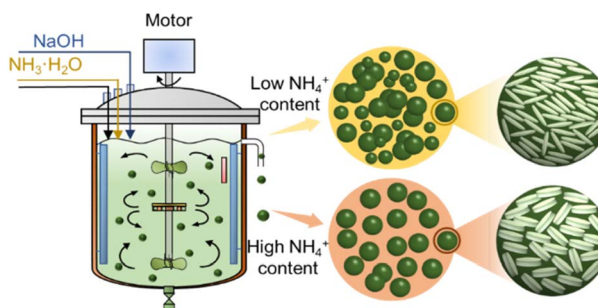
Hyo-Young Kim, Motonori Watanabe, Jun Tae Song, Miki Inada and Tatsumi Ishihara*



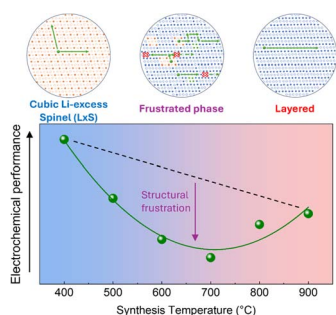
1181

What impact does ammonia have on the microstructure of the precursor and the electrochemical performance of Ni-rich layered oxides?

Jilu Zhang, Xinyue Zhai, Tian Zhao, Xiaoxia Yang, Qin Wang, Zhongjun Chen, Meng-Cheng Chen, Jian-Jie Ma, Ying-Rui Lu, Sung-Fu Hung and Weibo Hua*



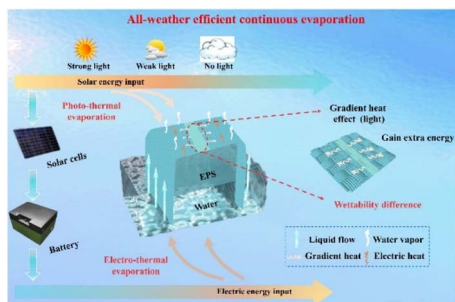
1191



Topotactic phase transformation of lithiated spinel to layered $\text{LiMn}_{0.5}\text{Ni}_{0.5}\text{O}_2$: the interaction of 3-D and 2-D Li-ion diffusion

Boyu Shi, Jihyeon Gim, Tianyi Li, Krishna Koirala, Chongmin Wang, Dewen Hou, Yuzi Liu, Jacob Jorne, Jason R. Croy, Michael M. Thackeray and Eungje Lee*

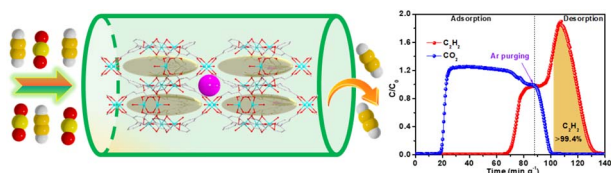
1201



A fabric-based multi-functional solar evaporator with all-weather efficient continuous evaporating capability through photothermal and electrothermal effects

Chuanliang Chen, Minhan Cheng, Yuliang Qu, Ke Tian, Qianyang Li, Qiang Fu and Hua Deng*

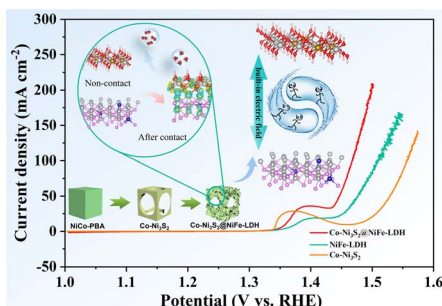
1213



Enabling high C_2H_2 storage and efficient $\text{C}_2\text{H}_2/\text{CO}_2$ separation in a cage-like MOF with multiple supramolecular binding sites

Gang-Ding Wang, Wen-Jie Shi, Yong-Zhi Li,* Weigang Lu,* Lei Hou* and Dan Li

1221



Construction of a cobalt-doped $\text{Ni}_3\text{S}_2@\text{NiFe-LDH}$ heterojunction with enhanced local electric field for efficient oxygen evolution reaction

Jie Wu, Anqi Huang, Wen Cao, Xuehui Gao* and Zhongwei Chen*

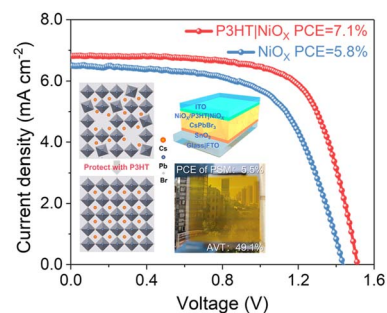


PAPERS

1230

Electron-beam-evaporated NiO_x for efficient and stable semi-transparent perovskite solar cells and modules

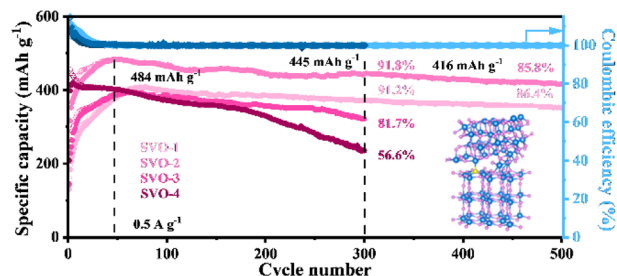
Junye Pan, Jiahui Chen, Bingxin Duan, Yuxi Zhang, Peiran Hou, Yanqing Zhu, Min Hu,* Wangnan Li, Yi-Bing Cheng and Jianfeng Lu*



1240

Manipulating defects simultaneously boosts the crystal stability and the electrochemical reversibility toward long-life aqueous zinc ion batteries

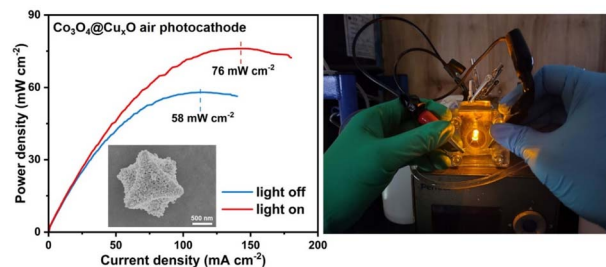
Shuyue Hou, Xinyue Chen, Gangguo He, Xin Peng, Jingjing Wang, Can Huang, Huan Liu, Tiezhong Liu, Xin Wang, Lingzhi Zhao* and Shuang Hou*



1249

Direct utilization of light energy to promote the power density of zinc–air batteries using $\text{Co}_3\text{O}_4@\text{Cu}_x\text{O}$ air photocathodes with porous octahedral superstructures

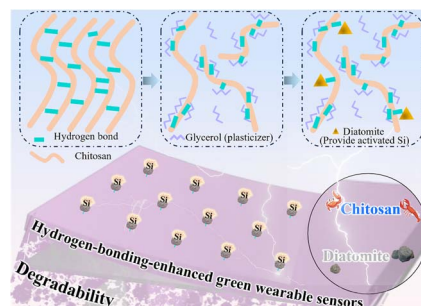
Yuhao Zhong, Jing Xie, Ruitong Xu, Xiaobo Feng and Ting Zhu*



1259

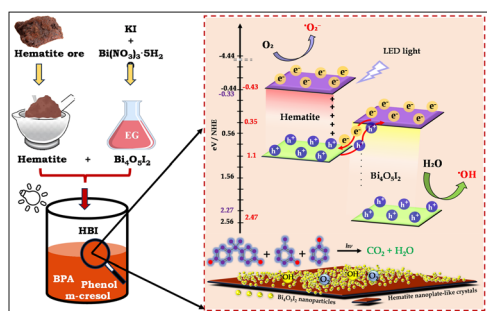
Hydrogen-bonding-enhanced green wearable sensors with high generation performance and low Young's modulus

Caixia Gao, Wangshu Tong,* Runfeng Yu, Songling Liu and Yihe Zhang*



PAPERS

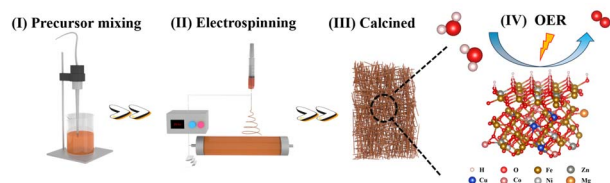
1271



An LED-driven Hematite/Bi₄O₅I₂ nanocomposite as an S-scheme heterojunction photocatalyst for efficient degradation of phenolic compounds in real wastewater

Akash Rawat, Suneel Kumar Srivastava, Chandra Sekhar Tiwari and Ashok Kumar Gupta*

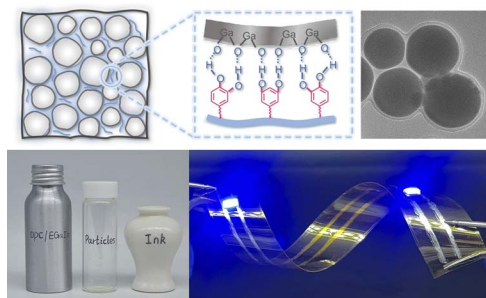
1287



High entropy spinel oxide (Ni_{0.2}Co_{0.2}Zn_{0.2}Cu_{0.2}Mg_{0.2}) Fe₂O₄ nanofibers for efficient oxygen evolution reaction

Mengyuan Zhang, Xuanyu Zhou, Kongliang Luo, Yaning Fan, Chuandong He, Qiang Niu, Junjun Zhang,* Pengfei Zhang* and Sheng Dai

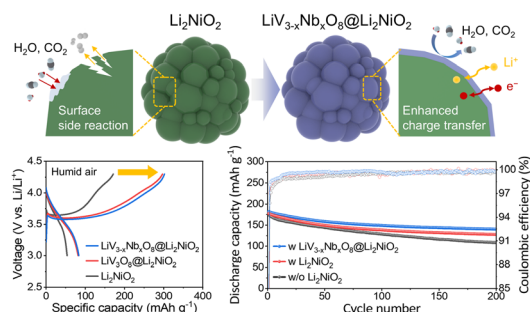
1302



Proanthocyanidin-enhanced wettability and adhesion in liquid metal inks for multi-substrate patterning in soft electronics

Haoran Liu, Yidong Peng, Jiahui Sun, Yuxi Zhang, Jiayan Long, Yanqing Gu, Steve Park, Tianxi Liu, Jiancheng Dong* and Yunpeng Huang*

1313



Functionalities of the LiV_{3-x}Nb_xO₈ surface layer on a Li₂NiO₂ cathode additive for enhancing the moisture stability and cycling performance of lithium-ion batteries

Jaewoo Jung, Yun Seong Byeon, Dongil Kim, Seong Hee Jeong, Chang Hoon Song, Eung-Ju Lee, Seung-Min Oh and Min-Sik Park*

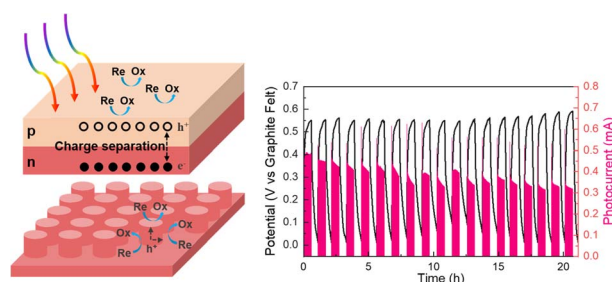


PAPERS

1320

Nanostructured $\text{Fe}_2\text{O}_3/\text{Cu}_x\text{O}$ heterojunction for enhanced solar redox flow battery performance

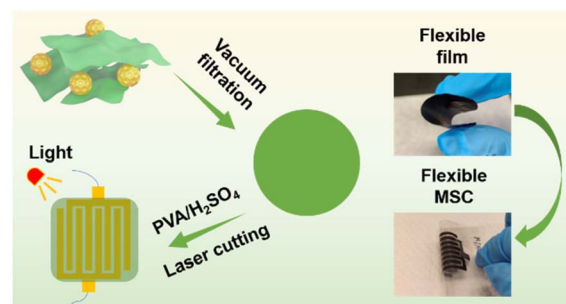
Jiaming Ma, Milad Sabzehparvar, Ziyang Pan and Giulia Tagliabue*



1330

Mesoporous gold decorated MXene ($\text{Ti}_3\text{C}_2\text{T}_x$) flexible composite films for photo-enhanced solid-state micro-supercapacitors

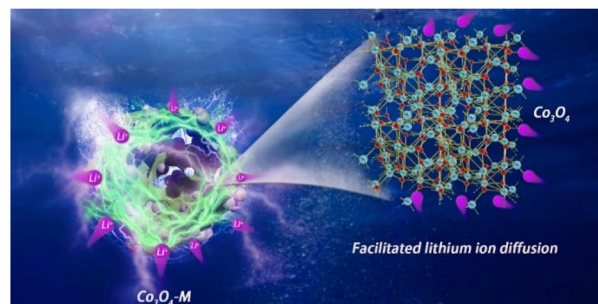
Yijia Luo, Wenxiu Que,* Asep Sugih Nugraha, Yunqing Kang, Yi Tang, Zhenwei Wu, Joel Henzie* and Yusuke Yamauchi*



1343

Magnetic field control in the growth process of Co_3O_4 and its performance enhancement mechanism as an anode material for lithium ion capacitors

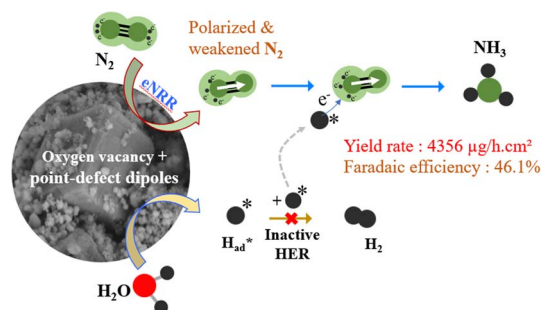
Fusen Lv, Rui Chen, Xiao Yang, Jiaqi Liu, Tie Liu, Kai Wang, Xiaoming Liu, Hao Li, Leiming Fang, Qiang Wang* and Shuang Yuan*



1355

Unveiling high-yield dinitrogen-to-green ammonia production via highly defective $\text{Cu}_4\text{Bi}_5\text{S}_{10}/\text{Mn}_4\text{V}_2\text{O}_9$ electrocatalysts in alkaline H-cell and stack-cell reactors

Merga Hailemariam Urgesa, Quoc-Nam Ha, Kuo-Hsin Lin, Li-Duan Tsai, Yin-Wen Tsai and Dong-Hau Kuo*

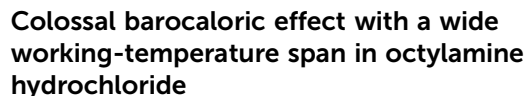




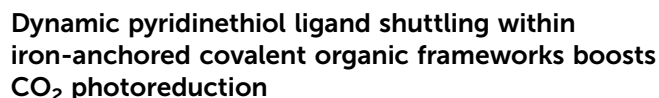
1384



1399



1407



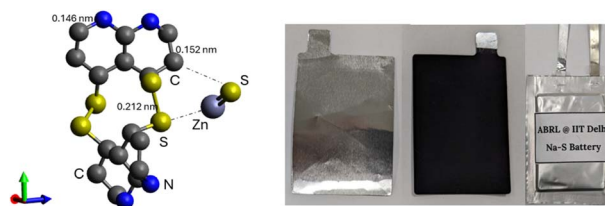
This journal is © The Royal Society of Chemistry 2025

PAPERS

1420

Tuning the local chemistry of SPAN to realize the development of room-temperature sodium–sulfur pouch cells

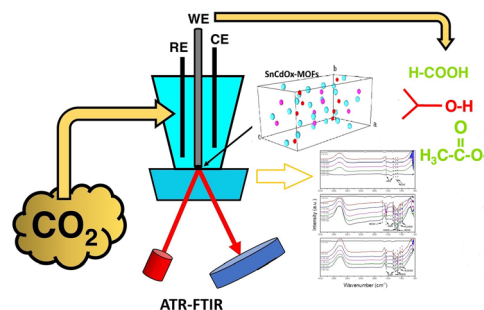
C. Sanjaykumar, Sungjemmenla, Mahesh Chandra, Chhail Bihari Soni, S. K. Vineeth, Sweta Das, Nevo Cohen, Hemant Kumar, Daniel Mandler and Vipin Kumar*



1430

Study of electrocatalytic CO₂ reduction using tin-oxalate organometallic frameworks doped with cadmium

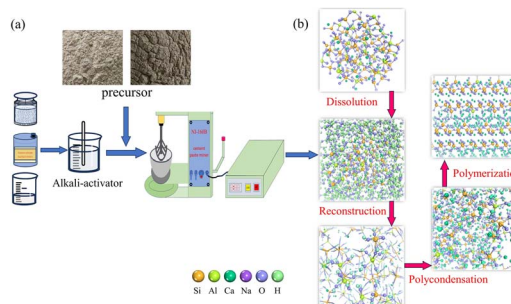
Adrián Farid Bustos-Jimenez, María Elena Manriquez-Ramírez,* Francisco Javier Tzompantzi-Morales, Rodrigo Andrés Espinosa Flores and Martin Daniel Trejo-Valdez*



1444

Multi-scale quantitative investigation of the early structural transformation mechanism in alkali-activated materials: insights from molecular dynamics and first-principles calculations

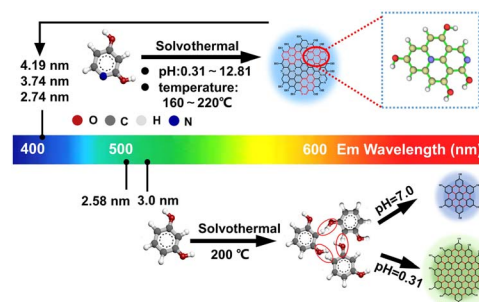
Jiazhi Huang, Baomin Wang* and Shipeng Zhang



1460

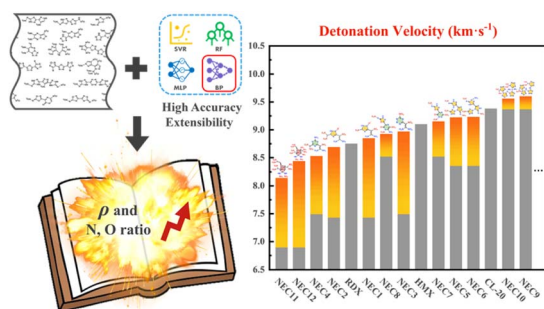
Graphitic nitrogen induced identical fluorescent emission of carbon dots for scalable anti-counterfeiting applications

Channa Wang, Fuzhu Liu, Mingjin Du, Mi Zhang, Xiangdong Ding* and Changsheng Xiang*



PAPERS

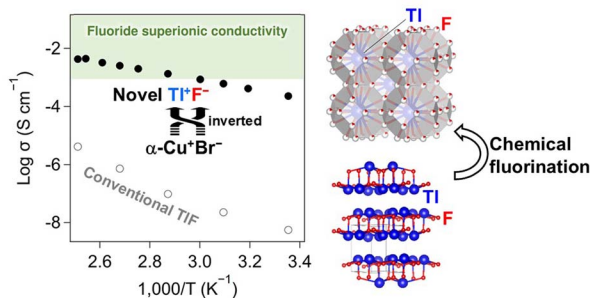
1470



Reverse design of high-detonation-velocity organic energetic compounds based on an accurate BPNN with wide applicability

Qiong Wu, Guan-chen Dong, Shuai-yu Wang, Xin-yu Wang, Bin Yan, Wei-hua Zhu, Jing Lv* and Ling-hua Tan*

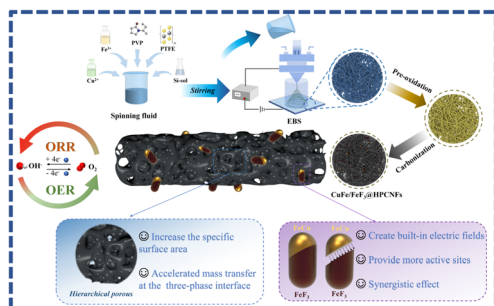
1478



Fluoride superionic conduction in TlF with the new anti- α -CuBr structure containing intrinsic F vacancies

Kazuki Tani, Tomofumi Tada and Tsuyoshi Takami*

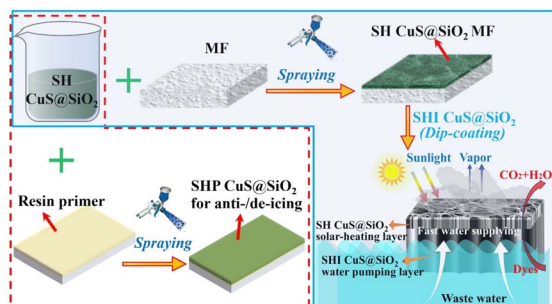
1485



Facile construction of hierarchically porous carbon nanofibers modified by an FeCu/FeF₃ heterojunction for oxygen electrocatalysis in liquid and flexible Zn–air batteries

Nanping Deng,* Yilong Wang, Qiang Zeng, Yang Feng, Gang Wang, Hao Chi, Weimin Kang* and Bowen Cheng

1499



Photothermal CuS@SiO₂ nanocomposites for solar-driven anti-icing/deicing and synchronous evaporation and photocatalysis

Rong Zhang, Helong Zhang, Yuwei Zhong, Shouqin Tian, Xiong Qian, Lee Li, Javad Shabani Shayeh, Roya Sedghi, Xiujian Zhao and Yi Xie*

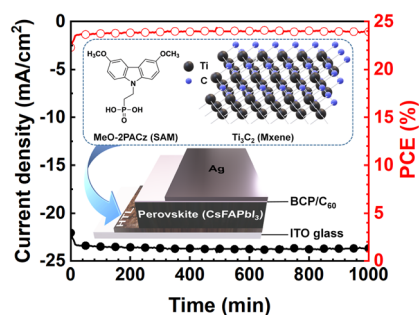


PAPERS

1512

MXene-driven augmentation of hole-selective self-assembled monolayer interfaces for efficient and stable p-i-n perovskite solar cells

Kyeong Su Kim, Jung Jae Do and Jae Woong Jung*



CORRECTION

1523

Correction: Thermodynamic assessment of Gd-doped CeO₂ for microwave-assisted thermochemical reduction

Dongkyu Lee, Jaemin Yoo, Gunsu S. Yun* and Hyungyu Jin*

