

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.

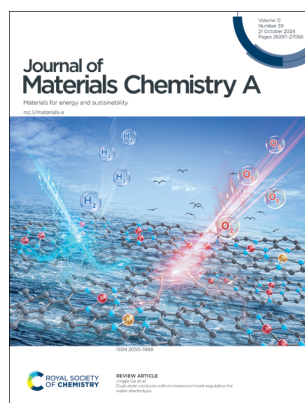
IN THIS ISSUE

ISSN 2050-7488 CODEN JMCAET 12(39) 26297–27066 (2024)



Cover

See Kasper Moth-Poulsen *et al.*, pp. 26457–26464. Image reproduced by permission of Nicolò Baggi from *J. Mater. Chem. A*, 2024, 12, 26457.



Inside cover

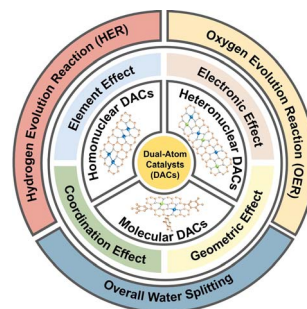
See Jingjie Ge *et al.*, pp. 26316–26349. Image reproduced by permission of Jingjie Ge from *J. Mater. Chem. A*, 2024, 12, 26316.

REVIEWS

26316

Dual-atom catalysts with microenvironment regulation for water electrolysis

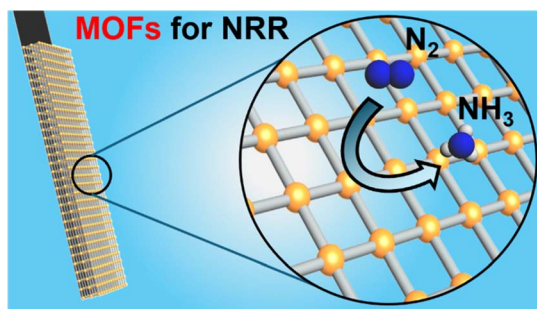
Ruoqing Xu, Rongbo Sun, Hai-Qun Xu, Gang Xie and Jingjie Ge*



26350

Metal–organic frameworks as promising electrocatalysts for the nitrogen reduction reaction: mapping the research landscape and identifying future trends

Riki Nakatani, Saikat Das* and Yuichi Negishi*



EES Batteries

**Exceptional research on
batteries and energy storage**

Part of the EES family

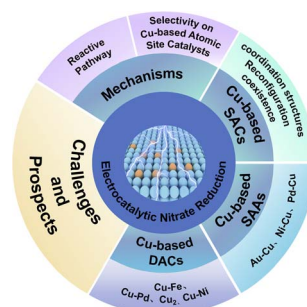
**Join
in** | Publish with us
rsc.li/EESBatteries

REVIEWS

26367

When electrocatalytic nitrate reduction meets copper-based atomic site catalysts

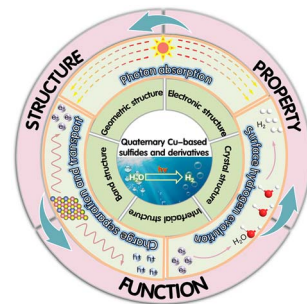
Xiaoqian Liu, Tianyi Xiang, Yuntao Liang, Xiangqin Zhou, Zihao Wang, Jianbin Liu, Min Cheng, Chengyun Zhou* and Yang Yang*



26390

Recent advances in quaternary copper-based sulfides and their derivatives for solar hydrogen evolution

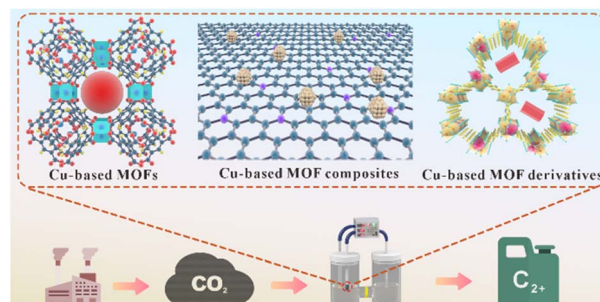
Yu Li, Zheming Liu, Jie Chen, Shuaibing Wang, Ouyang Lin, Chunhe Yang, Zhe Yin* and Aiwei Tang*



26421

Cu MOF-based electrocatalysts for CO₂ reduction to multi-carbon products

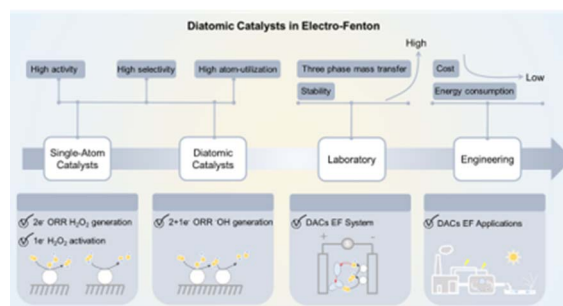
Li-Xia Liu,* Chengyu Qin, Taojiang Deng, Liming Sun, Zifan Chen and Xiguang Han*



26439

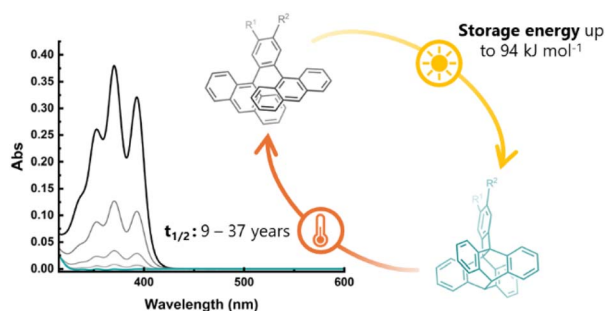
Engineered diatomic catalyst empowered electro-Fenton processes for advanced water purification

Wenxin Sun, Hua Zou, Guoshuai Liu,* Xiaohong Guan, Shaobin Wang and Xiaoguang Duan*



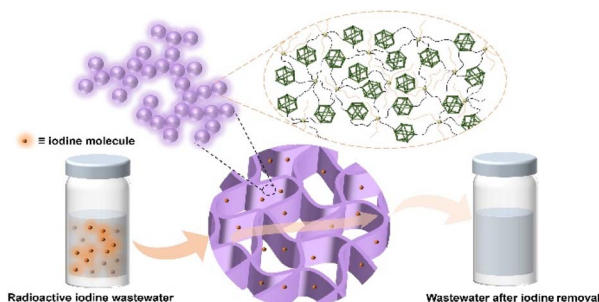
COMMUNICATIONS

26457

Exploring *ortho*-dianthrylbenzenes for molecular solar thermal energy storage

Nicolò Baggi, Lidiya M. Muhammad, Zacharias Liasi, Jacob Lyng Elholm, Paulius Baronas, Elies Molins, Kurt V. Mikkelsen and Kasper Moth-Poulsen*

26465

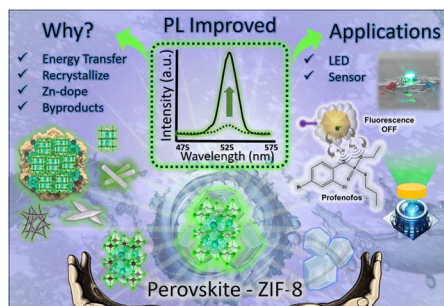


Robust hydrogels with hierarchical porosities from the controlled assembly of metal–organic polyhedra for rapid removal of low-concentration aqueous iodine

Haiyan Xiao, Jia-Fu Yin, Hanqiu Jiang, Linjie Lan, Jiadong Chen, Wei Liu-Fu, Shengqiu Liu, Yubin Ke and Panchao Yin*

PAPERS

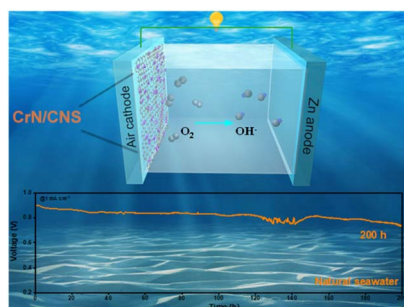
26471



Investigating a simple and sustainable photoluminescence improvement approach for a highly applicable perovskite-ZIF-8 hybrid material by using water

Andi Magattang Gafur Muchlis and Chun Che Lin*

26484



Carbon nanosheet-supported CrN nanoparticles as efficient and robust oxygen reduction electrocatalysts in acidic media and seawater Zn–air batteries

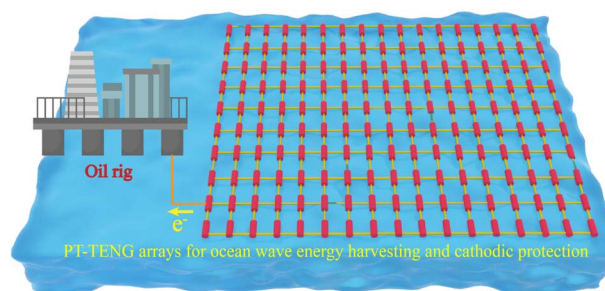
Yating Zhang, Haoming Wu, Jun Ma, Junming Luo,* Zhe Lu, Suyang Feng, Yijie Deng,* Hui Chen, Qi Wang, Zhengpei Miao, Peng Rao, Neng Yu, Yuliang Yuan, Jing Li and Xinlong Tian*



26493

A high-output tubular triboelectric nanogenerator for wave energy collection and its application in self-powered anti-corrosion applications

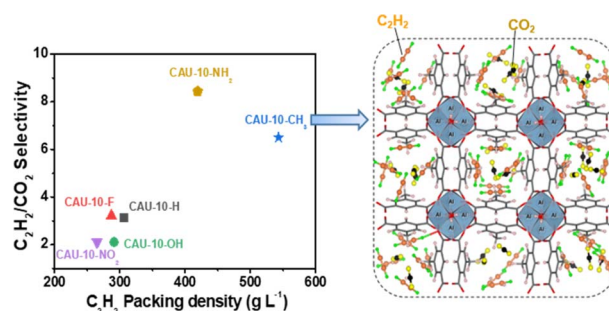
Wentao Li, Yupeng Liu, Weixiang Sun, Hanchao Wang, Wenqi Wang, Jie Meng, Xiaoqing Wu, Chuanpeng Hu, Daoai Wang* and Ying Liu*



26502

Functional group tuning of CAU-10(Al) for efficient C₂H₂ storage and C₂H₂/CO₂ separation

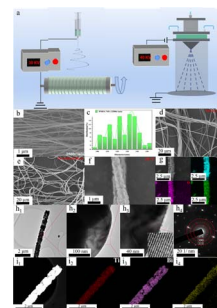
Eun Woo Lee, Balkaran Singh Sran, Ayoub Daouli, Maftun Salimov, Ji Woong Yoon, Kyung Ho Cho, Donghui Jo, Guillaume Maurin,* Su-Kyung Lee* and U-Hwang Lee*



26513

Synergistic effect of the PMIA nanofiber membrane with a dual-oriented network structure and Li_{0.5}Bi_{0.5}TiO₃ nanofibers for high-performance lithium metal batteries

Zhaozhao Peng, Nanping Deng,* Xiaofan Feng, Junbao Kang, Shuaishuai Wang, Tinglu Zheng, Bowen Cheng and Weimin Kang*



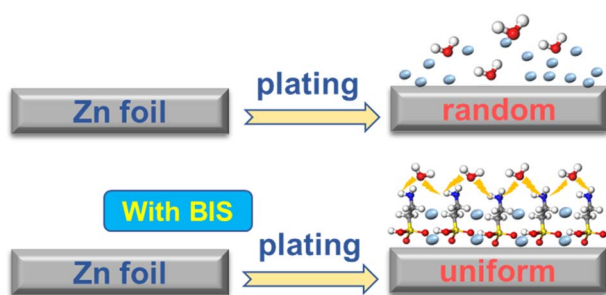
26528

Hierarchical core-shell heterostructure FeMoS@CoFe LDH for multifunctional green applications boosting large current density water splitting

Chun Han, Yunhe Zhao,* Gong Chen, Haiyan Song, Xiaoliang Wu, Zehua Guo and Chunxia Chen*



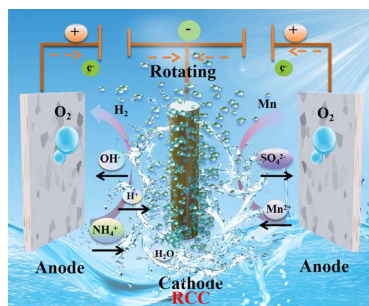
26536



Bifunctional interface stabilizer for promoting preferential crystal face adsorption and inducing planar Zn growth

Tiancun Liu,* Song Lu, Ronghan Jiang, Ling Chen, Xusheng Wang, Yong Wang* and Zhixin Yu

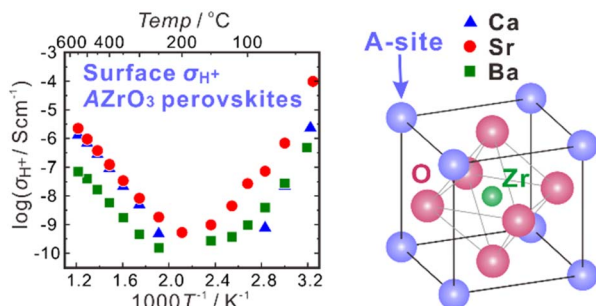
26544



Revealing the mass transfer of proton donors for tailoring hydrogen evolution coupled with manganese electrodeposition

Cai Tan, Chaoyi Chen,* Fan Yang,* Junqi Li, Liangxing Jiang, Changping Shi, Jiangyuan Yang, Yuanyu Chen and Lu Yu

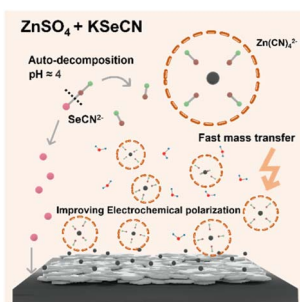
26555



Surface protonic conduction in porous alkaline earth zirconate perovskites CaZrO_3 , SrZrO_3 , and BaZrO_3

Jie Gu, Xinwei Sun, Lulu Jiang, Zihan Zhang, Truls Norby* and Donglin Han*

26568



Mediation of the electrochemical polarization for durable zinc anode

Ruixuan Yang, Yuchen Jiang, Simin Dai, Bei Qi, Yan Wang, Xinyan Zhuang, Haoying Han, Renfei Wei, Kefeng Xie, Rong Yang* and Liang Huang*

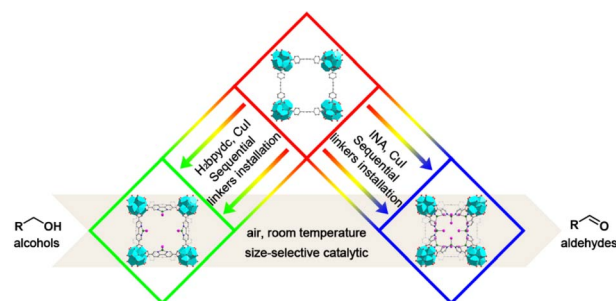


PAPERS

26578

Structural and catalytic regulation in a rigid Zr-MOF through linker installation

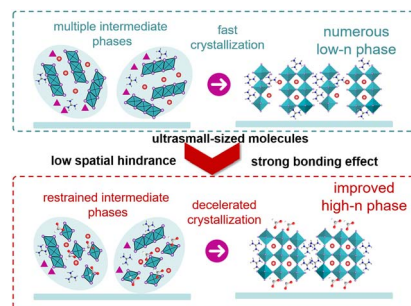
Jinyi Huang, Fugang Li, Yuxuan Meng, Xi Lin, Suijun Liu, Liangliang Zhang* and Yu Fang*



26586

Restraining unfavorable phases *via* reduced spatial hindrance of ultra small-sized molecules to enable high-performance quasi-two-dimensional perovskite solar cells

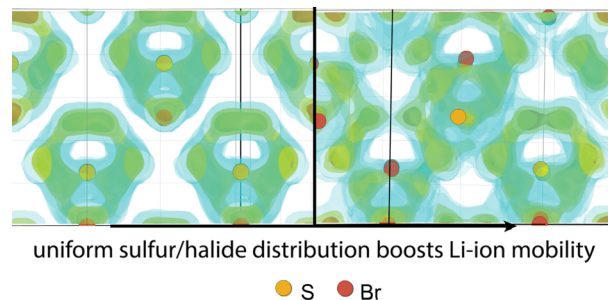
Dengxue Li, Shiyu Rao, Biao Hu, Canqiang Du, Jiajie Hong, Xiaotian Hu, Yiwang Chen and Ting Hu*



26596

Optimizing ionic transport in argyrodites: a unified view on the role of sulfur/halide distribution and local environments

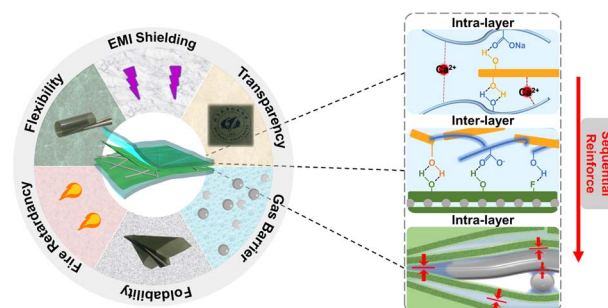
Anastasia K. Lavrinenko, Theodosios Famprikis, James A. Quirk, Victor Landgraf, Pedro B. Groszewicz, Jouke R. Heringa, Stef Smeets, Victor Azizi, Simone Ciarella, James A. Dawson, Marnix Wagemaker* and Alexandros Vasileiadis*



26612

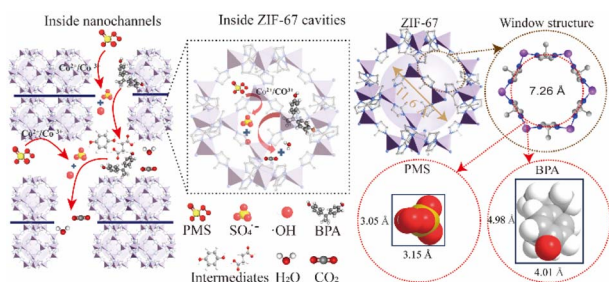
Sequential reinforcement of intra/interlayer interfaces to design flexible, transparent electromagnetic interference shielding film for "Green Electronics"

Gao Deng, Xin Sun, Xufeng Li, Zhenyang Li, Haihan Zou, Peng Yi, Ming Fang, Chunyan Chen, Junzhe He, Jianglan Shui, Ronghai Yu* and Xiaofang Liu*



PAPERS

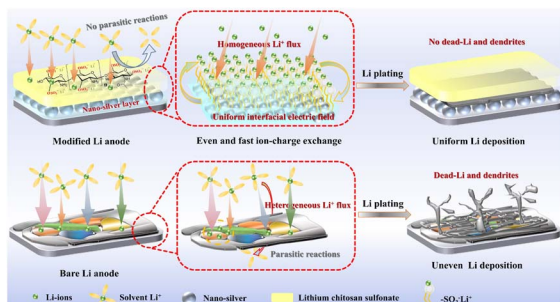
26627



Ultrafast degradation of organic pollutants enabled by nanofluidic ZIF-67/GO membranes via efficient nanoconfined peroxymonosulfate activation

Jian Hu, Jue Hou, Chen Zhao, Yuyu Su, Rong Wang and Huacheng Zhang*

26636

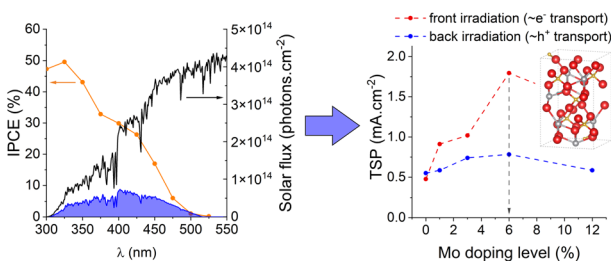


Synergistic dual-interface engineering with self-organizing Li-ion/electric fields for enhanced lithium metal anode stability

Zhiqiang Li,* Kemeng Liao, Lihong Yin, Zongrun Li, Yingzhi Li, Hongzhi Wang, Ning Qin, Shuai Gu, Jingjing Chen, Weihua Wan* and Zhouguang Lu*

26645

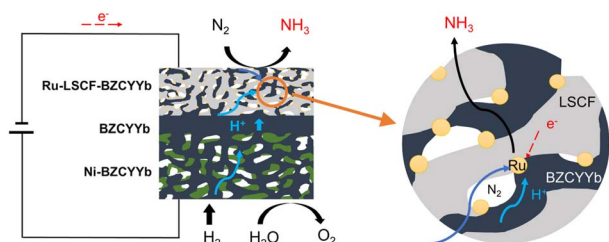
Series of Mo-doped BiVO₄ grown by CVD



The aerosol-assisted chemical vapour deposition of Mo-doped BiVO₄ photoanodes for solar water splitting: an experimental and computational study

Shaobin Zhao, Chenglin Jia, Xinyi Shen, Ruohao Li, Louise Oldham, Benjamin Moss, Brian Tam, Sebastian Pike, Nicholas Harrison, Ehsan Ahmad* and Andreas Kafizas*

26667



A mixed proton–electron-conducting cathode with a Ru nanoparticle catalyst for electrochemical ammonia synthesis based on a proton-conducting BZCYYb electrolyte

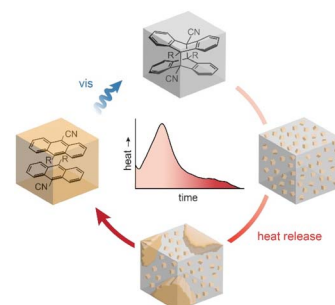
Jiaqi Chen, Wenbo Gao,* Liangzhu Zhu, Haoliang Tao, Sheng Feng, Hujun Cao, Jianping Guo, Yanxia Chen* and Ping Chen



26678

Elucidating the mechanism of solid-state energy release from dianthracenes *via* auto-catalyzed cycloreversion

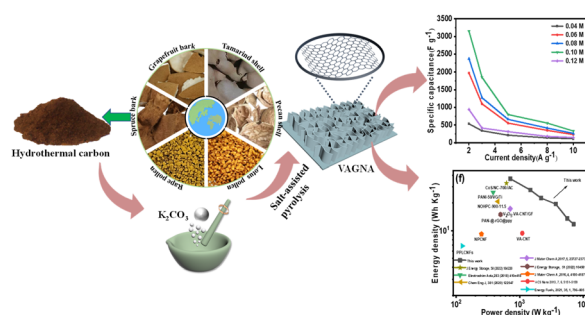
Cijil Raju, Zhenhuan Sun, Ryo Koibuchi, Ji Yong Choi, Subhayan Chakraborty, Jihye Park, Hirohiko Houjou,* Klaus Schmidt-Rohr* and Grace G. D. Han*



26687

Gram-scale production of vertically aligned holey graphene nanosheet arrays derived from a renewable biomass precursor *via* a facile hydrothermal/salt-assisted pyrolysis method for aqueous high-performance redox supercapacitors

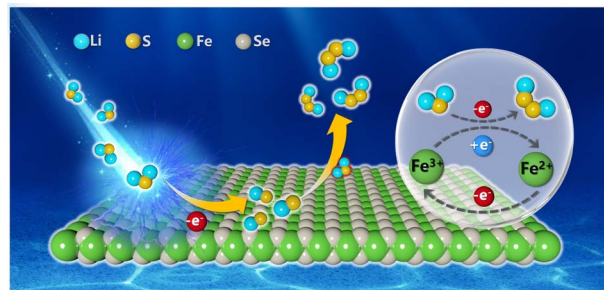
Qincheng Yang, Shuaibing Liu, Qianglin Li,* Ling Wu,* Binghua Zhou, Zhipeng Wang, Zheng-Hong Huang, Hao Yang and Ming-Xi Wang*



26707

Enhancing sulfur oxidation reaction by overcoming redox barriers with FeSe₂@C for lithium–sulfur batteries

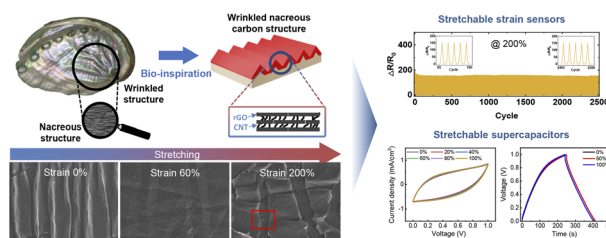
Pengkun Zou, Yushuang Lin, Long Li, Jiaxin Wang, Yu Chao, Borong Li, Hongyun Ma,* Zheyuan Liu, Yan Yu* and Chengkai Yang*



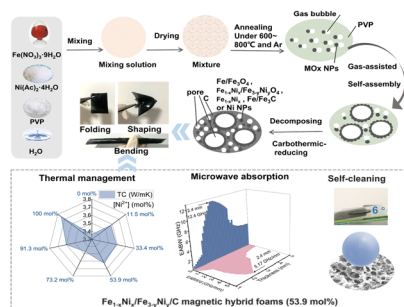
26718

Multifunctional wrinkled nacreous all-carbon films for high-performance stretchable strain sensors and supercapacitors

Soo-Hyeon Cho, TaeGyeong Lim, Hyeon-Jong Lee, Sang-Yun Kim and Ji Won Suk*



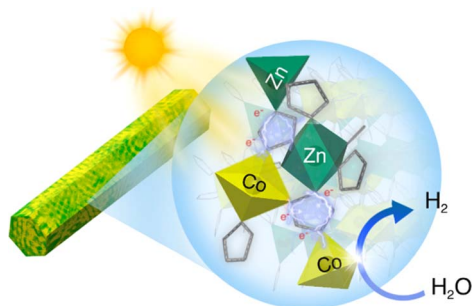
26728



Excellent self-cleaning, ultrawideband absorption, and rapid heat dissipation of magnetic hybrid foams from a facile one-step annealing route

Yangbing Chen, Ran Ji, Xuan Chen, Peiwen Wang, Huiming Ye, Guoxiu Tong,* Xiaojuan Wang and Wenhua Wu

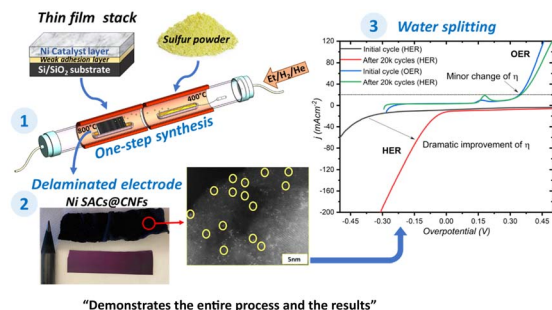
26743



Self-shuttle-mediated electron transfer to boost photocatalytic hydrogen production of Co–Zn bimetallic MOF

Taya Ko Saothayanun, Yollada Inchongkol, Nopphon Weeranoppanant, Mio Kondo, Makoto Ogawa and Sareeya Bureekaew*

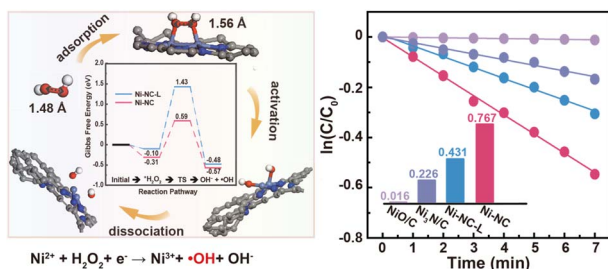
26749



High performance, binder-free electrodes with single atom catalysts on doped nanocarbons for electrochemical water splitting synthesized using one-step thermally controlled delamination of thin films

Efrat Shawat Avraham, Bibhudatta Malik, Alina Yarmolenko, Rajashree Konar, Sergei Remennik, Gili Cohen Taguri, Sandro Zorzi, Elti Cattaruzza, Michael Yakov Hubner and Gilbert Daniel Nessim*

26762



High-density single-atomic Ni–N₄ sites for efficient Fenton-like reactions

Shu-Qi Wang, Katherine Velez, Jiahui Cai, Linbo Huang, Qing-Hua Zhang, Feng Feng, Qi An,* Lu Zhao* and Jin-Song Hu

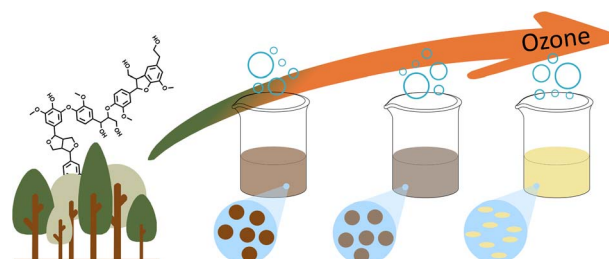


PAPERS

26772

Ozonolysis of regular and crosslinked lignin nanoparticles: closing the loop

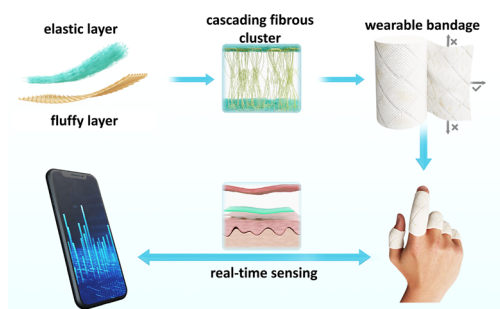
Alexandros E. Alexakis* and Mika H. Sipponen*



26780

Design and large-scale preparation of a laminated elastic fabric with high softness and a cascading fibrous cluster structure for wearable smart bandages

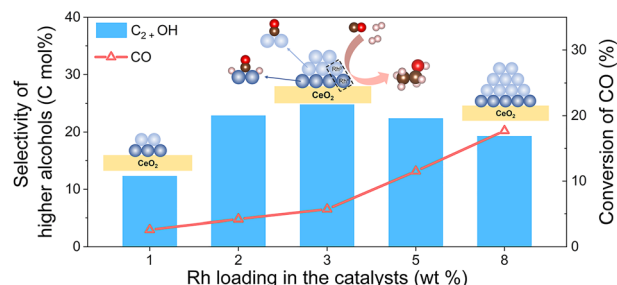
Heng Zhang,* Ke Zhao, Qian Zhai, Xiaoyu Guan, Jingqiang Cui and Qi Zhen



26791

Maximizing the number of $\text{Rh}^0\text{--Rh}^+$ sites through metal dispersion control for the synthesis of higher alcohols from syngas

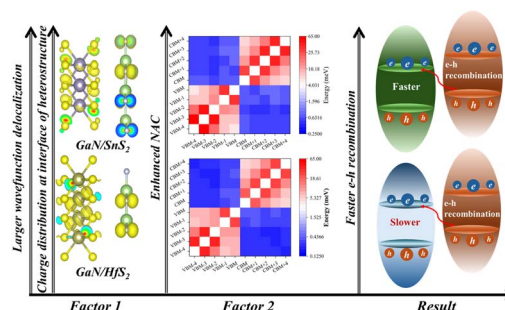
Ruyang Wang, Heng Cao, Peiyu Ma and Jun Bao*



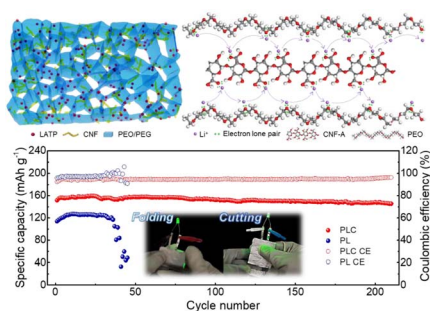
26800

Unveiling ultrafast carrier dynamics in photocatalytic 2-D heterostructures: insights from first-principles and nonadiabatic molecular dynamics

Zelong Gong, Zhao Qian,* Jian Gao, Kaixin Yang, Shiyu Cao, Muhammad Sajjad, Yuanning Jiang, Jianqiang Bi and Rajeev Ahuja



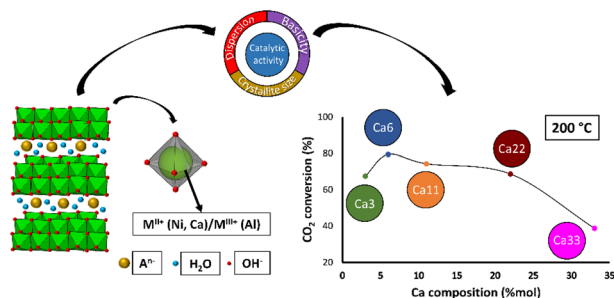
26809



High ionic conductivity of a flexible solid-state composite electrolyte for a lithium-ion battery

Yu-Huei Song, Yu-Ching Chen, En-Ci Lin, Tzu Yun Liang, Che Ya Wu, Ai-Yin Wang, Han-Yi Chen and Jyh Ming Wu*

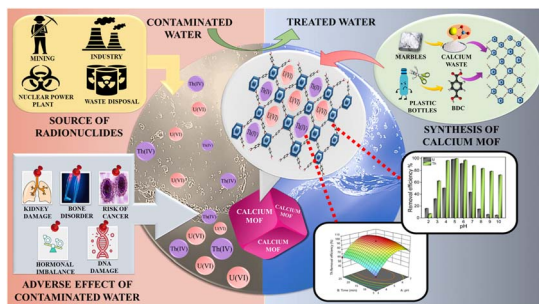
26820



Tuning the Ca content of Ni–Ca–Al layered-double hydroxide catalysts for low-temperature CO₂ methanation

Yan Resing Dias and Oscar W. Perez-Lopez*

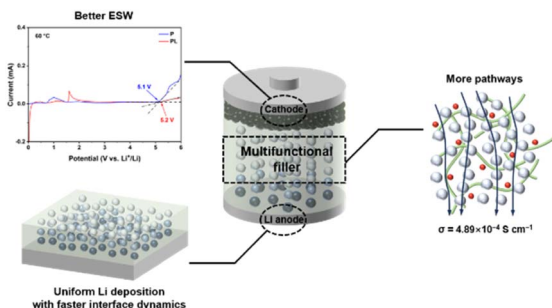
26833



Harnessing waste PET bottles for sustainable Ca-MOF synthesis: a high-efficiency adsorbent for uranium and thorium

Manish Sharma, Anshika, Priya Sharma, Vikash Chandra Janu and Ragini Gupta*

26848



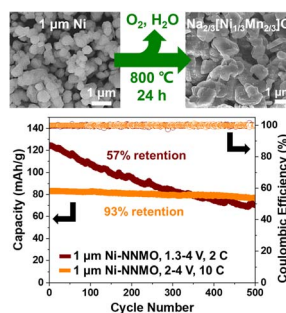
Utilizing Li₄Ti₅O₁₂ as multifunctional filler in composite solid electrolyte for all-solid-state lithium metal battery

Yubo Xu, Xiaosong Xiong, Jun Peng, Qi Zhou, Wenzhuo Wu, Wanjie Gao, Yi Peng, Tao Wang,* Faxing Wang and Yuping Wu*



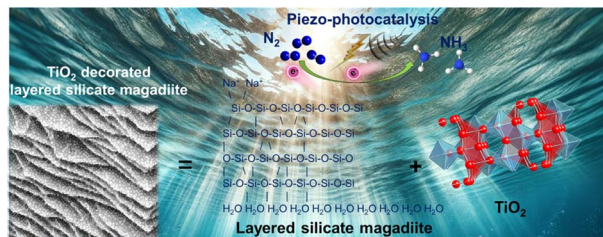
Jintao Fu, Mohamed H. Hassan, Jiaxin Liu,
Hyeongjun Koh, Alexander K. Ng, Chiara Bruzzi,
John S. Corsi and Eric Detsi*

Jintao Fu, Mohamed H. Hassan, Jiaxin Liu,
Hyeongjun Koh, Alexander K. Ng, Chiara Bruzzi,
John S. Corsi and Eric Detsi*



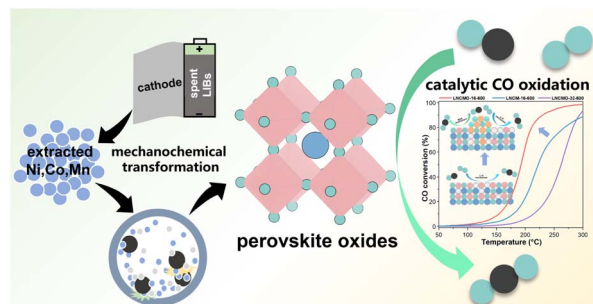
Ke-Chun Ma, Hsun-Yen Lin, Yu-Ching Chen,
Cheng-Hsi Tsai, Kai-Han Zheng and Jyh Ming Wu*

Ke-Chun Ma, Hsun-Yen Lin, Yu-Ching Chen,
Cheng-Hsi Tsai, Kai-Han Zheng and Jyh Ming Wu*



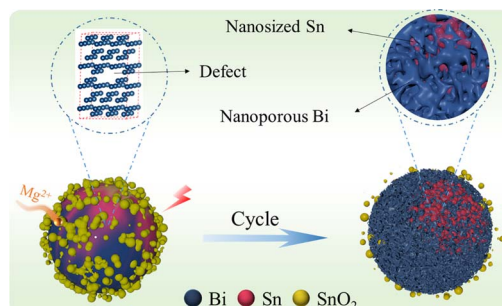
Guangze Nie, Xiangqian Du, Hongchao Yu, Weiye Fan,
Min Pan, Fei Gao, Feng Wu, Yunchuan Hong,
Hongjian Tang, Zhihao Zhou, Guoshu Deng, Lin Li,
Zhenkun Sun* and Lunbo Duan*

Guangze Nie, Xiangqian Du, Hongchao Yu, Weiye Fan,
Min Pan, Fei Gao, Feng Wu, Yunchuan Hong,
Hongjian Tang, Zhihao Zhou, Guoshu Deng, Lin Li,
Zhenkun Sun* and Lunbo Duan*

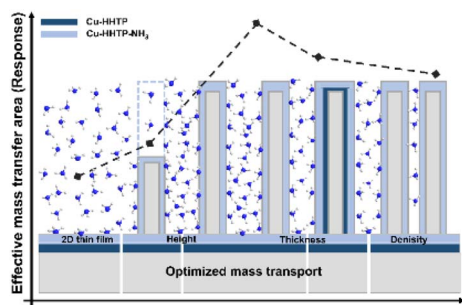


Dachong Gu, Yuan Yuan,* Xianhao Peng, Dajian Li,
Liang Wu, Guangsheng Huang, Jingfeng Wang
and Fusheng Pan

Dachong Gu, Yuan Yuan,* Xianhao Peng, Dajian Li,
Liang Wu, Guangsheng Huang, Jingfeng Wang
and Fusheng Pan



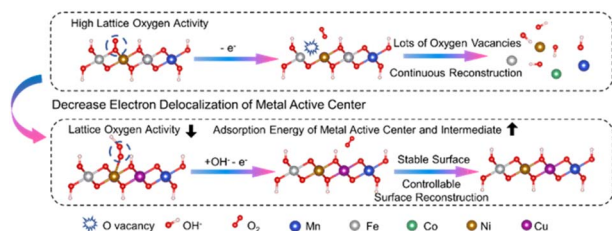
26902



Mass transport control over a conductive MOF 3D thin film to improve gas sensing

Yu Pan, Wei Sun, Junxiang Chen, Yuan Lin, Yong-Jun Chen,* Zhenhai Wen* and Gang Xu*

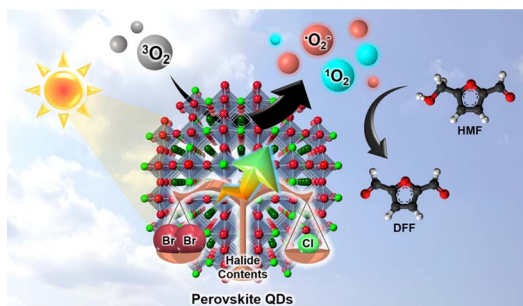
26909



Restricting the over-oxidation of active sites in high-entropy electrocatalysts towards ultra-stabilized oxygen evolution in alkaline water electrolysis

Yimin Zhang, Jianli Kang,* Haonan Xie, Hongxia Yin, Zhijia Zhang, Yuhua Ma, Guangxin Sun, Enzo Liu, Liying Ma, Biao Chen, Junwei Sha, Lihua Qian, Wenbin Hu, Chunnian He and Naiqin Zhao*

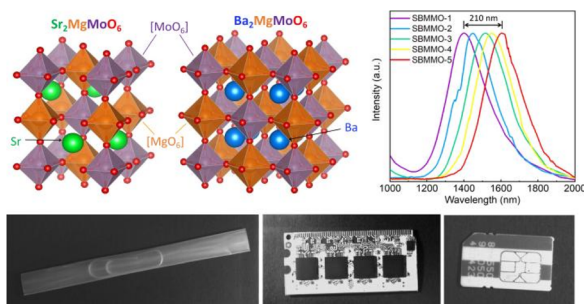
26920



Photocatalytic conversion of 5-hydroxymethylfurfural using mixed halide perovskite MAPbBr_xCl_{3-x} quantum dots

Jaemin Han, Hangil Lee* and Hyun Sung Kim*

26929



Long-wavelength near-infrared light emitting Ni²⁺-doped double perovskite molybdate-based solid-solution phosphors

Fengmei Zhu, Yuan Gao* and Jianbei Qiu*

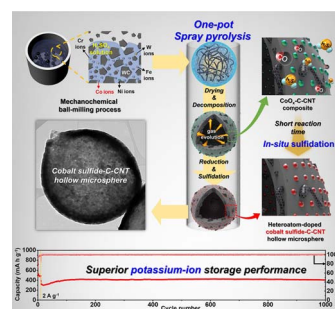


PAPERS

26939

One-pot spray pyrolysis method for nanostructured cobalt sulfide–C composite microspheres using recovered cobalt sulfuric acid solution and their excellent properties as anode materials for potassium-ion batteries

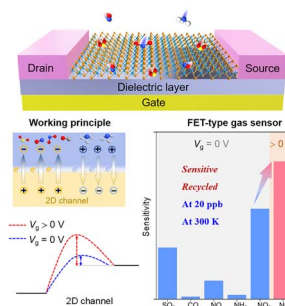
Yeong Beom Kim, A Yeon Jo, Seulgi Kim, Seungjo Jeong, Yun Chan Kang,* Dongju Lee* and Gi Dae Park*



26951

An ultra-sensitive and recyclable FET-type toxic gas sensor based on WTe₂ monolayers

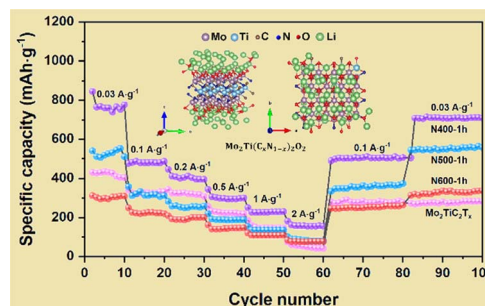
Mi-Mi Dong, Hang He, Ming-Wen Zhao,* Chuan-Kui Wang* and Xiao-Xiao Fu*



26962

Achieving high electrical conductivity, energy storage capacity and cycling stability in ammoniated Mo₂TiC₂T_x MXenes as an anode for lithium-ion batteries

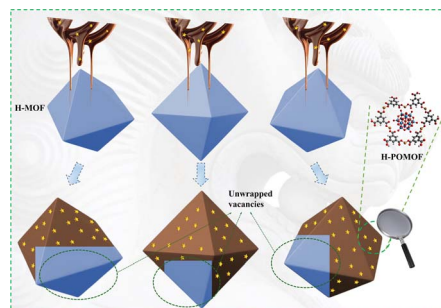
Jingya Liu, Xin Xu, Hongkang Wang, Peng-Fei Wang, Kai Wu, Yonghong Cheng* and Bing Xiao*



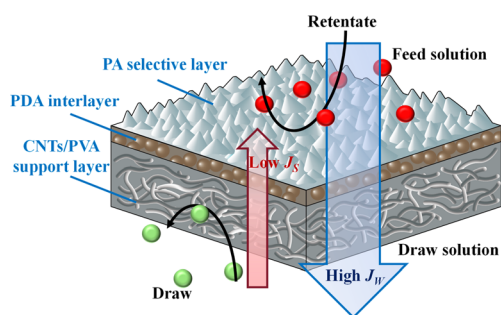
26980

Characterization, oxidative desulfurization performance evaluation and the catalytic reaction mechanism of polyoxometalate-coated, semi-encapsulated heart-shaped metal organic frameworks

Zhengxiang Sun and Rui Wang*



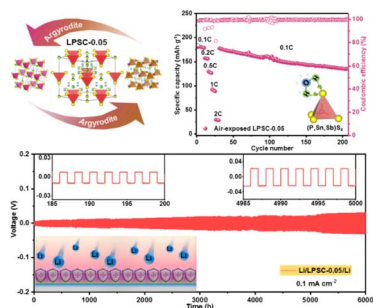
26999



An ultrathin support layer based on carbon nanotubes/polyvinyl alcohol for forward osmosis membranes with outstanding water flux

Hsi-Yuan Juan, Shivam Gupta, Chi-Young Lee, Yi-Ting Lai* and Nyan-Hwa Tai*

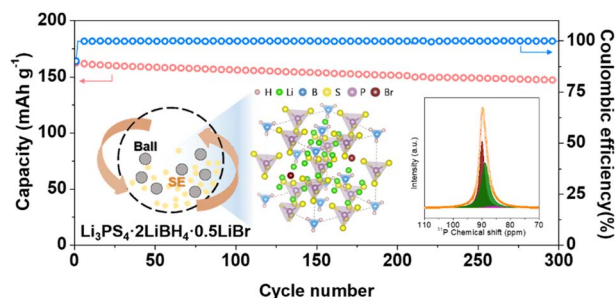
27011



High performance P-based argyrodite sulfide electrolytes enabled by Sb-based argyrodite doping for all-solid-state lithium metal batteries

Zhihui Ma, Ping Li,* Jie Shi, Feng Sun, Yidi Fu, Zhen Wang, Yixing Fang, Junmei Han and Xuanhui Qu

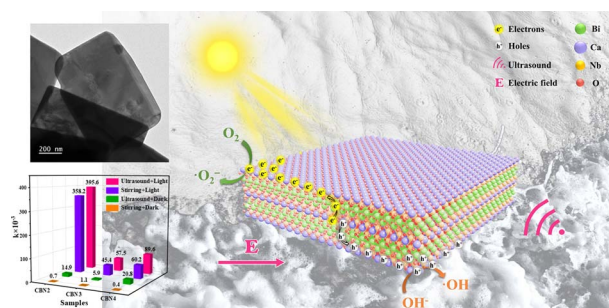
27022



Enhancement of ionic conductivity in Li argyrodite solid electrolytes with bromide and borohydride anions for all-solid-state batteries

Hyungeun Seo, Yong-Jin Jang, Jaeseong Yoo, Ji-Hoon Han, Young-Su Lee, Jae Yup Jung, Soeun Lee, Kyung-Woo Yi, Young Whan Cho, Woosuk Cho* and Jae-Hun Kim*

27031



Ultra-high piezo-photocatalytic performance of (Na, Sm) co-doped CaBi₂Nb₂O₉ nanoplates by the surface effect

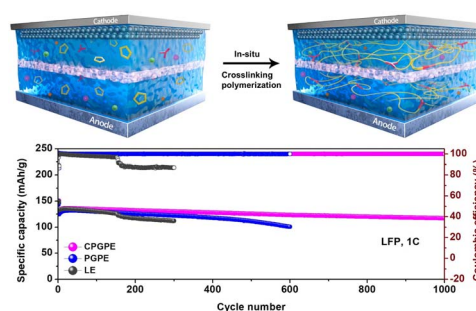
Qiuyan Yi, Xiaogang Luo, Xuefan Zhou, Yan Zhao, Qiong Liu, Qiwei Sun, Hang Luo* and Dou Zhang*



27043

Synthesis of a crosslinked ether-based polymer for high-performance semi-solid lithium metal batteries *via in situ* integration

Dezhi Yang, Yanan Yang, Yeying Cui, Yiyang Sun and Tao Zhang*



27053

Low-temperature ionothermal polymerization of phenazine-based small molecules towards ultrastable and high-capacity anodes of aqueous alkaline sodium-ion batteries

Xiaorong Yan, Mingjun Hu,* Guoqing Zhao, Chuanguang Wu, Rui Li, Xinyu Wang, Haiping Yu, Zhihui Wang, Bei Wang, Yuxin Hao, Jingru Liu, Yilan Wu* and Jun Yang*

