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Journal of Materials Chemistry A

Materials for energy and sustainability

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IN THIS ISSUE

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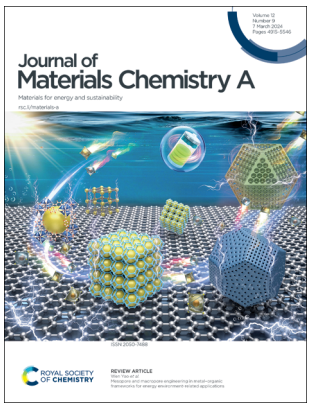


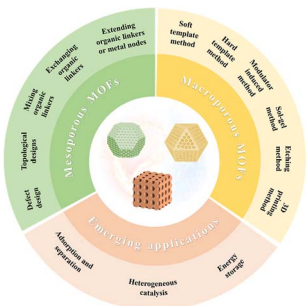
Cover
See Wen Yao *et al.*, pp. 4931–4970. Image reproduced by permission of Wen Yao from *J. Mater. Chem. A*, 2024, **12**, 4931.

REVIEWS

4931

Mesopore and macropore engineering in metal–organic frameworks for energy environment-related applications

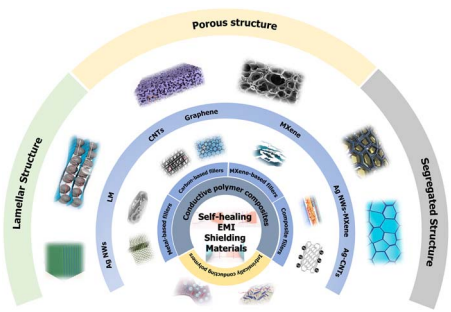
Yu Xin, Yue Cao, Jie Yang, Xinrong Guo, Kui Shen and Wen Yao*



4971

Structural design underpinning self-healing materials for electromagnetic interference shielding: coupling of dynamic polymer chemistry and electrical conductivity

Yu Meng, Tong Liu, YongQiang Jia, ZuSheng Hang, JianHua Xu* and JiaJun Fu*



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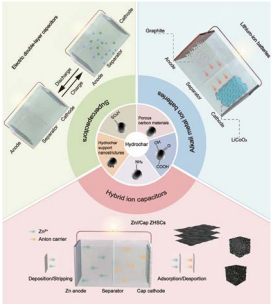
REVIEWS

4996

Sustainable hydrothermal carbon for advanced electrochemical energy storage

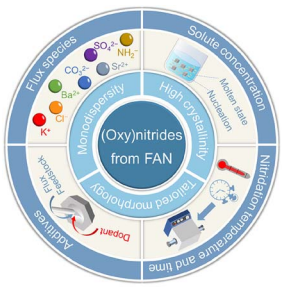
Xuesong Zhang,* Tianqi Cao, Guanyu Zhang, Quan Liu, Ge Kong, Kejie Wang, Yuan Jiang, Xin Zhang and Lujia Han*



5040

Nanostructured (oxy)nitrides controllably synthesized by flux-assisted nitridation for promoted photocatalytic water splitting

Zhongxu Yuan, Chunjiang Liu, Shanshan Chen* and Fuxiang Zhang*

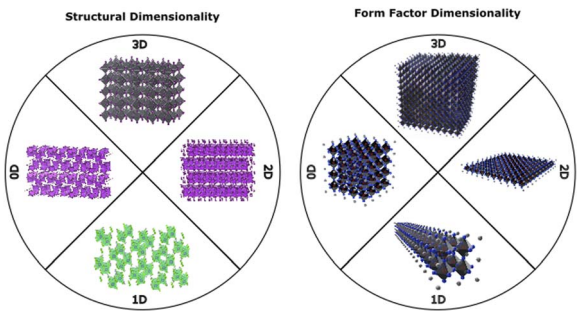


FAN: Flux-assisted nitridation

5055

Two-dimensional complex metal halides: influence of restricted dimensionality on functional properties

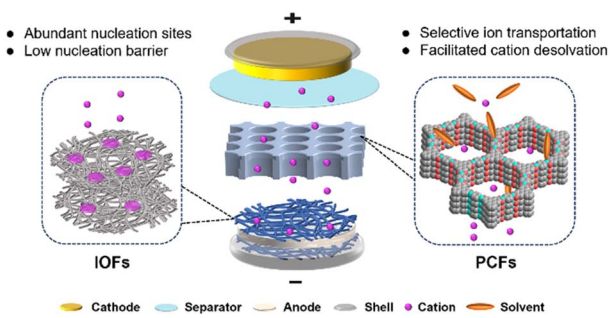
Charles Chen, Jianwei Xu,* Xizu Wang* and Robert G. Palgrave*



5080

Interfacial chemistry regulation using functional frameworks for stable metal batteries

Yaohui Huang, Jiarun Geng, Tong Zhang, Zhuoliang Jiang, Hengyi Fang, Wei Hu and Fujun Li*



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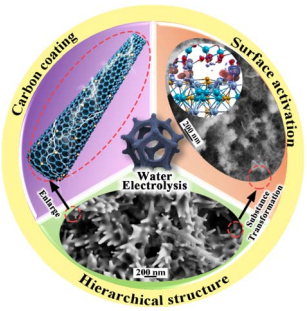
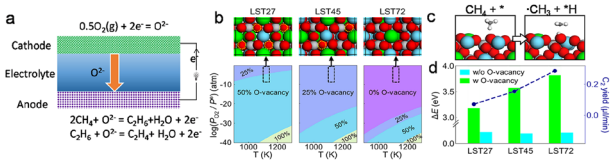


Ultra-thin carbon layer encapsulated NiCoP coralline-like catalysts for efficient overall water electrolysis

Haobo Liu, Yuqi Zhang, Jiancheng Li, Riyue Ge,* Julie M. Cairney, Rongkun Zheng, Sean Li, Bin Liu,* Liming Dai, Ting Liao* and Wenxian Li*

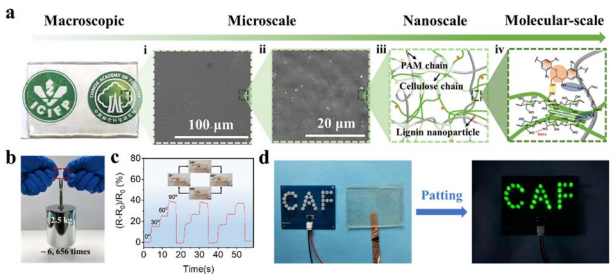
5115



Enhancing electrochemical methane coupling in solid oxide cells by tuning oxygen species in the catalyst

Xiaoyong Xu,* Haobo Li, Xu Han and Yao Zheng*

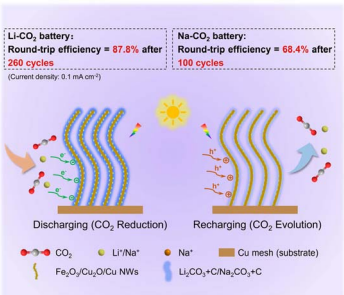
5124



Biomimicking natural wood to fabricate isotropically super-strong, tough, and transparent hydrogels for strain sensor and triboelectric nanogenerator applications

Yitong Xie, Xiaoyu Shi, Shishuai Gao, Chenhuan Lai, Chuanwei Lu, Yuxiang Huang, Daihui Zhang,* Shuangxi Nie,* Feng Xu* and Fuxiang Chu

5133



Type-II heterojunction photocathode for CO_2 reduction and light-assisted metal–CO_2 batteries

Yanbin Zhu, Yan Wei, Peize Li, Shujie Liu, Jiandong Zhang, Liyuan Tian, Pengkun Gao, Yali Zhang, Jie Li, Deyu Wang, Yan Shen* and Mingkui Wang*

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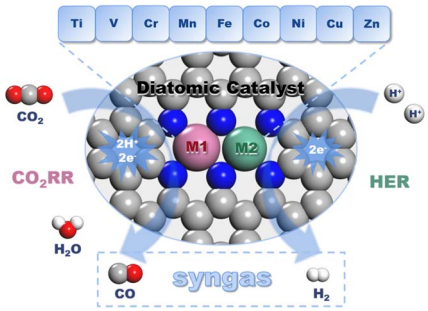
5145

Computational screening of a promising diatomic catalyst for CO_2 electroreduction to syngas

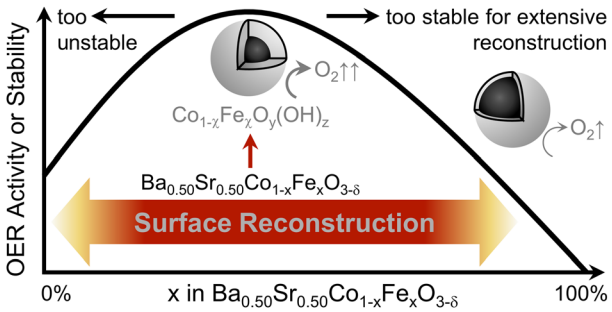
Lipan Luo, Zhou Huang and Qing Tang*



5156

Delving into Fe-content effects on surface reconstruction of $Ba_{0.50}Sr_{0.50}Co_{1-x}Fe_xO_{3-\delta}$ for the oxygen evolution reaction

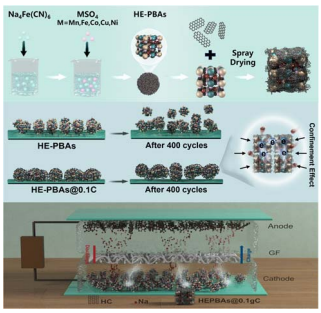
Dino Aegerter,* Emiliana Fabbri,* Mario Borlaf, Nur Sena Yüzbasi, Nataša Diklić, Adam H. Clark, Vladyslav Romankov, Cinthia Piamonteze, Jan Dreiser, Thomas Huthwelker, Thomas Graule and Thomas J. Schmidt



5170

High-entropy prussian blue analogs with 3D confinement effect for long-life sodium-ion batteries

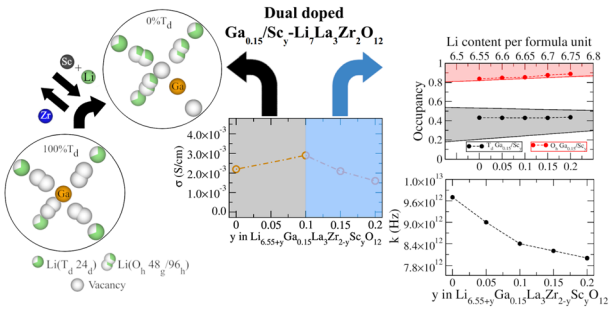
Yichao Wang, Ning Jiang, Cheng Yang, Jiahe Liu, Shouyu Sun, Xinyu Wang, Jianhua Yang and Yu Liu*



5181

A data-mining approach to understanding the impact of multi-doping on the ionic transport mechanism of solid electrolytes materials: the case of dual-doped $Ga_{0.15}/Sc_y$ $Li_7La_3Zr_2O_{12}$

Henry A. Cortés,* Mauricio R. Bonilla, Herbert Früchtl, Tanja van Mourik, Javier Carrasco and Elena Akhmatskaya



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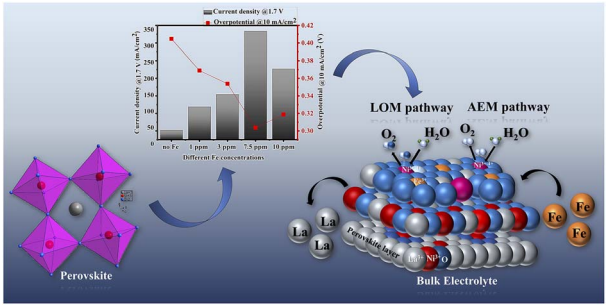
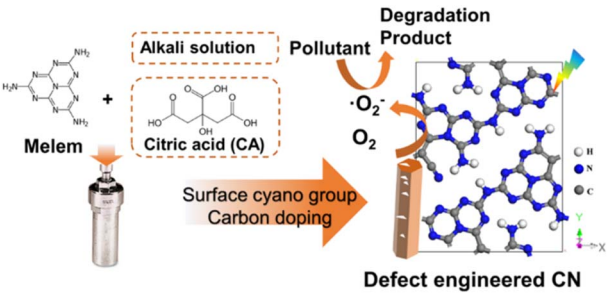


Deciphering the role of Fe impurities in the electrolyte boosting the OER activity of $LaNiO_3$

Haritha Cheraparambil, Miquel Vega-Paredes, Yue Wang, Harun Tüysüz, Christina Scheu and Claudia Weidenthaler*

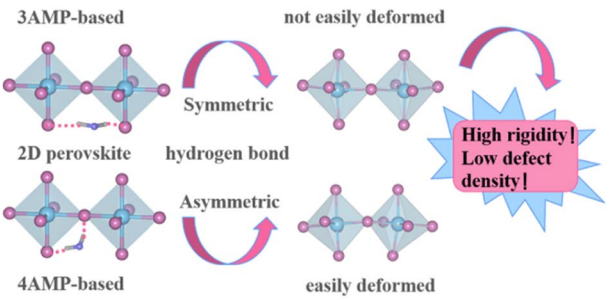
5204



One-pot synthesis of defect engineered carbon nitride for highly efficient visible light photocatalysis

Xuying Li, Haoxin Mai,* Xingdong Wang, Zongli Xie, Junlin Lu, Xiaoming Wen, Salvy P. Russo, Dehong Chen* and Rachel A. Caruso*

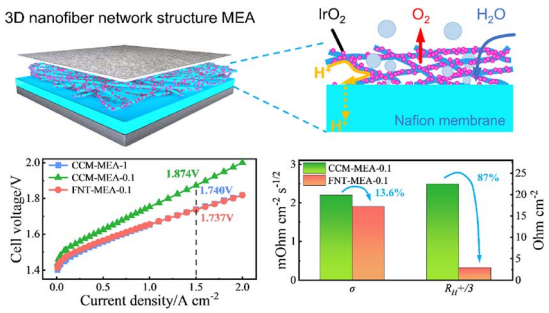
5215



Effect of the rigidity of an organic interlayer on the nonradiative recombination and exciton dissociation in hybrid Dion–Jacobson 2D lead iodide perovskites

Kexuan Sun, Yuanyuan Meng,* Ruikun Cao, Yumin Ren, Yuhong Mao, Ruijia Tian, Yaohua Wang, Xujie Lü, Chang Liu* and Ziyi Ge*

5225



A 3D nanofiber network anode expediting mass and proton transport to boost proton exchange membrane water electrolysis

Maolin Geng, Zhenlan Dou, Hao Zhao, Qiansen Wang, Chunyan Zhang, Zhiqing Zou, Jun Li,* Hui Yang and Qingqing Cheng*

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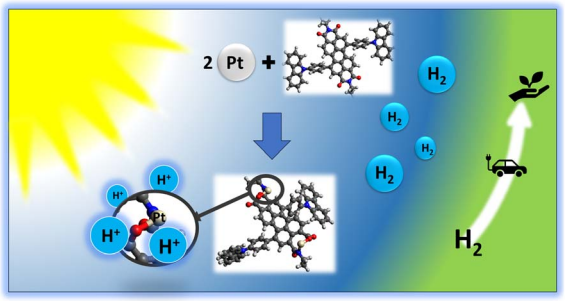
5233

Photochemical transformation of a perylene diimide derivative beneficial for the *in situ* formation of a molecular photocatalyst of the hydrogen evolution reaction

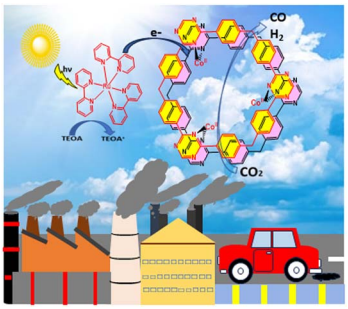
Estera Hoffman, Karol Kozakiewicz, Małgorzata Rybczyńska, Michał Mońka, Daria Grzywacz, Beata Liberek, Piotr Bojarski and Illia E. Serdiuk*



5244

Single-site cobalt catalyst embedded in a covalent triazine-based framework (CTF) for photocatalytic CO_2 reduction

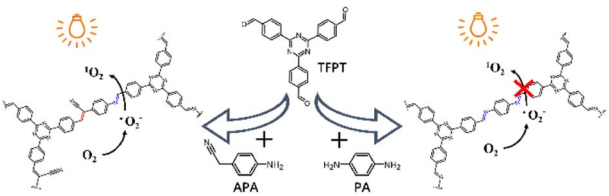
Anupam Jana, Arijit Maity, Abhimanyu Sarkar, Bibhutibhushan Show, Preeti A. Bhobe and Asamanjoy Bhunia*



5254

One-step synthesis of a highly crystalline covalent organic framework with olefin and imine dual linkages for tuning the catalytic activity

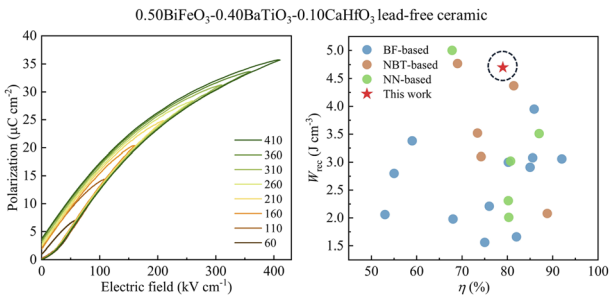
Qing Sun, Shaodong Jiang, Hongyun Niu, Ying Li, Xiaodong Wu, Yali Shi and Yaqi Cai*



5261

Superior energy storage performance of $BiFeO_3$–$BaTiO_3$–$CaHfO_3$ lead-free ceramics

Jianwei Zhao,* Hongtian Li, Yuxiao Du, Xiaoxin Chen, Hailan Qin, Jinming Wang, Tingnan Yan, Shuhui Yu, Yongming Hu* and Dawei Wang*



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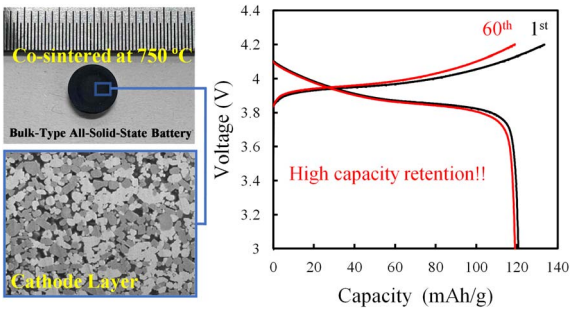
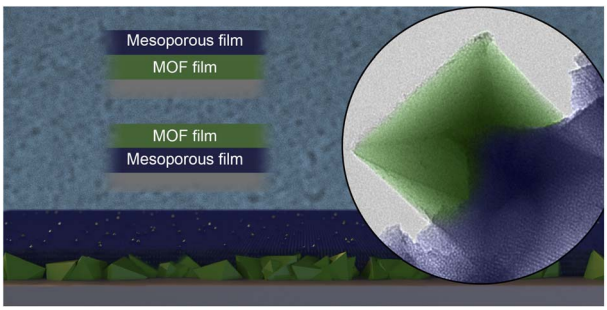


Co-sintering a cathode material and garnet electrolyte to develop a bulk-type solid-state Li metal battery with wide electrochemical windows

Naohiro Hayashi,* Ken Watanabe* and Kengo Shimanoe

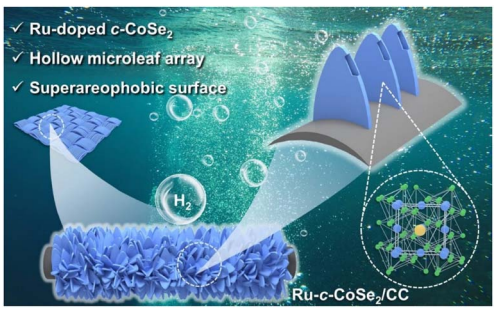
5282



Design, synthesis and characterization of hierarchical porous stacked thin films based on MOFs and ordered mesoporous oxides

Melina Arcidiácono, Juan A. Allegretto, Omar Azzaroni, Paula C. Angelomé* and Matías Rafti*

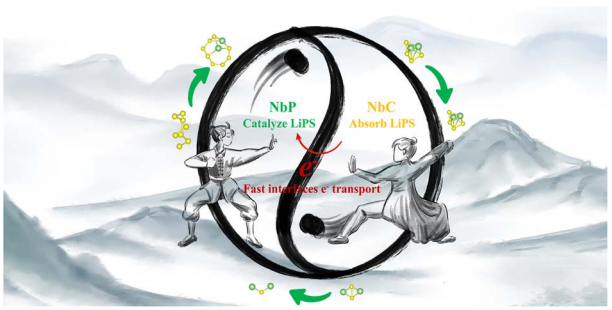
5294



Fabrication of superaerophobic Ru-doped c-$CoSe_2$ for efficient hydrogen production

Yujie Wei, Jianying Wang, Yahang Shang, Chang Lv, Xiaoyang He, Tao Wang, Zuofeng Chen, Lvlv Ji* and Sheng Wang*

5307



Regulating the interfacial electric field of NbP–NbC heterostructures to efficiently inhibit polysulfide shuttling in Li–S batteries

Tao Ren, Xinyuan Wang, Nannan Wang, Dan Huang, Yanqiu Zhu, Pei Kang Shen and Jinliang Zhu*

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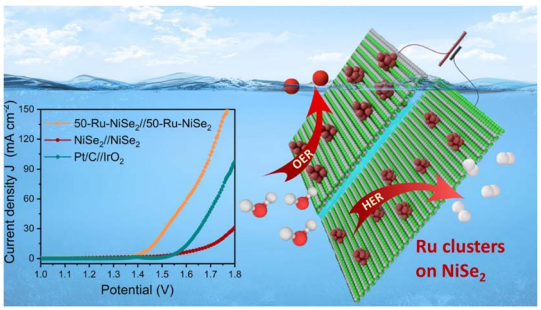
5319

Electrosynthesis of ruthenium nanocluster incorporated nickel diselenide for efficient overall water splitting

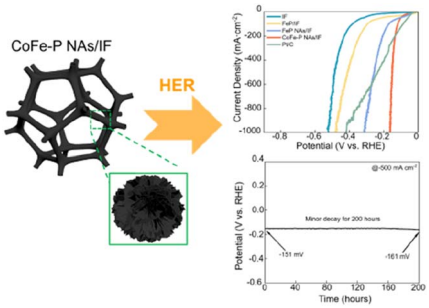
Vipin Yadav, Megha, Prasenjit Sen* and M. M. Shaijumon*



5331

Self-supported iron-based bimetallic phosphide catalytic electrode for efficient hydrogen evolution reaction at high current density

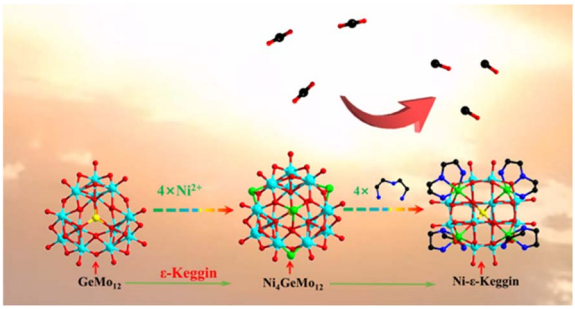
Ziteng Zuo, Xian Zhang, Ouwen Peng, Lianwei Shan, Shengling Xiang, Qing Lian, Ningxue Li, Guojun Mi, Abbas Amini and Chun Cheng*



5340

Self-assembled novel Co/Ni-based ε-Keggin crystal materials as highly efficient photocatalysts for diluted CO_2 photoreduction

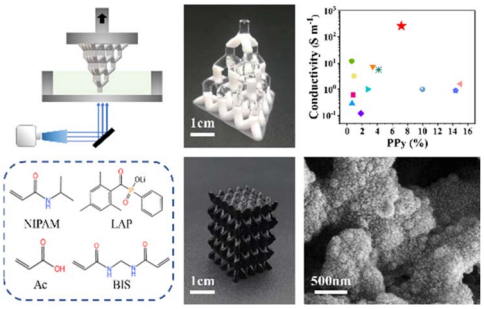
Yin-Hua Zhu, Jian-Bo Yang, Pin-Fang Yan, Zhi-Ming Dong, Hua Mei* and Yan Xu*



5348

DLP 3D printing of electrically conductive hybrid hydrogels *via* polymerization-induced phase separation and subsequent *in situ* assembly of polypyrrole

Chuhan Song, Qian Zhao, Tao Xie and Jingjun Wu*



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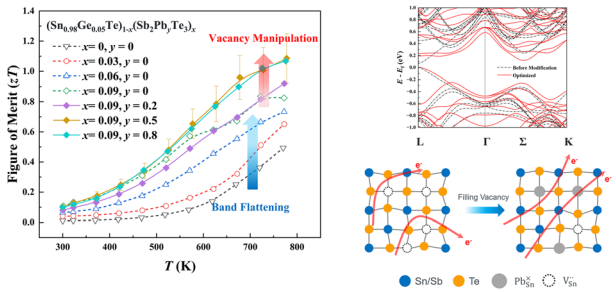
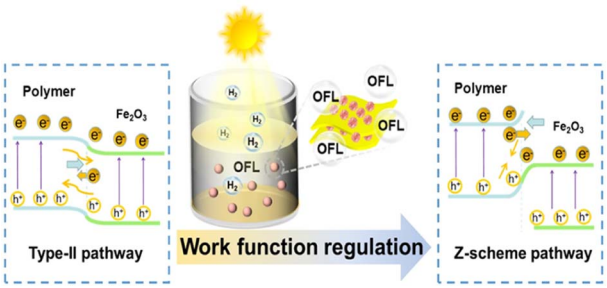


Band and vacancy engineering in SnTe to improve its thermoelectric performance

Zan Yang, Evan Smith, Yu-Chih Tseng, Kamil Ciesielski, Sergei Novikov, Thomas Kalab, Yuyang Huang, Eric Toberer and Yurij Mozharivskyj*

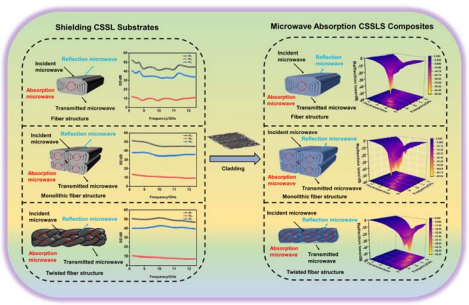
5366



Z-scheme charge transfer between a conjugated polymer and α-Fe_2O_3 for simultaneous photocatalytic H_2 evolution and ofloxacin degradation

Ziheng Xiao, Jie Xiao, Luxi Yuan, Minhua Ai,* Faryal Idrees, Zhen-Feng Huang, Chengxiang Shi, Xiangwen Zhang, Lun Pan and Ji-Jun Zou*

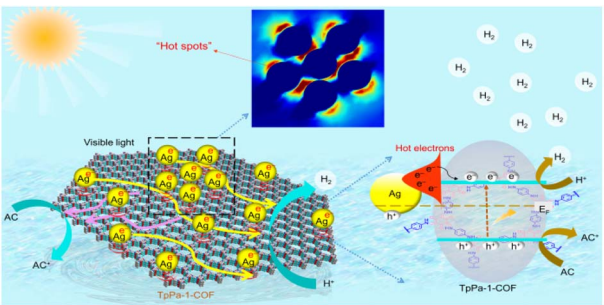
5377



Fiber, monolithic fiber and twisted fiber structures: efficient microwave absorption *via* surface-modified carbon nanotube buckypaper/silicon carbide-based self-sealing layered composites

Siyu Guo, Yanzhi Cai,* Laifei Cheng, Shaohua Huang, Tingting Liu, Haiming Yu, Dengpeng Chen, Yuhan Wang, Zhongyi Hu and Yuan Zhou

5392



Insights into the plasmonic "hot spots" and efficient hot electron injection induced by Ag nanoparticles in a covalent organic framework for photocatalytic H_2 evolution

Lihua Zhang, Xu Lu, Jiaqi Sun, Cunxia Wang and Pengyu Dong*

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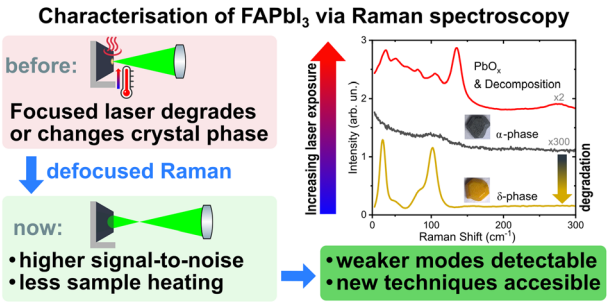
5406

Direct observation of phase transitions between delta- and alpha-phase $FAPbI_3$ *via* defocused Raman spectroscopy

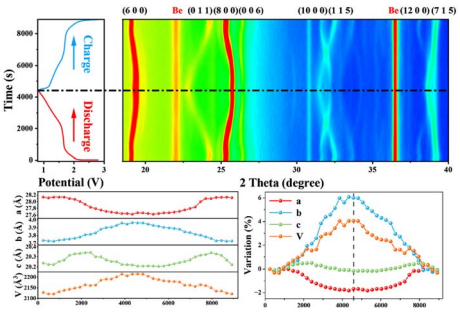
Bernd K. Sturdza, Benjamin M. Gallant, Philippe Holzhey, Elisabeth A. Duijnstee, Marko W. von der Leyen, Harry C. Sansom, Henry J. Snaith, Moritz K. Riede and Robin J. Nicholas*



5414

Wadsley–Roth phase $CoNb_{11}O_{29}$ as a high-performance anode for lithium-ion batteries

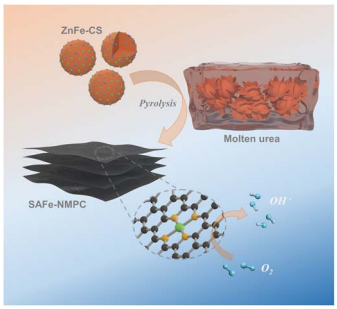
Huaibing Liu and Chunhua Chen*



5422

Urea with trifunctional effects: an assistant for high exposure of single-atom active sites on 2D nanosheets *via* structural transformation

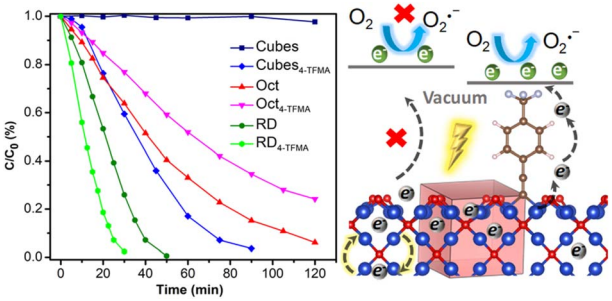
Xieyiming Dong, Hongyin Xia, Ruoyu Pang, Erkang Wang and Jing Li*



5429

Photocatalytic activity enhancement with 4-trifluoromethylphenylacetylene-functionalized Cu_2O cubes and rhombic dodecahedra from band structure modulation and use in boronic acid hydroxylation

Kuo-Chang Chien, Wei-Yang Yu, Jui-Cheng Kao, Yu-Chieh Lo,* Jyh-Pin Chou* and Michael H. Huang*



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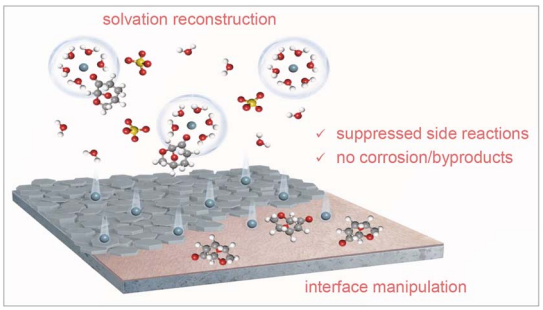
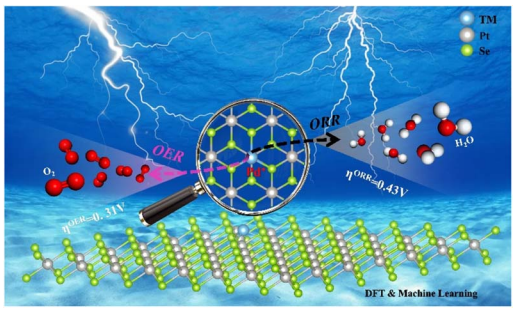
5439



Solvation configuration and interfacial chemistry regulation *via* a bio-based Cyrene additive for highly reversible zinc anodes

Chang Li, Yang Song, Ning Gao, Can Ye, Xuebing Xu, Weisheng Yang and Chaoquan Hu*

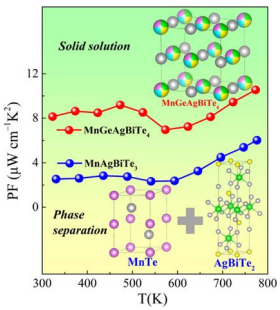
5451



Rational design of single transition-metal atoms anchored on a $PtSe_2$ monolayer as bifunctional OER/ORR electrocatalysts: a defect chemistry and machine learning study

Shijiao Yue, Dongying Li, Aodi Zhang, Yuli Yan, Hongxia Yan, Zhenzhen Feng* and Wentao Wang*

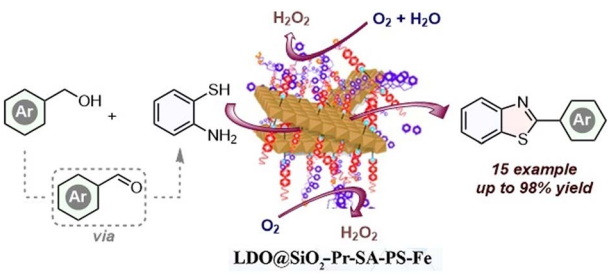
5464



Large effective mass and ultralow thermal conductivity lead to high thermoelectric performance in the high-entropy semiconductor $MnGeAgBiTe_4$

Yuxia Tang,* Wenjie Shu, Bingwen Su, Aijun Hong, Wenjing Zhai, Juan Li, Guanzhong Zhou, Lin Lin, Xiaohui Zhou, Zhibo Yan,* Qian Zhang and Jun-Ming Liu

5474



Synthesis of benzothiazoles using an iron-anchored polysulfonamide modified layered double oxide/sodium alginate nanocomposite

Ramin Ghiai, Sedigheh Alavinia, Ramin Ghorbani-Vaghei,* Ardeshir Khazaei, Rahman Karimi-Nami and Idris Karakaya

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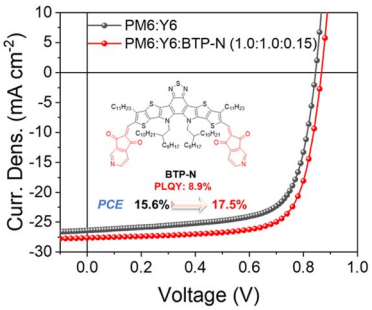
5493

A highly fluorescent pyridine-ended Y6 derivative as a third component for organic solar cells

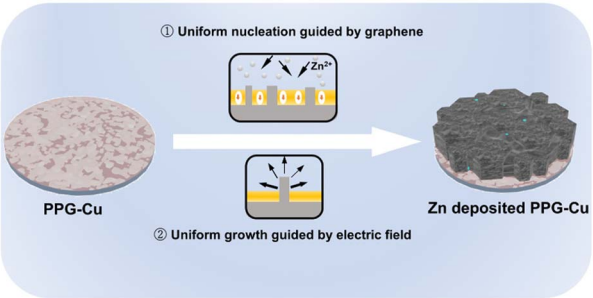
Yu Qiao, Xuan Liu, Yang Li, Xin Guo* and Can Li*



5499

Interfacial design towards stable zinc metal-free zinc-ion batteries with high energy density

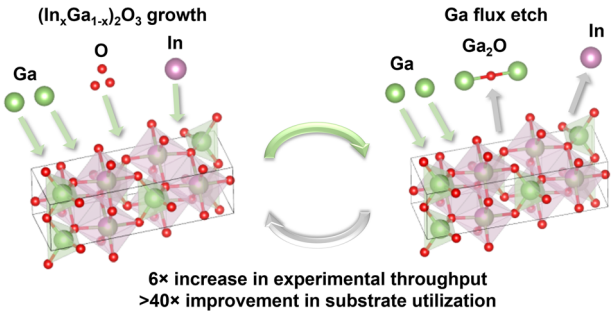
Ting Xiong, Deqiang Zhang, Jing Ying Yeo, Yufeng Zhan, Yong Kang Ong, Carlos Maria Alava Limpo, Lu Shi, Yifan Rao, Yanhui Pu, Wenhui Lai, Jonghak Lee, Wee Siang Vincent Lee and Barbaros Özyilmaz*



5508

Rapid screening of molecular beam epitaxy conditions for monoclinic $(In_xGa_{1-x})_2O_3$ alloys

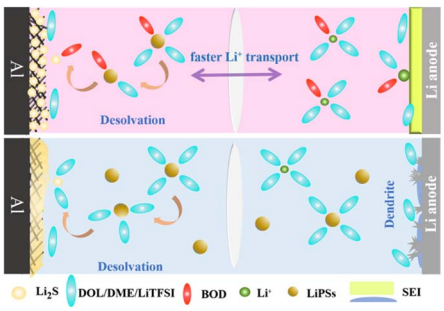
Stephen Schaefer,* Davi Febba, Kingsley Egbo, Glenn Teeter, Andriy Zakutayev and Brooks Tellekamp*



5520

An electrolyte additive of bromoxoindole enables uniform Li-ion flux and tunable Li_2S deposition for high-performance lithium–sulfur batteries

Jinxuan Zou, Pengxuan He, Yufang Zhang, Dong Cai,* Shuo Yang,* Ying He, Yangyang Dong, Kuikui Xiao, Xuemei Zhou, Huagui Nie and Zhi Yang*



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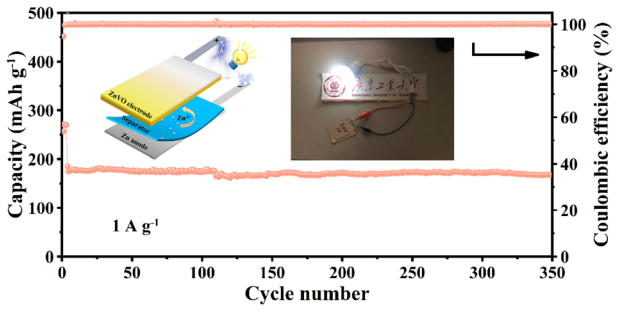
5530



V_4C_3 MXene-derived $Zn_{0.99}V_5O_{12}\cdot nH_2O$ nanoribbons as advanced cathodes for ultra-long life aqueous zinc-ion batteries

Wenhai Xiao, Shenghong Yang, Rui Jiang, Qiaofeng Huang, Xiaoyan Shi, Yuen Hong Tsang, Lianyi Shao* and Zhipeng Sun*

CORRECTIONS

5540

Correction: An oriented Ni–Co-MOF anchored on solution-free 1D CuO: a p–n heterojunction for supercapacitive energy storage

Iftikhar Hussain, Sarmad Iqbal, Tanveer Hussain, Yatu Chen, Muhammad Ahmad, Muhammad Sufyan Javed, Akram AlFantazi and Kaili Zhang*

5542

Correction: An *in situ* growth route towards anti-perovskite Ni_3InN nanoparticles embedded within amorphous silicon nitride

Shotaro Tada, Sakurako Takazawa, Norifumi Asakuma, Maxime Cheype, Sawao Honda, Ravi Kumar, Samuel Bernard and Yuji Iwamoto*

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