

# Journal of Materials Chemistry A

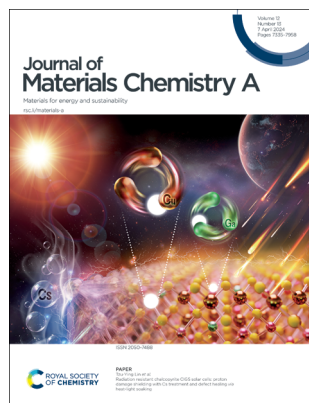
Materials for energy and sustainability

[rsc.li/materials-a](https://rsc.li/materials-a)

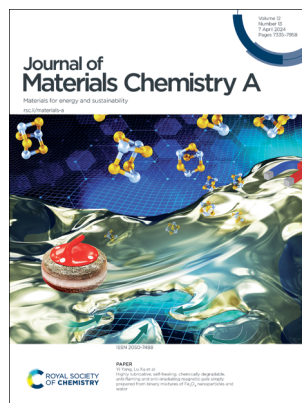
The Royal Society of Chemistry is the world's leading chemistry community. Through our high impact journals and publications we connect the world with the chemical sciences and invest the profits back into the chemistry community.

## IN THIS ISSUE

ISSN 2050-7488 CODEN JMCAET 12(13) 7335–7958 (2024)



**Cover**  
See Tzu-Ying Lin *et al.*, pp. 7536–7548. Image reproduced by permission of Tzu-Ying Lin from *J. Mater. Chem. A*, 2024, 12, 7536.



**Inside cover**  
See Yi Yang, Lu Xu *et al.*, pp. 7549–7563. Image reproduced by permission of Lu Xu from *J. Mater. Chem. A*, 2024, 12, 7549.

## REVIEWS

7351

### Scope, evaluation and current perspectives of MXene synthesis strategies for state of the art applications

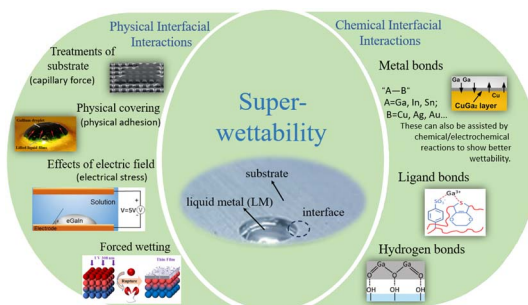
Muhammad Zeeshan Abid, Khezina Rafiq,\* Anam Aslam, Rongchao Jin and Ejaz Hussain\*



7396

### Interfacial interaction-induced super-wettability of gallium-based liquid metals: a review

Yiran Wang and Yibing Xie\*



# Royal Society of Chemistry approved training courses

Explore your options.  
Develop your skills.  
Discover learning  
that suits you.

**Courses in the classroom,  
the lab, or online**

Find something for every  
stage of your professional  
development. Search our  
database by:

- subject area
- location
- event type
- skill level

Members **get at least 10% off**

Visit [rsc.li/cpd-training](https://rsc.li/cpd-training)



**SAVE  
10%**

## REVIEWS

7418

### Critical review of the recent progress and challenges of polyanion $\text{Na}_3\text{V}_2(\text{PO}_4)_3$ cathode materials in rechargeable sodium-ion batteries

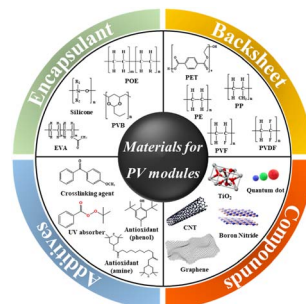
Ranjit S. Kate, Harsharaj S. Jadhav, Ujjwala P. Chothe, Kaustav Bhattacharjee, Milind V. Kulkarni, Ramesh J. Deokate,\* Bharat B. Kale\* and Ramchandra S. Kalubarme\*



7452

### Recent developments of polymer-based encapsulants and backsheets for stable and high-performance silicon photovoltaic modules: materials nanoarchitectonics and mechanisms

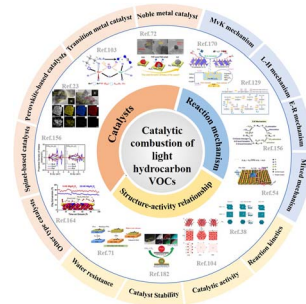
Donggyun Kim, Hyunsoo Lim, Sung Hyun Kim, Kang No Lee, Jungmok You, Du Yeol Ryu\* and Jeonghun Kim\*



7470

### Recent advances and future challenges in the catalytic combustion of light hydrocarbon VOCs

Xiuzi He, Fang Dong,\* Weigao Han, Zhicheng Tang\* and Yong Ding

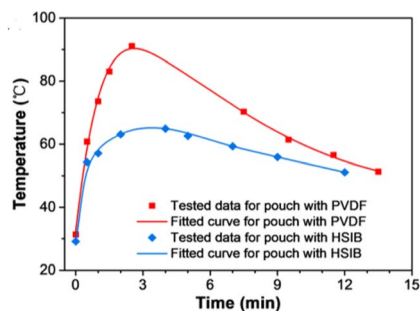


## COMMUNICATIONS

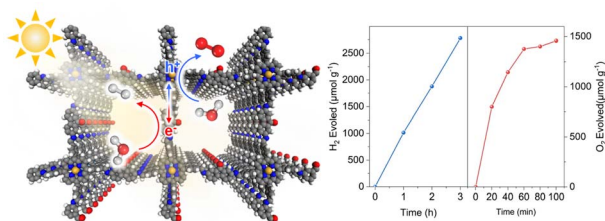
7508

### Novel heat storage ionomer binder for thermal management of Li-ion batteries

Danni Shen, Tingting Han, Jie Liu,\* Junwu Yang, Jinqiu Zhou, Yufei Li, Xi Zhou, Zhenkang Wang, Tao Qian and Chenglin Yan\*



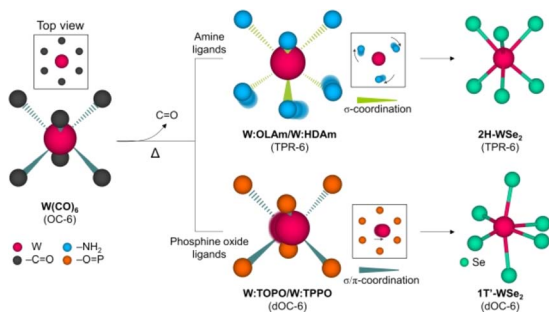
7515



### A dual-functional metalloporphyrin-fluorenone covalent organic framework for solar hydrogen and oxygen production

Zhiwei Xiao, Huyue Wu, Lei Jiao, Xiang Zhang\* and Yaobing Wang\*

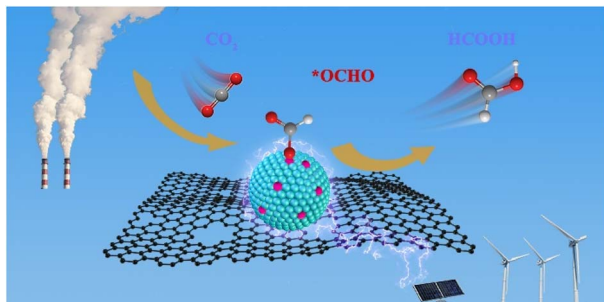
7522



### Unveiling the ligand-mediated phase engineering mechanism in two-dimensional transition metal chalcogenides through coordination geometry control

Sungju Jun, Joo-Won Lee, Sung-Chul Kim, Soong Ju Oh and Sohee Jeong\*

7528

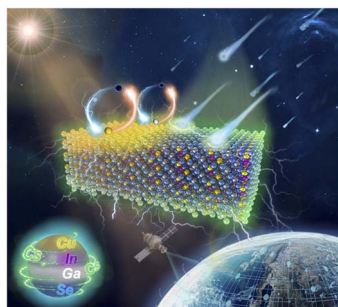


### Modulation of the electronic structure of metallic bismuth catalysts by cerium doping to facilitate electrocatalytic CO<sub>2</sub> reduction to formate

Yangyuan Zhang, Shilong Liu, Nannan Ji, Lingzhi Wei, Qiyang Liang, Jiejie Li, Ziqi Tian,\* Jianwei Su\* and Qianwang Chen\*

PAPERS

7536



### Radiation resistant chalcopyrite CIGS solar cells: proton damage shielding with Cs treatment and defect healing *via* heat-light soaking

Tzu-Ying Lin,\* Chi-Feng Hsieh, Ayaka Kanai, Takahiko Yashiro, Wen-Jing Zeng, Jian-Jie Ma, Sung-Fu Hung and Mutsumi Sugiyama

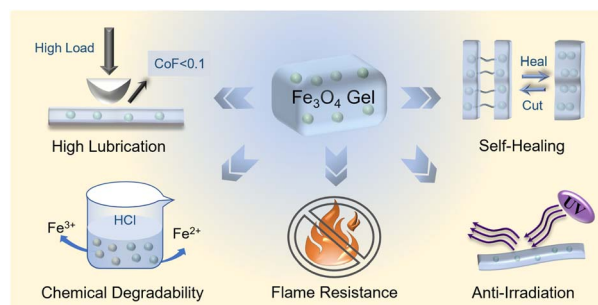




7549

## Highly lubricative, self-healing, chemically degradable, anti-flaming and anti-irradiating magnetic gels simply prepared from binary mixtures of $\text{Fe}_3\text{O}_4$ nanoparticles and water

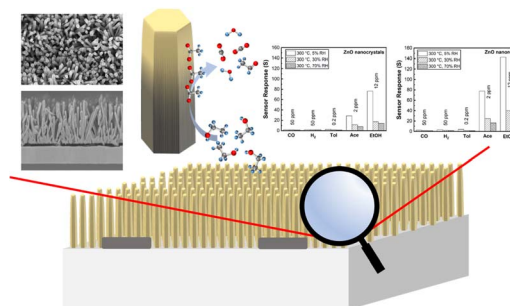
Lulin Hu, Weiyan Yu, Jian Liu, Yi Yang,\* Jingcheng Hao and Lu Xu\*



7564

## Ethanol sensing mechanism of ZnO nanorods revealed by DRIFT spectroscopy and DFT calculations

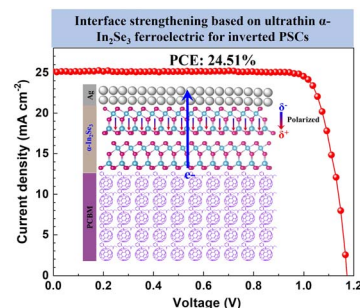
Takeshi Shinkai, Jonas Karl Christopher N. Agutaya,\* Biplab Manna, Matthias Boepple, Masaru Iwai, Keigo Masumoto, Kanako Koga, Koki Kawanami, Yusui Nakamura, Armando T. Quitain, Koichi Suematsu, Yusuke Inomata, Nicolae Barsan and Tetsuya Kida\*



7577

## Strengthened cathode interface using an ultrathin 2D ferroelectric semiconductor for inverted perovskite solar cells

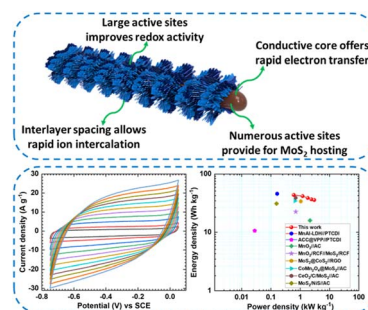
Hua Zhang,\* Weihong Liu, Yongping Bao, Rong Wang, Jianfei Liang, Lei Wan and Huan Wang\*



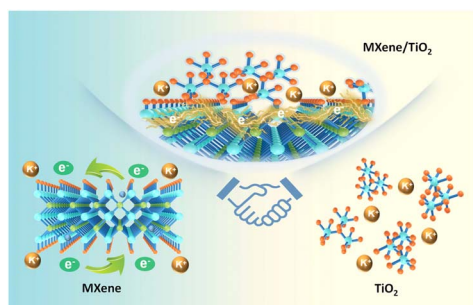
7587

## Extrinsic pseudocapacitive ultrathin 2D $\text{MoS}_2$ nanoflakes clamped on 1D $\text{Sb}_2\text{S}_3$ nanorods: an advanced heterostructured anode for high-energy ammonium ion hybrid capacitors

Supriya J. Marje, Harshitha B. Tyagaraj, Seung-Kyu Hwang, Kugalur Shanmugam Ranjith, Ebrahim Alhajri, Nilesh R. Chodankar,\* Yun Suk Huh\* and Young-Kyu Han\*



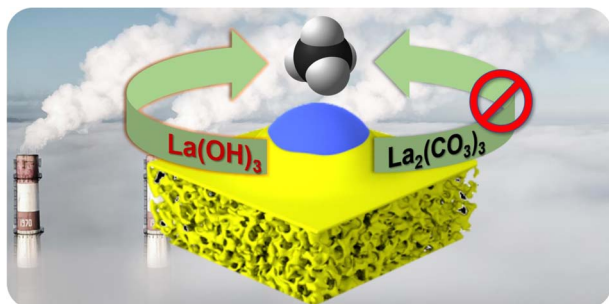
7598



### A 3D crinkled MXene/TiO<sub>2</sub> heterostructure with interfacial coupling for ultra-fast and reversible potassium storage

Xinyue Zhang, Jing Wang, Yuting Jiang, Meng Zhang, Huihua Min, Hao Yang\* and Jin Wang\*

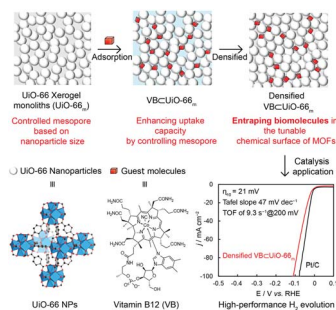
7605



### Uncovering the critical function of lanthanum in CH<sub>4</sub> production from CO<sub>2</sub> using exsolved LaNiO<sub>3</sub> perovskite catalysts

Mathias Barreau,\* Davide Salusso, Jinming Zhang, Michael Haevecker, Detre Teschner, Anna Efimenko, Fabrice Bourneil, Jean-Jacques Gallet, Elisa Borfecchia, Kamil Sobczak, Corinne Petit and Spyridon Zafeiratos\*

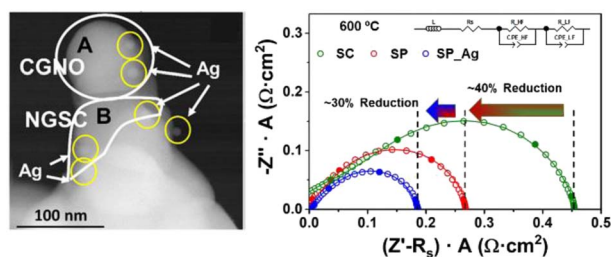
7622



### "Ship-in-a-bottle" entrapment of biomolecules in MOF-based xerogel monoliths for high-performance electrochemical hydrogen evolution

Thach N. Tu, Suraj A. Khalate, Kunok Chang and Jinsoo Kim\*

7631



### Optimisation of the electrochemical performance of (Nd,Gd)<sub>1/3</sub>Sr<sub>2/3</sub>CoO<sub>3-δ</sub> cathode for solid oxide fuel cells via spray-pyrolysis deposition and decoration with Ag nanoparticles

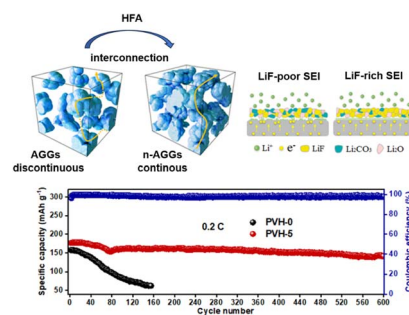
Paula Rosendo Santos, Domingo Pérez-Coll, M. Teresa Azcondo, Glenn C. Mather, Álvaro Muñoz-Noval, Eduardo Salas-Colera, Ulises Amador, Khalid Boulahya and Daniel Muñoz-Gil\*



7645

## Engineering a well-connected ion-conduction network and interface chemistry for high-performance PVDF-based polymer-in-salt electrolytes

Xiaodan Li, Yucheng Wang, Qingfeng Zhou, Hongxiang Kuai, Chuang Ji and Xunhui Xiong\*



7654

## A 3D porous P-doped Cu–Ni alloy for atomic H<sup>+</sup> enhanced electrocatalytic reduction of nitrate to ammonia

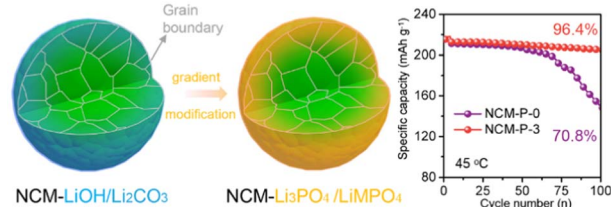
Zhichao Ma, Chenyi Wang, Tianfang Yang, Gangya Wei, Jinrui Huang, Mengran Liu, Kun Zhang, Zunjie Zhang, Yang Liu\* and Shuyan Gao\*



7663

## Gradient and multilevel surface modification of Ni-rich layered cathodes by gas penetration for enhanced electrochemical performance

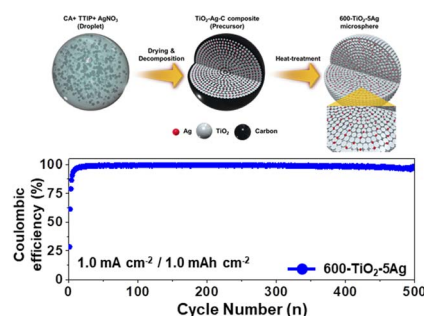
Rui Jiang,\* Zhongjia Dai, Yongen Gao, Xikang Zhao, Jianfang Du, Gang Li\* and Zexue Du



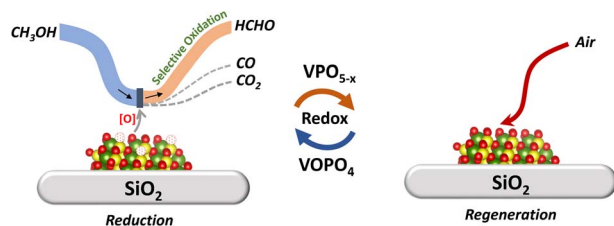
7670

## Optimized lithium deposition on Ag nanoparticles-embedded TiO<sub>2</sub> microspheres: a facile spray pyrolysis approach for enhanced lithium metal anode

Jae Wook Kang, Jae Hun Choi, Jung-Kul Lee\* and Yun Chan Kang\*



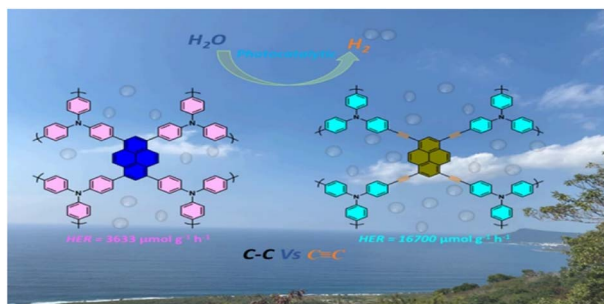
7680



### Chemical looping methanol oxidation using supported vanadium phosphorous oxide carriers for formaldehyde production

Anuj Joshi, Sonu Kumar, Melissa Marx, Amanda H. Trout, Sudeshna Gun, Zain Mohammad, Yehia Khalifa and Liang-Shih Fan\*

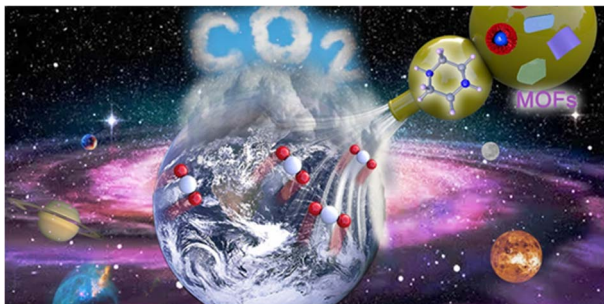
7693



### Reticular design and alkyne bridge engineering in donor- $\pi$ -acceptor type conjugated microporous polymers for boosting photocatalytic hydrogen evolution

Mohamed Gamal Mohamed,\* Mohamed Hammad Elsayed,\* Chia-Jung Li, Ahmed E. Hassan, Islam M. A. Mekhmer, Ahmed Fouad Musa, Mahmoud Kamal Hussien, Li-Chyong Chen, Kuei-Hsien Chen, Ho-Hsiu Chou and Shiao-Wei Kuo\*

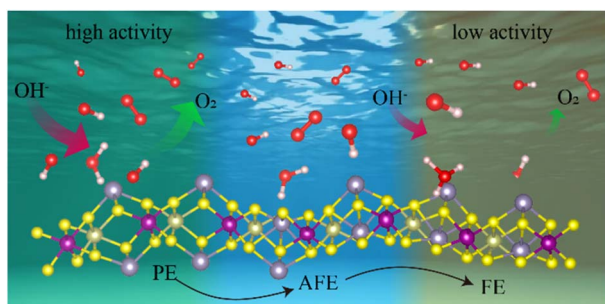
7711



### Heterocycles for direct air capture and MOFs prepared from $\text{CO}_2$ utilization

Jingcheng Du, Linghao Liu, Qian Sun, Ziyi Song, Ayan Yao, Ji Ma, Tai-Shung Chung,\* Wei Xu, Hongjun Zhang and Jiangtao Liu\*

7724



### Effect of ferroelectric polarization on the oxygen evolution reaction: a theoretical study of $\text{M}(\text{Bi, Mn, and Sb})\text{Sn}_2\text{S}_6$

Haoyun Bai, Weng Fai Ip, Wenlin Feng and Hui Pan\*

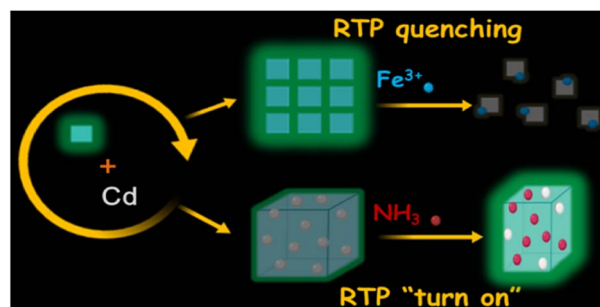




7732

## Two new Cd-based metal–organic frameworks for afterglow detection of Fe<sup>3+</sup> and NH<sub>3</sub>

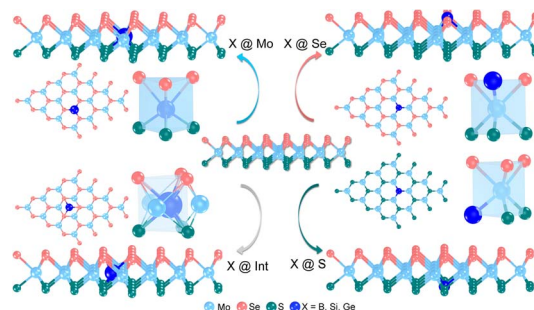
Wen-Qi Zhang, Bo-Lun Zhang, Ting Wang, Jun Chen, Zhong-Yi Li,\* Rui-Hong Wang, Shuqin Liu and Jian-Jun Zhang\*



7742

## Metalloid-doping in SMOSe Janus layers: first-principles study on efficient catalysts for the hydrogen evolution reaction

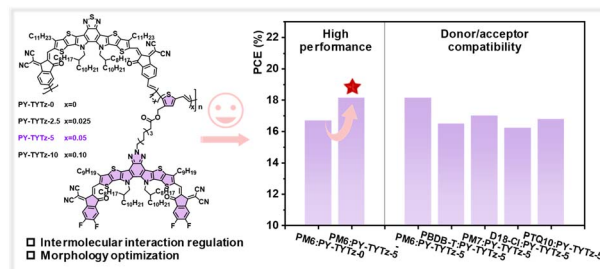
M. Vallinayagam,\* J. Karthikeyan, M. Posselt, D. Murali and M. Zschornak



7754

## High-performance binary all-polymer solar cells enabled by a Y-derivative pendant random-copolymerized polymer acceptor with a broad donor–acceptor matching tolerance

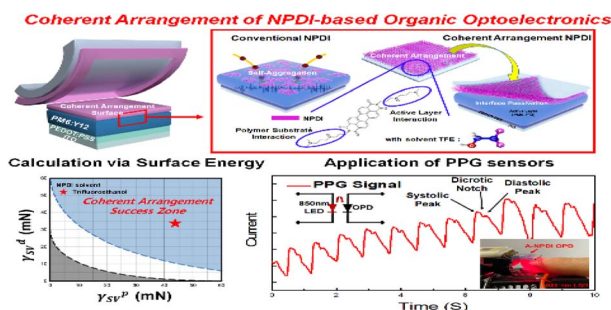
Mingxia Chen, Shanshan Wang, Rui Sun,\* Xinrong Yang, Xiaohei Wu, Yuan Gao, Bo Xiao, Lin-Yong Xu, Yiming Shao, Biao Xiao, Ji Wan, Meimei Zhang, Renqiang Yang, Raja Shahid Ashraf and Jie Min\*



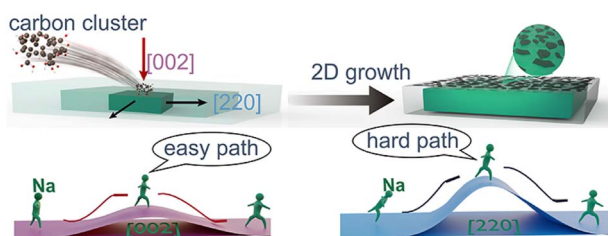
7765

## Coherent arrangement of perylene diimide derivative via adhesion-controlled transfer for noise-suppressed light signal detection

Jihyun Lim, Woongsik Jang, Zhao Yang and Dong Hwan Wang\*



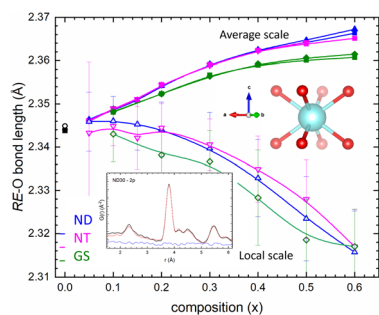
7777



### Exposing the (002) active facet by reducing surface energy for a high-performance $\text{Na}_3\text{V}_2(\text{PO}_4)_2\text{F}_3$ cathode

Zhuangzhi Li, Lang Qiu, Ping Li, Hao Liu, Dong Wang, Weibo Hua, Ting Chen, Yang Song, Fang Wan, Benhe Zhong, Zhenguo Wu\* and Xiaodong Guo\*

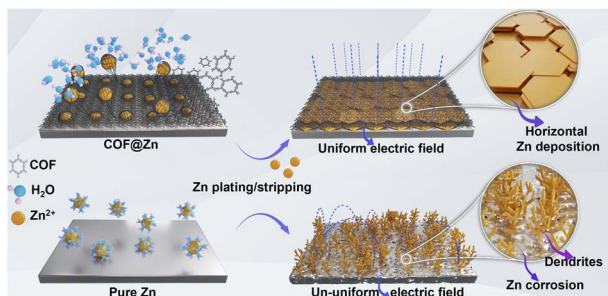
7788



### Unveiling the local structure of doubly doped $\text{CeO}_2$ : a synchrotron X-ray pair distribution function study

Alberto Martinelli, Sara Massardo, Cristina Artini,\* Maria M. Carnasciali and Marcella Pani

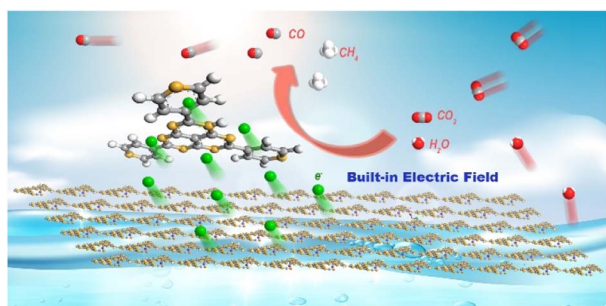
7799



### Interface regulation using a fluorinated vinylene-linked covalent organic framework for a highly stable Zn anode

Yanjie Wang, Ning Li, Huiyan Liu, Haoyang Sun, Zhuo Wang, Lipeng Zhai,\* Kongyao Chen, Liwei Mi,\* Zhe Fang and Yunhui Huang\*

7807



### Construction of a graphitic carbon nitride-based photocatalyst with a strong built-in electric field via $\pi$ - $\pi$ stacking interactions boosting photocatalytic $\text{CO}_2$ reduction

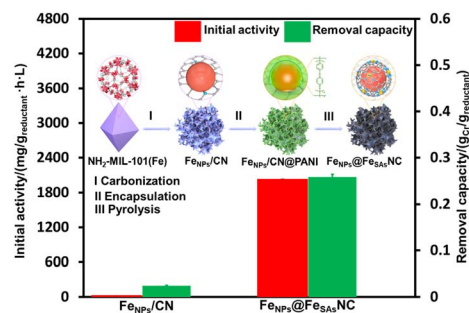
Yanrui Li,\* Linda Wang, Xiang Gao, Yingying Xue, Bozhan Li and Xiaolin Zhu\*



7817

## Engineering Fe–N–C sites onto Fe nanoparticles for synergistically boosting Cr(vi) reduction: performance, mechanism, and applications

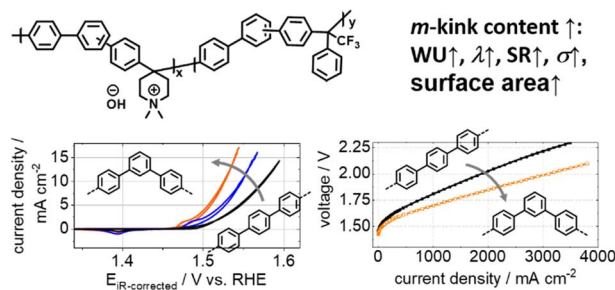
Minghui Li, Wenjing Liu, Panxinchun Liu, Xiaoqin Lin, Hongjie Zhu, Caixia Fang, Wenwen Li and Chang Liu\*



7826

## Meta-kinks are key to binder performance of poly(arylene piperidinium) ionomers for alkaline membrane water electrolysis using non-noble metal catalysts

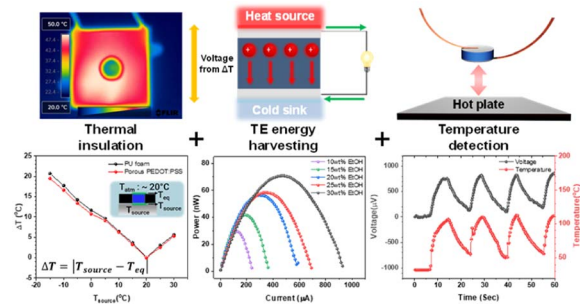
Richard Weber, Malte Klingenhof, Susanne Koch, Lukas Metzler, Thomas Merzdorf, Jochen Meier-Haack, Peter Strasser, Severin Vierrath and Michael Sommer\*



7837

## Porous PEDOT:PSS smart thermal insulators enabling energy harvesting and detection

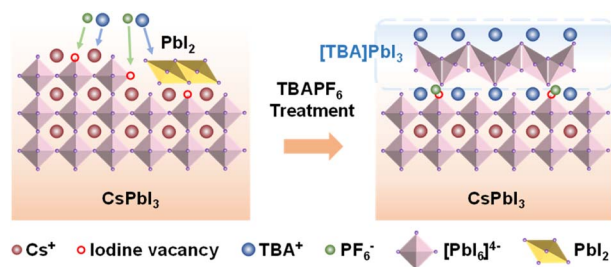
Jeong Seob Yun and Sang Hyuk Im\*



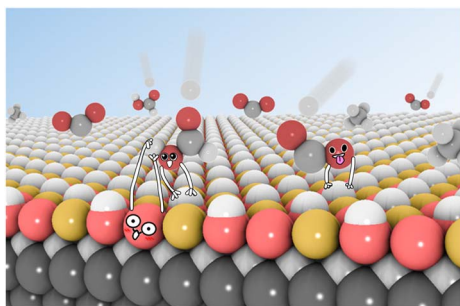
7847

## Surface engineering based on ionic liquids for efficient and stable CsPbI<sub>3</sub> perovskite solar cells

Dong Rui, Jianfei Fu, Qiaoyun Chen, Ji Cao, Wenting Wu, Lei Chen, Jing Zhang, Zelong Zhang,\* Yi Zhou\* and Bo Song\*



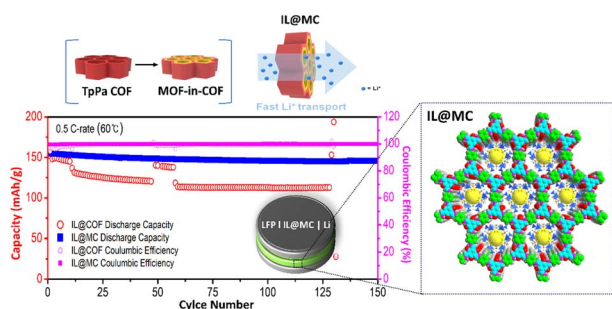
7856



### Surface termination dependent carbon dioxide reduction reaction on $\text{Ti}_3\text{C}_2$ MXene

Ling Meng, Li-Kai Yan,\* Francesc Viñes\* and Francesc Illas

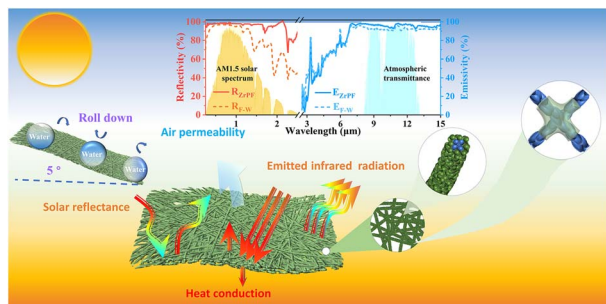
7875



### Ion-transporting channel-embedded MOF-in-COF structures as composite quasi-solid electrolytes with highly enhanced electrochemical properties

Kai Le Loo, Jeong Won Ho, Chan-Hwa Chung, Myoung-Woon Moon and Pil J. Yoo\*

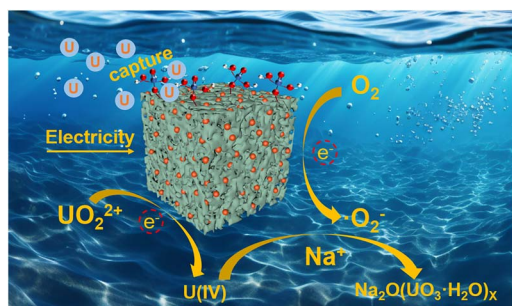
7886



### Superhydrophobic and mechanical properties enhanced the electrospinning film with a multiscale micro-nano structure for high-efficiency radiation cooling

Lijing Kong, Puqing Sun, Jincheng Liu, Yongxing Lin, Chao Xiao, Chao Bao, Kang Zheng, Meng Xue, Xian Zhang, Xianglan Liu\* and Xingyou Tian\*

7896



### Nickel single atom mediated phosphate functionalization of moss derived biochar effectively enhances electrochemical uranium extraction from seawater

Huachuan Feng, Huanhuan Dong, Pan He, Junhui He, Enmin Hu, Zishu Qian, Jin Li, Jiejie Li, Wenkun Zhu\* and Tao Chen\*

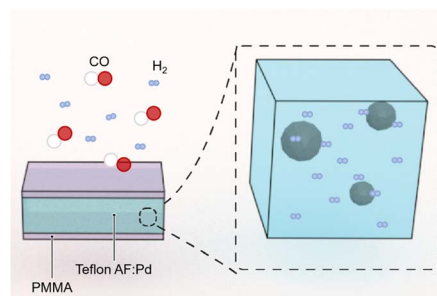




7906

### A surface passivated fluorinated polymer nanocomposite for carbon monoxide resistant plasmonic hydrogen sensing

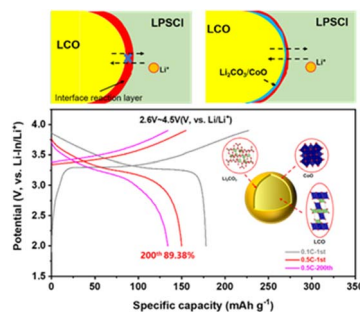
I. Östergren, I. Darmadi, S. Lerch, R. R. da Silva, M. Craighero, S. H. K. Paleti, K. Moth-Poulsen, C. Langhammer\* and C. Müller\*



7916

### Surface reconstruction layer boosting interfacial stability of LiCoO<sub>2</sub>/Li<sub>6</sub>PS<sub>5</sub>Cl in bulk all-solid-state Li batteries

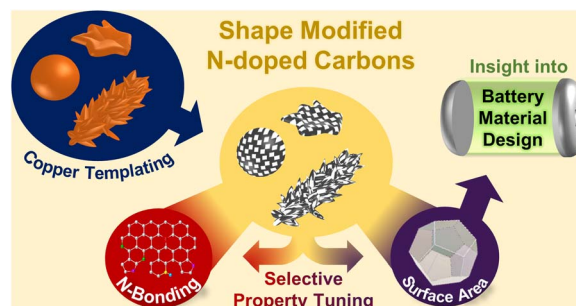
Shiliang Zheng, Zengzhu Li, Zhiwe He, Wenguang Zhao, Chenyu Liu,\* Zhan Lin, Zengqing Zhuo\* and Bingkai Zhang\*



7923

### Copper shape-templated N-doped carbons: exercising selective surface area control for lithium-ion batteries & beyond

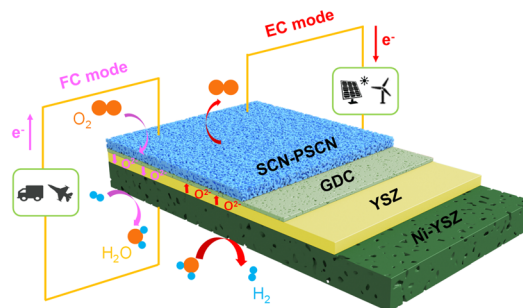
Samantha N. Lauro, James N. Burrow, Benjamin G. Broekhuis, Philippe E. Papa and C. Buddie Mullins\*



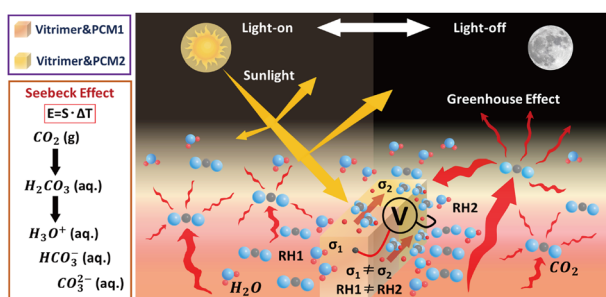
7932

### An active and durable air electrode with self-generated nanoparticles decorated on the surface for reversible oxygen-ionic ceramic electrochemical cells

Chuanyu Fang, Kang Xu, Feng Zhu, Yangsen Xu, Fan He and Yu Chen\*



7943



## Energy harvesting and electricity production through dissolved carbon dioxide by connecting two form-stable phase change materials

Chengbin Yu, John Konlan and Guoqiang Li\*

