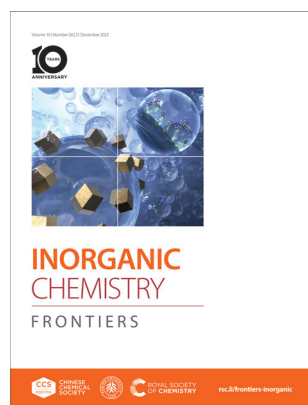


### IN THIS ISSUE

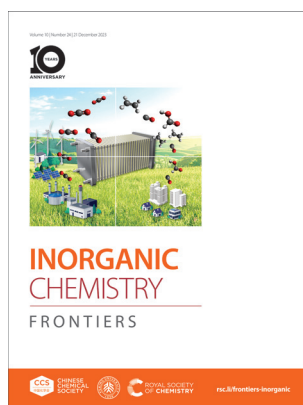
ISSN 2052-1553 CODEN ICFNAW 10(24) 7085–7382 (2023)



#### Cover

See Juyeong Kim *et al.*, pp. 7146–7154.

Image reproduced by permission of Juyeong Kim from *Inorg. Chem. Front.*, 2023, **10**, 7146.



#### Inside cover

See Naohiro Fujinuma and Samuel E. Lofland, pp. 7095–7108.

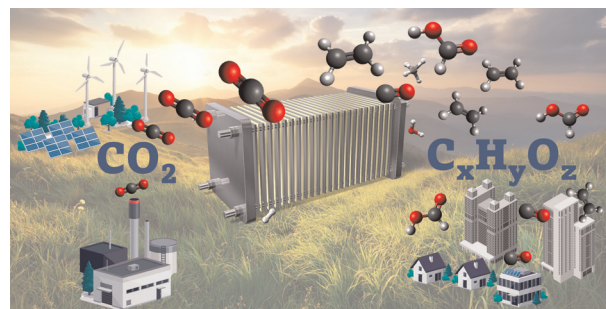
Image reproduced by permission of Naohiro Fujinuma from *Inorg. Chem. Front.*, 2023, **10**, 7095.

### REVIEWS

7095

#### Recent advances in electrocatalytic reduction of ambient CO<sub>2</sub> toward high-value feedstock

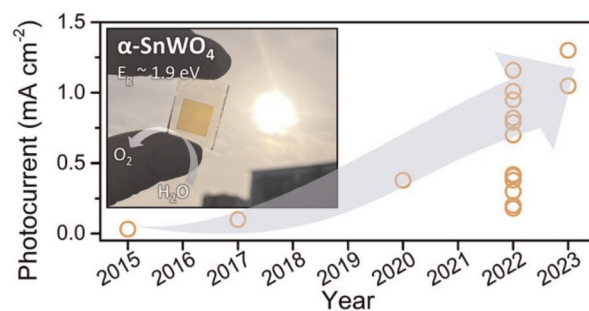
Naohiro Fujinuma\* and Samuel E. Lofland\*



7109

#### Recent progress in the development of tin tungstate ( $\alpha$ -SnWO<sub>4</sub>) photoanodes for solar water oxidation

Heejung Kong and Fatwa F. Abdi\*



## EDITORIAL STAFF

## Executive Editor

Wenjun Liu

## Deputy Editor

Kailin Deng

## Development Editor

Cheng Du

## Editorial Production Manager

Helen Saxton

## Senior Publishing Editor

Becky Webb

## Publishing Editors

Kirstine Anderson, Matthew Bown, Laura Cooper, Hannah Fielding, Clare Fitzgerald, Anoushka Handa, Claire Harding, Alan Holder, Charlie Palmer, Rosie Rothwell, Donna Smith, Laura Smith

## Assistant Editors

Jie Gao, Yu Zhang

## Publisher

Jeanne Andres

For queries about submitted papers, please contact Helen Saxton, Editorial Production Manager, in the first instance. E-mail: [InorgChemFrontiersPROD@rsc.org](mailto:InorgChemFrontiersPROD@rsc.org)

For pre-submission queries please contact Wenjun Liu, Executive Editor. Email: [InorgChemFrontiersED@rsc.org](mailto:InorgChemFrontiersED@rsc.org)

Inorganic Chemistry Frontiers (electronic: ISSN 2052-1553) is published 24 times a year by the Royal Society of Chemistry, Thomas Graham House, Science Park, Milton Road, Cambridge, UK CB4 0WF.

All orders, with cheques made payable to the Royal Society of Chemistry, should be sent to RSC Order Department, Royal Society of Chemistry, Thomas Graham House, Science Park, Milton Road, Cambridge, CB4 0WF, UK Tel +44 (0)1223 432398; E-mail [orders@rsc.org](mailto:orders@rsc.org)

2023 Annual (electronic) subscription price: £2,182; US\$3,492. Customers in Canada will be subject to a surcharge to cover GST. Customers in the EU subscribing to the electronic version only will be charged VAT.

If you take an institutional subscription to any Royal Society of Chemistry journal you are entitled to free, site-wide web access to that journal. You can arrange access via Internet Protocol (IP) address at [www.rsc.org/ip](http://www.rsc.org/ip)

Customers should make payments by cheque in sterling payable on a UK clearing bank or in US dollars payable on a US clearing bank.

Whilst this material has been produced with all due care, the Royal Society of Chemistry cannot be held responsible or liable for its accuracy and completeness, nor for any consequences arising from any errors or the use of the information contained in this publication. The publication of advertisements does not constitute any endorsement by the Royal Society of Chemistry or Authors of any products advertised. The views and opinions advanced by contributors do not necessarily reflect those of the Royal Society of Chemistry which shall not be liable for any resulting loss or damage arising as a result of reliance upon this material. The Royal Society of Chemistry is a charity, registered in England and Wales, Number 207890, and a company incorporated in England by Royal Charter (Registered No. RC000524), registered office: Burlington House, Piccadilly, London W1J 0BA, UK, Telephone: +44 (0) 207 4378 6556.

## Advertisement sales:

Tel +44 (0) 1223 432246; Fax +44 (0) 1223 426017;

E-mail [advertising@rsc.org](mailto:advertising@rsc.org)

For marketing opportunities relating to this journal, contact [marketing@rsc.org](mailto:marketing@rsc.org)

## INORGANIC CHEMISTRY

## FRONTIERS

An international, high quality journal for interdisciplinary research between inorganic chemistry and related subjects.



CHINESE  
CHEMICAL  
SOCIETY



[rsc.li/frontiers-inorganic](http://rsc.li/frontiers-inorganic)

Published in collaboration with the Chinese Chemical Society and College of Chemistry and Molecular Engineering, Peking University

## Editorial Board

## Editor-in-Chief

Song Gao, Peking University, Sun Yat-sen University, China

## Associate Editors

Jun Chen, Nankai University, China  
Paula Diaconescu, University of California, Los Angeles, USA  
Svetlana Mintova, Université de Caen, France  
Justin J. Wilson, Cornell University, USA  
Tepei Yamada, The University of Tokyo, Japan  
Zhiping Zheng, Southern University of Science and Technology, China

## Members

Hiroshi Kitagawa, Kyoto University, Japan  
Yu Tang, Lanzhou University, China  
Xianran Xing, University of Science and Technology Beijing, China  
Nanfeng Zheng, Xiamen University, China

## Advisory Board

Christopher J. Chang, University of California, Berkeley, USA  
Chi-Ming Che, University of Hong Kong, China  
Ling Chen, Beijing Normal University, China  
Xiaoming Chen, Sun Yat-Sen University, China  
Eugenio Coronado, University of Valencia, Spain  
Yi Cui, Stanford University, USA  
Patrick Gámez, University of Barcelona, Spain  
Hairong Guan, University of Cincinnati, USA  
Andy Hor, University of Hong Kong, China  
Zhaomin Hou, RIKEN, Japan  
Xile Hu, École Polytechnique Fédérale de Lausanne, Switzerland  
Mercouri Kanatzidis, Northwestern University,

USA  
Jaqueline L. Kiplinger, Los Alamos National Laboratory, USA  
Yadong Li, Tsinghua University, China  
Wenbin Lin, University of Chicago, USA  
Yi Lu, University of Texas at Austin, USA  
P. S. Mukherjee, Indian Institute of Science, India  
Wonwoo Nam, Ewha Womans University, Korea  
Hiroshi Nishihara, University of Tokyo, Japan  
Hiroki Oshio, University of Tsukuba, Japan  
Oleg Ozerov, Texas A&M University, USA  
Manfred Scheer, University of Regensburg, Germany

Baolian Su, University of Namur, Belgium  
Jean Pascal Sutter, Laboratory of Coordination Chemistry, CNRS, France  
Richard Winpenny, University of Manchester, UK  
Yi Xie, University of Science and Technology of China, China  
Zuwei Xie, The Chinese University of Hong Kong, China  
Chunhua Yan, Peking University, China  
Hong-Cai Joe Zhou, Texas A&M University, USA  
Xiaodong Zou, Stockholm University, Sweden  
Qichun Zhang, City University of Hong Kong, China

## Information for Authors

Full details on how to submit material for publication in Inorganic Chemistry Frontiers are given in the Instructions for Authors (available from <http://www.rsc.org/authors>). Submissions should be made via the journal's homepage: [rsc.li/frontiers-inorganic](http://rsc.li/frontiers-inorganic)

Authors may reproduce/republish portions of their published contribution without seeking permission from the Royal Society of Chemistry, provided that any such republication is accompanied by an acknowledgement in the form: (Original Citation)-Reproduced by permission of the Royal Society of Chemistry.

This journal is © the Partner Organisations 2023.

Apart from fair dealing for the purposes of research or private study for non-commercial purposes, or criticism or review, as permitted under the Copyright, Designs and Patents Act 1988 and the Copyright and Related Rights Regulation 2003, this publication may only be reproduced, stored or transmitted, in any form or by any means, with the prior permission in writing of the Publishers or in the case of reprographic reproduction in accordance with the terms of licences issued by the Copyright Licensing Agency in the UK. US copyright law is applicable to users in the USA.

Registered charity number: 207890

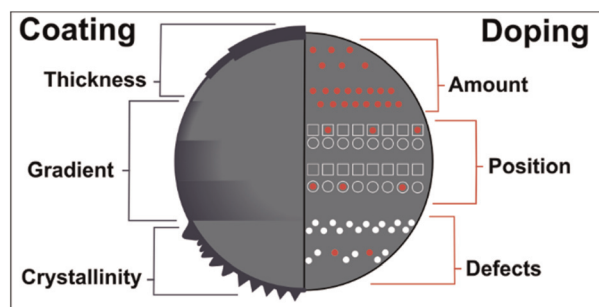


## REVIEWS

7126

**The role of niobium in layered oxide cathodes for conventional lithium-ion and solid-state batteries**

Barbara Nascimento Nunes,\* Wessel van den Bergh,\* Florian Strauss, Aleksandr Kondrakov, Jürgen Janek and Torsten Brezesinski\*

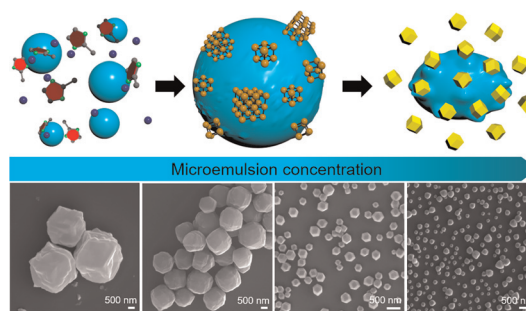


## RESEARCH ARTICLES

7146

**Soft seed-mediated dimensional control of metal–organic framework nanocrystals through oil-in-water microemulsions**

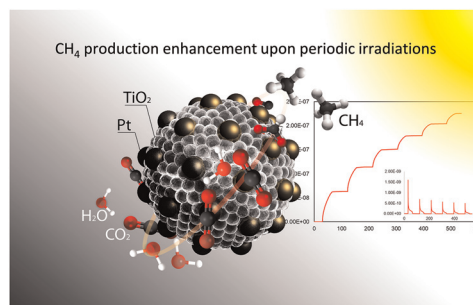
Jaedeok Lee, Suhyeon Park, Seojeong Woo, Cheongwon Bae, Yuri Jeon, Mingyu Gu, Jeongeon Kim, Yeram Kim, Sang Yong Nam, Jong Hwa Jung and Juyeong Kim\*



7155

**Exploring the effect of the reaction conditions on the mechanism of the photocatalytic reduction of CO<sub>2</sub> in the vapor phase over Pt/TiO<sub>2</sub>: an *operando* FTIR study**

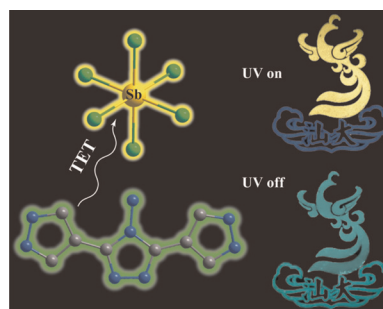
Joudy Dankar,\* Virgile Rouchon, Céline Pagis, Mickael Rivallan and Mohamad El-Roz\*



7167

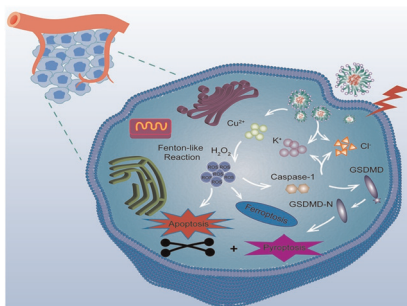
**Efficient triplet energy transfer in a 0D metal halide hybrid with long persistence room temperature phosphorescence for time-resolved anti-counterfeiting**

Jie Li, Jingjie Wu, Yonghong Xiao, Longshi Rao, Ruosheng Zeng,\* Ke Xu, Xiao-Chun Huang, Jin Z. Zhang and Binbin Luo\*



## RESEARCH ARTICLES

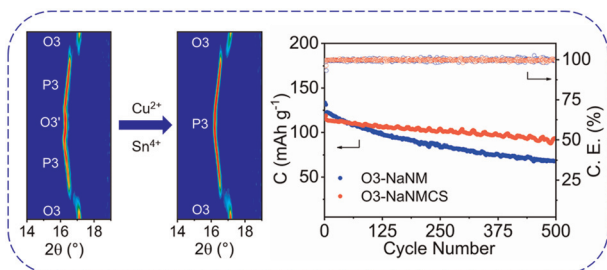
7176



### Copper-based inorganic nanozymes enhance the electrical conductivity of tumors to synergistically induce the pyroptosis, ferroptosis, and apoptosis of tumors

Xia Qin, Jianmin Xiao, Huimin Li, Hai Huang, Hongyuan Jin, Yu Zhang, Geng Tian, Gang Wang\* and Guilong Zhang\*

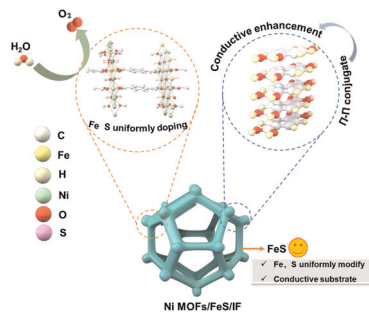
7187



### Depressed P3–O3' phase transition in an O3-type layered cathode for advanced sodium-ion batteries

Zhaohui Liang, Meng Ren, Yihe Guo, Tong Zhang, Xiuling Gao, Hua Ma and Fujun Li\*

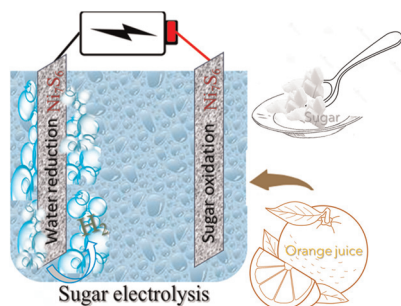
7193



### Fe, S-uniformly dispersed Ni MOFs based on FeS substrate precipitation-dissolution equilibrium for water and seawater oxidation

Na Xu, Fu-Li Wang, Jun-Qi Han, Wen-Li Yu, Wen-Jing Li, Yi-Chuan Li, Yu-Lu Zhou, Yong-Ming Chai\* and Bin Dong\*

7204



### Unlocking the catalytic potential of nickel sulfide for sugar electrolysis: green hydrogen generation from kitchen feedstock

Supriya A. Patil, Atul C. Khot, Kalyani D. Kadam, Hoa Thi Bui, Hyunsik Im and Nabeen K. Shrestha\*



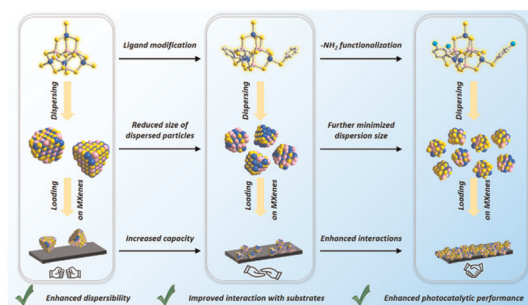


## RESEARCH ARTICLES

7212

### Surface functionalization of discrete metal-chalcogenide supertetrahedral clusters and the photocatalytic application

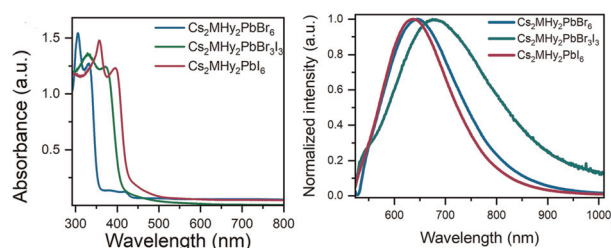
Jin Wu, Qiang Fu, Zixin Wu, Peipei Sun, Xing Zhu, Ying Wang, Ning Chen, Dong-Sheng Li and Tao Wu\*



7222

### Zero-dimensional mixed-cation hybrid lead halides with broadband emissions

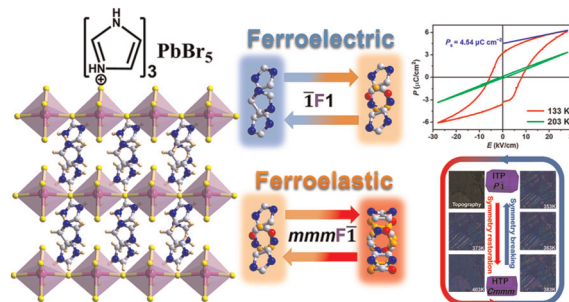
Mirośław Mączka,\* Dawid Drozdowski, Dagmara Stefańska and Anna Gaḡor



7231

### Molecular orientation dynamics triggers ferroelectricity and ferroelasticity in an organic-inorganic halide material

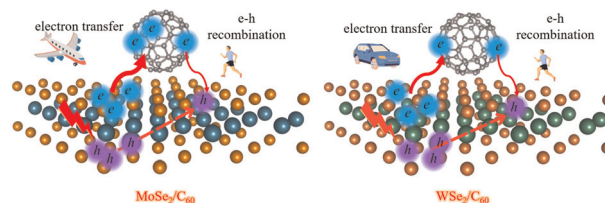
Hao-Fei Ni, Jia-He Lin, Chang-Feng Wang, Qing-Feng Luo, Pei-Zhi Huang, Zhi-Xu Zhang,\* Da-Wei Fu\* and Yi Zhang\*



7238

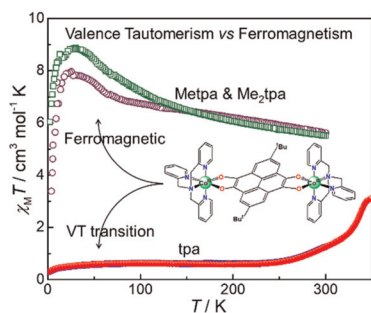
### MoSe<sub>2</sub>/C<sub>60</sub> heterojunction may be efficient for photovoltaic applications: time-domain *ab initio* analysis of interfacial charge separation and recombination dynamics

Pingzhi Zhang, Ting Xue, Zhiguo Wang, Wei Wei, Xiaoyin Xie,\* Ran Jia\* and Wei Li\*



## RESEARCH ARTICLES

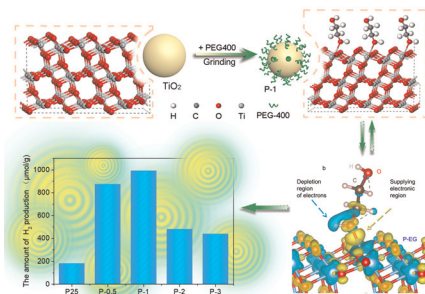
7251



### Tuning the magnetic properties of dinuclear cobalt–tetraoxolene compounds: from valence tautomerism to ferromagnetic coupling

Yu-Meng Zhao, Jia-Ping Wang, Xiang-Yi Chen, Meng Yu,\* Alyona A. Starikova\* and Jun Tao\*

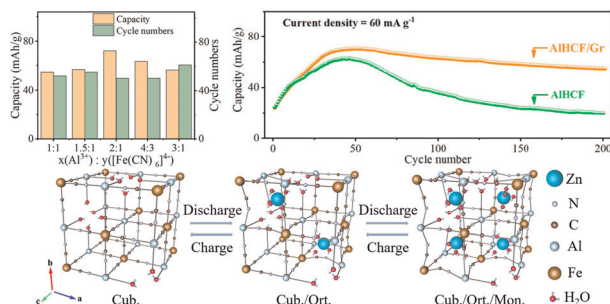
7265



### Construction of surface electron island by a simple organic molecule adsorption strategy: tuning the energy band structure and boosting the photocatalytic performance

Jindou Hu, Xiaoyan Lu, Dilireba Turgan, Anjie Liu, Zhenjiang Lu, Jing Xie and Yali Cao\*

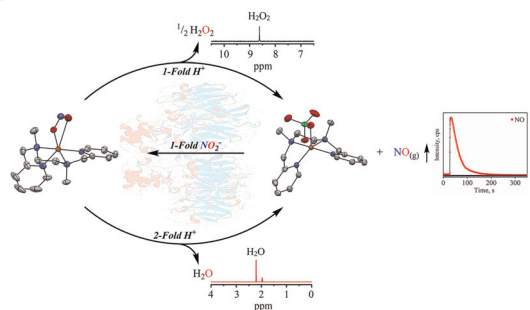
7274



### Open-framework aluminum hexacyanoferrate as a cathode material for high voltage aqueous zinc-ion batteries: effect of Al<sup>3+</sup> cations on three-phase transition of AlFe(CN)<sub>6</sub>

Yulin Kong, Yawei Xiao, Shutao Zhang, Liang Chen, Zhaoping Liu\* and Yude Wang\*

7285



### Acid-induced conversion of nitrite to nitric oxide at the copper(II) center: a new catalytic pathway

Prabhakar Bhardwaj, Kulbir, Tarali Devi\* and Pankaj Kumar\*

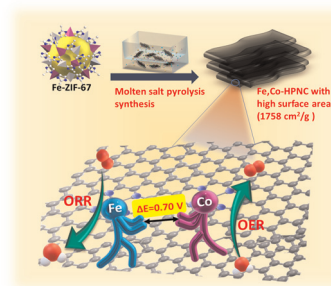


## RESEARCH ARTICLES

7296

### Rational design of ZIF-derived nanocarbon with dual metal active sites *via* molten salt strategy for advancing oxygen electrocatalysis

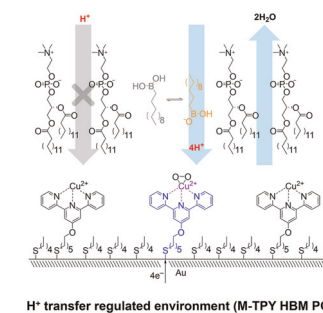
Sakshi Bhardwaj, Tribani Boruah and Ramendra Sundar Dey\*



7308

### Protonic nanoenvironment engineering for tuning the electrocatalytic efficiency and product selectivity of O<sub>2</sub> reduction

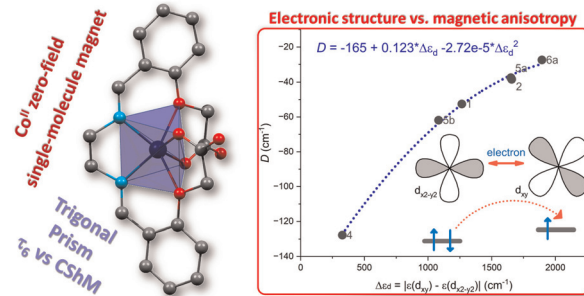
Hei Tung Yau, Zuo Hang Yu and Edmund C. M. Tse\*



7319

### 2-Formylphenoxyacetic acid Schiff bases: a promising ligand scaffold for readily available trigonal prismatic Co(II) single-ion magnets

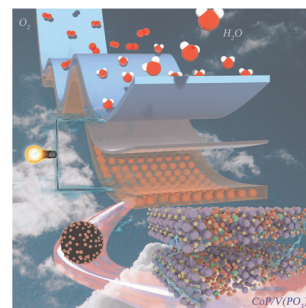
Kamil Kotrle, Ivan Nemeč, Peter Antal, Kamila Petrželová, Erik Čizmar and Radovan Herchel\*



7333

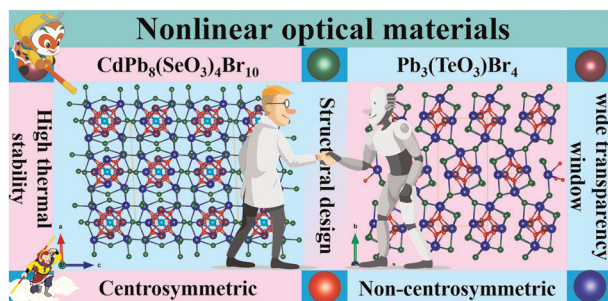
### Boosting oxygen reduction of well-dispersed CoP/V(PO<sub>3</sub>)<sub>3</sub> sites *via* geometric and electronic engineering for flexible Zn–air batteries

Zuyang Luo, Fengli Wei, Junlin Gong, Lixia Wang, Zhiyang Huang, Tayirjan Taylor Isimjan\* and Xiulin Yang\*



## RESEARCH ARTICLES

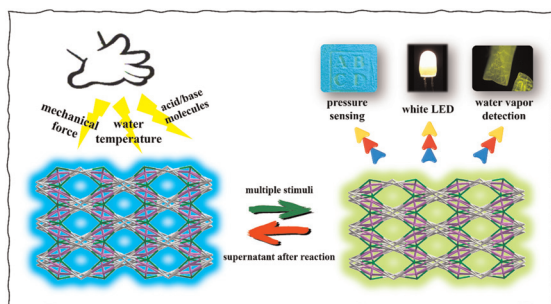
7343



### From $\text{CdPb}_8(\text{SeO}_3)_4\text{Br}_{10}$ to $\text{Pb}_3(\text{TeO}_3)\text{Br}_4$ : the first tellurite bromide exhibiting an SHG response and mid-IR transparency

Peng-Fei Li, Chun-Li Hu, Bing-Xuan Li, Jiang-Gao Mao and Fang Kong\*

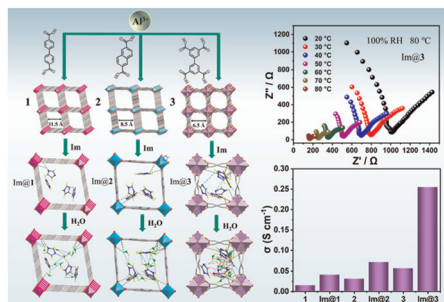
7351



### Multi-stimulus responsive properties of a Cd-MOF based on tetraphenylethylene

Chen Wang, Ting Zhang, Li-Xian Sun, Yong-Heng Xing\* and Feng-Ying Bai\*

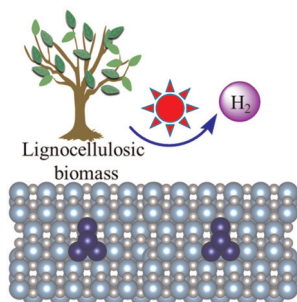
7359



### Pore size effects on high-efficiency proton conduction in three stable 3D Al-based MOFs modified with imidazole

Lu Zhang, Xiaoxue Ma, Xin Li, Ronghua Liu, Xin Zhao, Hongguo Hao,\* Hui Yan,\* Hongjie Zhu, Huawei Zhou and Dichang Zhong

7369



### Boosted charge transfer in Pt cluster anchored $\text{TiO}_2$ microspheres with rich oxygen vacancies for solar driven $\text{H}_2$ production from lignocellulosic biomass

Fu-Guang Zhang, Miao Cheng, Yong-Jun Yuan,\* Qing-Yu Liu, Quan Cheng and Jie Guan\*

