

Journal of Materials Chemistry A

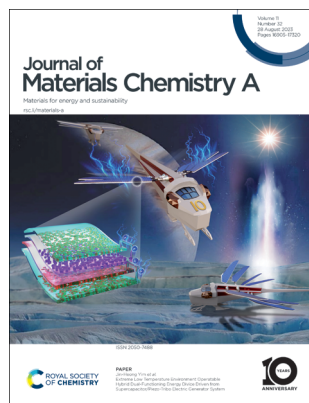
Materials for energy and sustainability

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 11(32) 16905–17320 (2023)



Cover

See Jin-Heong Yim *et al.*, pp. 16973–16984. Image reproduced by permission of Jin-Heong Yim from *J. Mater. Chem. A*, 2023, **11**, 16973.



Inside cover

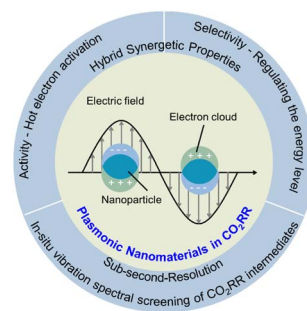
See Xigao Jian *et al.*, pp. 16985–16994. Image reproduced by permission of Xigao Jian from *J. Mater. Chem. A*, 2023, **11**, 16985.

REVIEW

16918

Surface plasmon assisted photoelectrochemical carbon dioxide reduction: progress and perspectives

Jia Liu, Chenfeng Xia, Shahid Zaman,* Yaqiong Su, Lin Tan and Shenghua Chen*

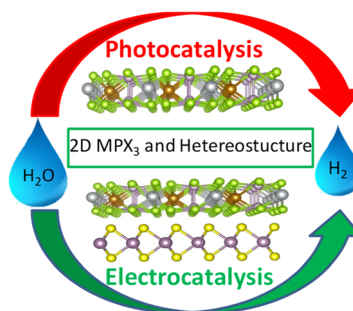


PERSPECTIVE

16933

2D transition metal-based phospho-chalcogenides and their applications in photocatalytic and electrocatalytic hydrogen evolution reactions

K. Pramoda* and C. N. R. Rao*



Editorial Staff

Executive Editor

Michaela Muehlberg

Deputy Editor

Geraldine Hay

Editorial Production Manager

Jonathon Watson

Senior Publishing Editor

Isobel Tibbetts

Development Editor

Rose Wedgbury

Publishing Editors

Matthew Blow, Chris Dias, Hemna Fathima, Juan Gonzalez, Ellie Griffiths, Rob Hinde, Sam Howell, Clara Humann, Ash Hyde, Francesca Jacklin, Evie Karkera, Shruti Karnik, Tamara Kosikova, Brian Li, Sam Mansell, Carole Martin, Kirsty McRoberts, Yasmin Mehanna, Tiffany Rogers, Cat Schofield, Charu Storr-Vijay, Manman Wang, Ella White, Tom Williams

Editorial Assistant

Daniel Smith

Publishing Assistant

Julie-Ann Roszkowski

Publisher

Sam Keltie

For queries about submitted papers, please contact Jonathon Watson, Editorial Production Manager in the first instance. E-mail: materialsA@rsc.org

For pre-submission queries please contact Michaela Muehlberg, Executive Editor. E-mail: materialsA-rsc@rsc.org

Journal of Materials Chemistry A (electronic: ISSN 2050-7496) is published 48 times a year by the Royal Society of Chemistry, Thomas Graham House, Science Park, Milton Road, Cambridge, UK CB4 0WE.

All orders, with cheques made payable to the Royal Society of Chemistry, should be sent to the Royal Society of Chemistry Order Department, Royal Society of Chemistry, Thomas Graham House, Science Park, Milton Road, Cambridge, CB4 0WE, UK

Tel +44 (0)1223 432398; E-mail orders@rsc.org

2023 Annual (electronic) subscription price: £1968, \$4085. 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

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

For marketing opportunities relating to this journal, contact marketing@rsc.org

Journal of Materials Chemistry A

rsc.li/materials-a

Journal of Materials Chemistry A, B & C cover high quality studies across all fields of materials chemistry. The journals focus on those theoretical or experimental studies that report new understanding, applications, properties and synthesis of materials. *Journal of Materials Chemistry A* covers materials with applications in energy & sustainability.

Editorial Board

Editor-in-Chief

Anders Hagfeldt, EPFL, Switzerland

Scientific Editors

Frank Osterloh, University of California, Davis, USA

Associate Editors

Veronica Augustyn, North Carolina State University, USA

Viola Birss, University of Calgary, Canada

Goutam De, S N Bose National Centre for Basic Sciences, India

Ghim Wei Ho, National University of Singapore, Singapore

Yun Jeong Hwang, Seoul National University, South Korea

Kisuk Kang, Seoul National University, South Korea

Subrata Kundu, Central Electrochemical Research Institute (CECRI), India

Dan Li, Jinan University, China

Yi-Chun Lu, Chinese University of Hong Kong, Hong Kong

Jennifer Rupp, Technical University Munich, Germany

Germany

Lydia Wong, Nanyang Technological University, Singapore

Li-Zhu Wu, Technical Institute of Physics and Chemistry, China

Yusuke Yamauchi, University of Queensland, Australia

Zhen Zhou, Nankai University, China

Miriam Unterlass, University of Konstanz, Germany

Advisory Board

P. Adelhelm, Humboldt-University Berlin, Germany

R. Ahuja, Uppsala University, Sweden

C. Ania, CNRS Orleans, France

J.-B. Baek, Ulsan National Institute of Science and Technology, Korea

C. Berlinguette, University of British Columbia, Canada

K. Biswas, Jawaharlal Nehru Centre for Advanced Scientific Research, India

E. Bucher, University of Leoben, Austria

M. Chabinye, University of California, Santa Barbara, USA

A. Chattopadhyay, IIT Guwahati, India

J.-S. Chen, Shanghai Jiao Tong University, China

W. Chueh, Stanford University, USA

S. Cussen, University of Sheffield, UK

X. Duan, University of Adelaide, Australia

M. Eddaoudi, King Abdullah University of Science and Technology, Saudi Arabia

T. Edvinsson, Uppsala University, Sweden

X. Feng, Dresden University of Technology, Germany

J. Fleig, Dresden University of Technology, Germany

M. Florea, University of Bucharest, Romania

G. Galli, University of Chicago, USA

N. Garcia-Araez, University of Southampton, UK

UK

G. Grancini, University of Pavia, Italy

J. Huang, Northwestern University, USA

H. Imahori, Kyoto University, Japan

T. Ishihara, Kyushu University, Japan

S. Islam, University of Bath, UK

F. Jiao, University of Delaware, USA

E. Kendrick, University of Birmingham, UK

B. Kim, KAIST, Korea

D.-H. Kim, Ewha Womens University, Korea

U. Kramm, TU Darmstadt, Germany

Y.J. Lee, Hanyang University, Korea

B. Li, Tsinghua University, China

J. Li, Rutgers University, USA

Z. Lin, National University of Singapore, Singapore

B. Lotzsch, Max Planck Institute for Solid State Research, Stuttgart, Germany

J. Luo, Nankai University, China

C.-B. Mullins, University of Texas at Austin, USA

A. K. Nandi, IACS, India

L. Nazar, University of Waterloo, Canada

M. Niederberger, ETH Zürich, Switzerland

A.F. Nogueira, University of Campinas, Brazil

C. Osuji, University of Pennsylvania, USA

S. Parker, University of Bath, UK

S. Patil, Indian Institute of Science, Bangalore, India

S. Qiao, University of Adelaide, Australia

Z. Schnepf, University of Birmingham, UK

Z. Shao, Curtin University, Australia

Y. Shimakawa, Kyoto University, Japan

S. Skinner, Imperial College London, UK

M.C. Stefan, University of Texas at Dallas, USA

C.-Y. Su, Sun Yat-Sen University, China

S.-G. Sun, Xiamen University, China

V. Thangadurai, University of Calgary, Canada

M. Titirici, Imperial College London, UK

S. Uk Son, Sungkyunkwan University, Korea

E. Unger, Lund University, Sweden

R.-N. Vannier, ENSC Lille, France

M. Wang, Sun Yat-Sen University, China

M. Wei, Beijing University of Chemical Technology, China

E. Weiss, Northwestern University, USA

C. Williams, University of Oxford, UK

C. Xiong, Boise State University, USA

Y. Xu, University College London, UK

Y.-J. Xu, Fuzhou University, China

M. Ye, Xiamen University, China

Q. Zhang, Tsinghua University, China

X.S. Zhao, University of Queensland, Australia

G. Zheng, Fudan University, China

Information for Authors

Full details on how to submit material for publication in Journal of Materials Chemistry A 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/materials-a. Submissions: The journal welcomes submissions of manuscripts for publication as Full Papers, Communications, Reviews, Highlights and Applications. Full Papers and Communications should describe original work of high quality and impact which must highlight the novel properties or applications (or potential properties/applications) of the materials studied.

Additional details are available from the Editorial Office or <http://www.rsc.org/authors>

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 Royal Society of Chemistry 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

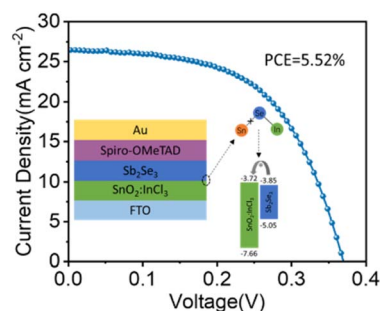


COMMUNICATION

16963

InCl₃-modified SnO₂ as an electron transporting layer for Cd-free antimony selenide solar cells

Lei Huang, Junjie Yang, Yujian Xia, Peng Xiao, Huiling Cai, Aoxing Liu, Yan Wang, Xiaosong Liu,* Rongfeng Tang,* Changfei Zhu and Tao Chen*

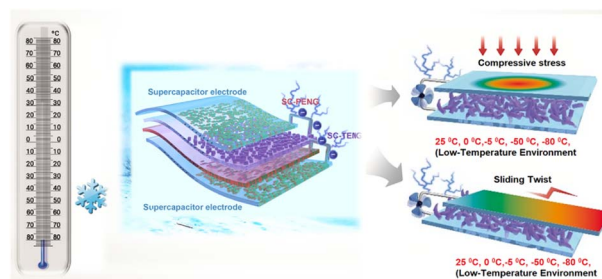


PAPERS

16973

An extremely low temperature environment operable hybrid dual-functioning energy device driven by a supercapacitor/piezo-triboelectric generator system

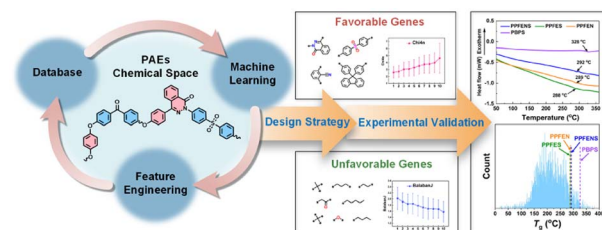
Samayanan Selvam, Young-Kwon Park and Jin-Heong Yim*



16985

A polymer genome approach for rational design of poly(aryl ether)s with high glass transition temperature

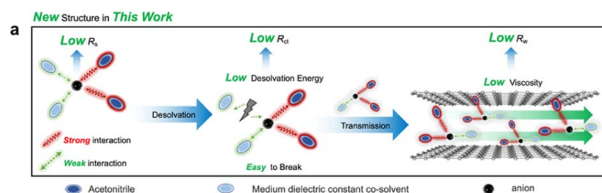
Ce Song, Hongjian Gu, Linyan Zhu, Wanyuan Jiang, Zhihuan Weng, Lishuai Zong, Cheng Liu, Fangyuan Hu, Yuxi Pan* and Xigao Jian*



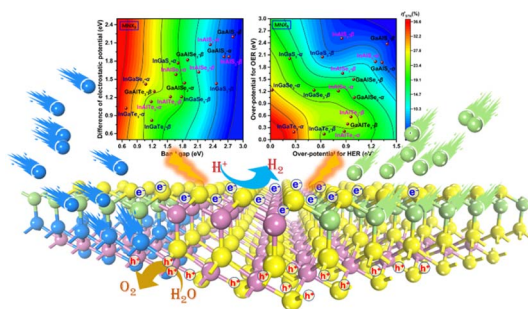
16995

A strong-weak binary solvation structure for unimpeded low-temperature ion transport in nanoporous energy storage materials

Huachao Yang, Zifan Wang, Yiheng Qi, Qinghu Pan, Chuanzhi Zhang, Yuhui Huang, Jianhua Yan, Kefa Cen, Guoping Xiong, Zheng Bo* and Kostya (Ken) Ostrikov



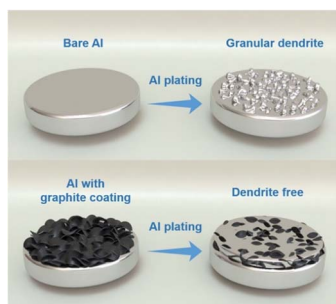
17007



High solar-to-hydrogen efficiency in the novel derivatives of group-III trichalcogenides for photocatalytic water splitting: the effect of elemental composition

Hao Ma, Wen Zhao,* Saifei Yuan, Hao Ren, Houyu Zhu, Yuhua Chi and Wenyue Guo*

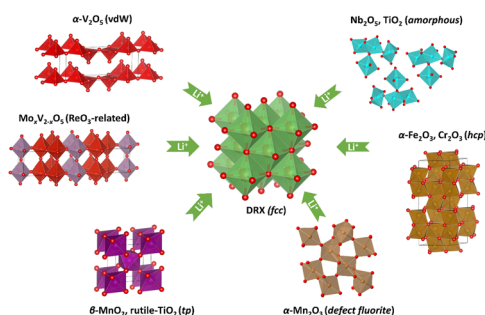
17020



Aluminum dendrite suppression by graphite coated anodes of Al-metal batteries

Shiman He, Jie Wang, Xu Zhang,* Weiqin Chu, Shu Zhao, Daping He, Min Zhu* and Haijun Yu*

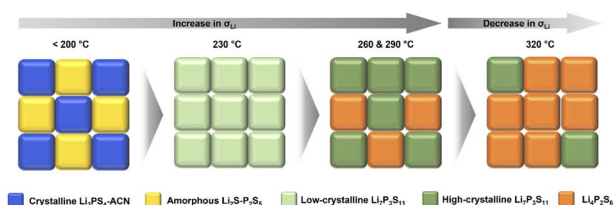
17027



Electrochemical lithiation-induced formation of disordered rocksalt

Matthew J. A. Leesmith, Nathan R. Halcovitch and Xiao Hua*

17035



Structural evolution during solution-based synthesis of $\text{Li}_7\text{P}_3\text{S}_{11}$ solid electrolyte by synchrotron X-ray total scattering

Bowen Shao, Ratnottam Das, Yonglin Huang, Ruihao Deng, Sara Seelman and Fudong Han*

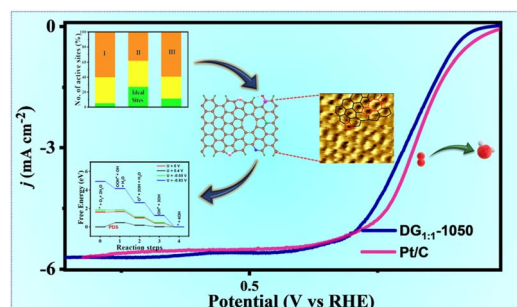


PAPERS

17045

Elucidating the oxygen reduction reaction kinetics on defect engineered nanocarbon electrocatalyst: interplay between the N-dopant and defect sites

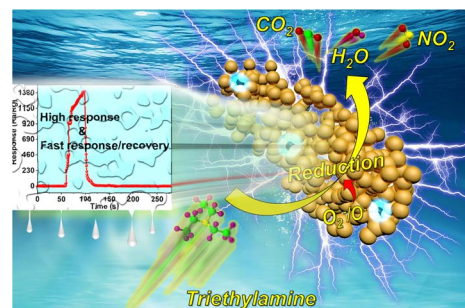
Sakshi Bhardwaj, Samadhan Kapse, Soirik Dan, Ranjit Thapa* and Ramendra Sundar Dey*



17056

Unique Pd/PdO–In₂O₃ heterostructures for the highly efficient detection of triethylamine

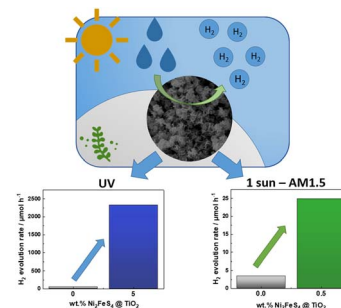
Yumin Zhang, Zongming Deng, Jianhong Zhao,* Tong Zhou, Alain R. Puente Santiago, Tianwei He, Jin Zhang, Qingju Liu* and Guangzhi Hu*



17066

Ni₂FeS₄ as a highly efficient earth-abundant co-catalyst in photocatalytic hydrogen evolution

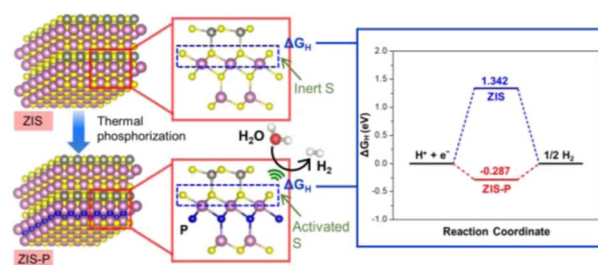
Judith Zander and Roland Marschall*



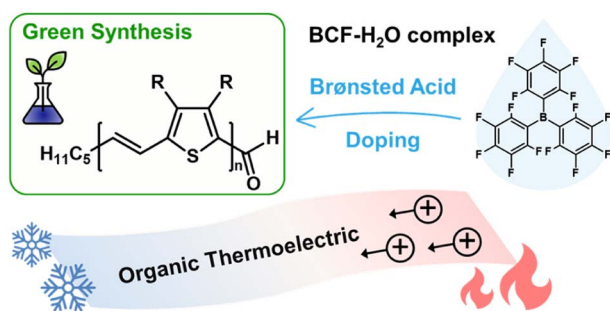
17079

Heteroatom P filling activates intrinsic S atomic sites of few-layered ZnIn₂S₄ via modulation of H adsorption kinetics for sacrificial agent-free photocatalytic hydrogen evolution from pure water and seawater

Boon-Junn Ng, Wei-Kean Chong, Lutfi Kurnianditia Putri, Xin Ying Kong, Jingxiang Low, Hing Wah Lee, Lling-Lling Tan, Wei Sea Chang and Siang-Piao Chai*



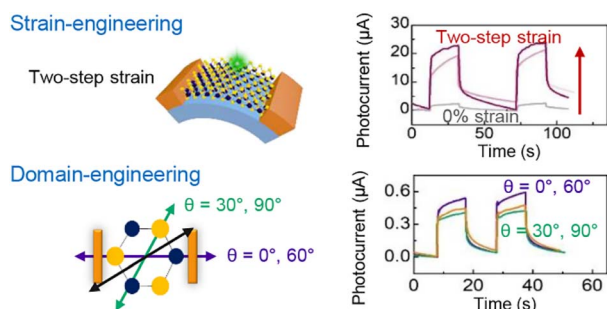
17091



Synthesis and Brønsted acid doping of solution processable poly(thienylene vinylene) for thermoelectric application

Wei-Ni Wu, Kei-ichiro Sato, Jun-Hao Fu, Yi-Tsu Chan, Jhih-Min Lin, Shih-Huang Tung, Tomoya Higashihara* and Cheng-Liang Liu*

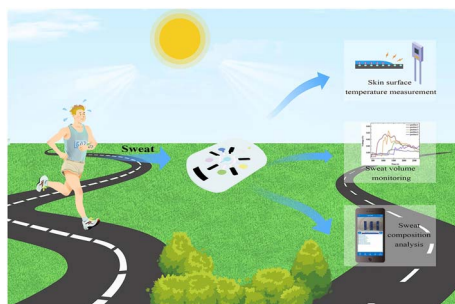
17101



Ultrahigh photoresponse in strain- and domain-engineered large-scale MoS₂ monolayer films

Ye Seul Jung, Jae Woo Park, Ji Yeon Kim, Youngseo Park, Dong Gue Roe, Junseok Heo, Jeong Ho Cho and Yong Soo Cho*

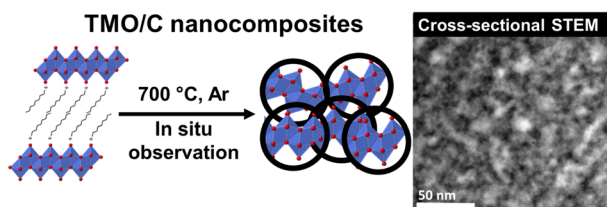
17112



Integrated multimodal microfluidic E-skin powered by synergistic tandem nanogenerators for sweat-based health monitoring and skin-temperature analysis

Kai Han, Dadong Zhang, Wenbo Zhuang, Yanfen Wan* and Peng Yang*

17125



Carbonization process and microstructure formation revealed

Mechanistic understanding of microstructure formation during synthesis of metal oxide/carbon nanocomposites

Mennatalla Elmanzalawy, Alessandro Innocenti, Maider Zarrabeitia, Nicolas J. Peter, Stefano Passerini, Veronica Augustyn and Simon Fleischmann*

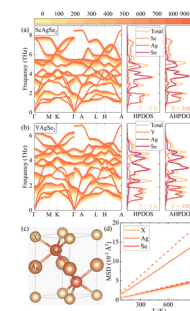


PAPERS

17138

High thermoelectric performance in $X\text{AgSe}_2$ ($X = \text{Sc}$, Y) from strong quartic anharmonicity and multi-valley band structure

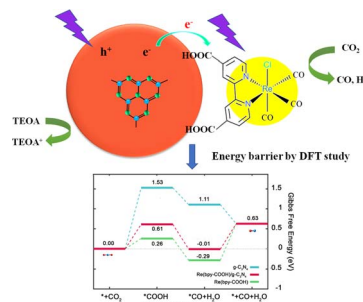
Xuhao Song, Yinchang Zhao,* Jun Ni, Sheng Meng and Zhenhong Dai*



17145

Constructing a rhenium complex supported on $g\text{-C}_3\text{N}_4$ for efficient visible-light-driven photoreduction of CO_2 to CO via a novel Z-scheme heterojunction

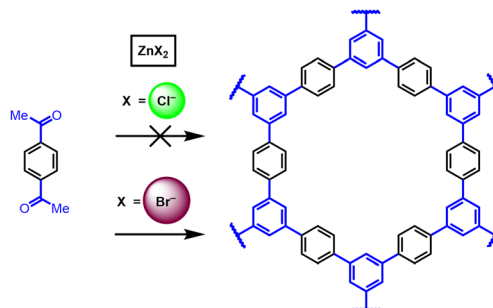
Phuong Ngoc Nguyen, Trang Thanh Tran, Quynh Anh Thi Nguyen, Yoshiyuki Kawazoe, S. V. Prabhakar Vattikuti, Long V. Le, Viet Quoc Bui,* Tuan Manh Nguyen* and Nam Nguyen Dang



17159

Zinc bromide: a general mediator for the ionothermal synthesis of microporous polymers via cyclotrimerization reactions

Jaehwan Kim, Minh H. Le, Makayla C. Spicer, Casandra M. Moisanu, Suzi M. Pugh and Phillip J. Milner*



17167

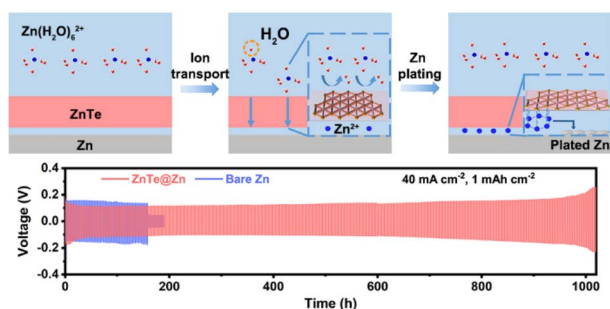
Modification of $\text{Ti}_3\text{C}_2\text{T}_x$ MXene with hyperbranched polyethylene ionomers: stable dispersions in nonpolar/low-polarity organic solvents, oxidation protection, and potential application in supercapacitors

Bahareh Raisi, Lingqi Huang and Zhibin Ye*



PAPERS

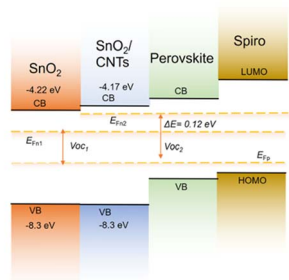
17188



A zincophilic ion-conductive layer with the desolvation effect and oriented deposition behavior achieving superior reversibility of Zn metal anodes

Leilei Sun, Yang Wang,* Guosheng Duan, Bin Luo, Sinan Zheng, Jingyun Huang* and Zhizhen Ye*

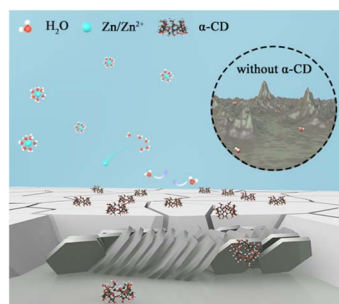
17200



Interface connection of functionalized carbon nanotubes for efficient and stable perovskite solar cells

Guang Shao,* Hui-Juan Yu, Dian Wang, Jing Xiao, Zhi-Lan Yu, Jun-Feng Qu, Jian Chen, Qurat Ul Ain, Ammar Ahmed Khan, Zeliang Qiu, Ruiyuan Hu, Jianxing Xia,* Khalid A. Alamry and Mohammad Khaja Nazeeruddin*

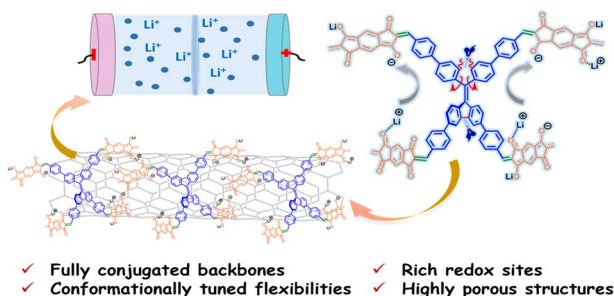
17207



Is (002) the only one that's important? An overall consideration of the main exposed crystallographic planes on a Zn anode for obtaining dendrite-free long-life zinc ion batteries

Yu Wang, Songyao Zhang, Haoqiang Wang, Yi Wang, Yani Liu, Shuming Dou, Xinrui Miao, Wenli Deng, Xi Lin* and Qunhui Yuan*

17217



Fully sp²-carbon connected polymeric frameworks with rotatable conformation-enhanced lithium-storage performance

Sidra Mushtaq, Fancheng Meng, Zixing Zhang, Zhiheng Wang, Biao Jiang, Bai Xue* and Fan Zhang*

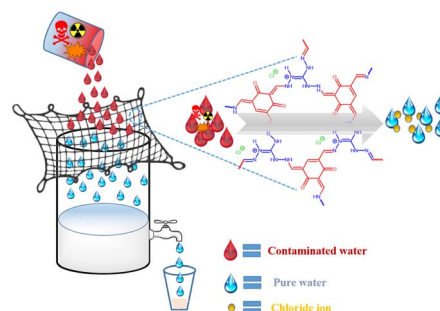


PAPERS

17226

Rapid and selective removal of toxic and radioactive anionic pollutants using an ionic covalent organic framework (iCOF-2)

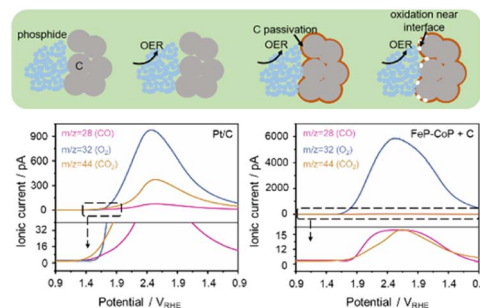
Atikur Hassan, Md Mofizur Rahman Mollah, Soumen Das and Neeladri Das*



17237

Suppressing carbon corrosion *via* mechanically mixing transition metal phosphide clusters: a comparative *in situ* study in alkaline media

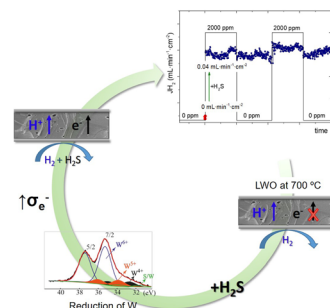
Xiaoyu Wu, Kai Zhao, Xiaoyu Yan, Xiaojuan Cao, Le Ke, Yang Zhao, Lingjiao Li, Xiaoyi Jiang and Ning Yan*



17246

Promotion of mixed protonic–electronic transport in $\text{La}_{5.4}\text{WO}_{11.1-\delta}$ membranes under H_2S atmospheres

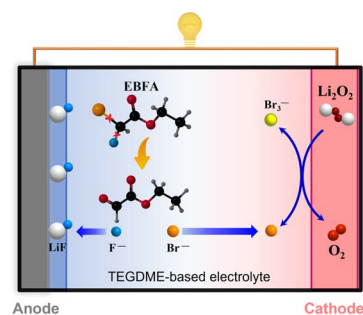
S. Escolástico,* M. Balaguer, C. Solís, F. Toldra-Reig, S. Somacescu, U. Gerhards, A. Aguadero, K. Haas-Santo, R. Dittmeyer and J. M. Serra*



17257

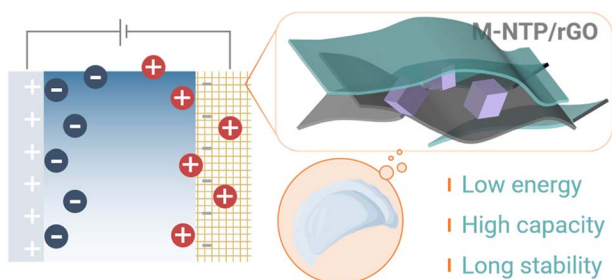
An ethyl bromofluoroacetate redox mediator enables a robust LiF-rich solid electrolyte interphase for advanced lithium–oxygen batteries

Yuan-Jia Rong, Xiao-Ping Zhang,* Chu-Yue Li, Qian-Yan Wang, Min-Sheng Wu and Wei-Rong Chen



PAPERS

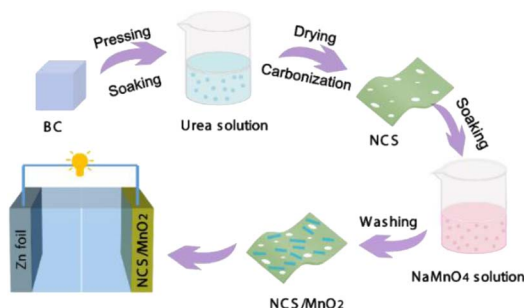
17263



Chinese dumpling-like $\text{NaTi}_2(\text{PO}_4)_3/\text{MXene}$ @reduced graphene oxide for capacitive deionization with high capacity and good cycling stability

Xiaojie Shen, Yuecheng Xiong, Fei Yu* and Jie Ma*

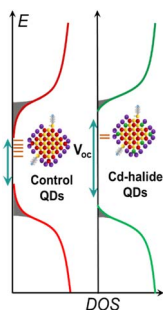
17272



High performance N-doped carbon nanosheet/ MnO_2 cathode derived from bacterial cellulose for aqueous Zn-ion batteries

Wenhai Wang, Ashley P. Black, Cheng Liu, Vlad Martin-Diaconescu, Laura Simonelli and Dino Tonti*

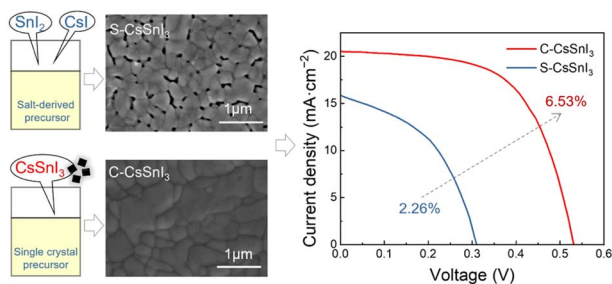
17282



High open-circuit voltage in lead sulfide quantum dot solar cells via solution-phase ligand exchange with low electron affinity cadmium halides

Neha V. Dambhare, Arindam Biswas, Anjali Sharma, Dipak Dattatray Shinde, Chandan Mahajan, Anurag Mitra and Arup K. Rath*

17292



A single crystal derived precursor for improving the performance of CsSnI_3 perovskite solar cells

Qiang Sun, Anjie Gu, Haixuan Yu, Yan Shen and Mingkui Wang*

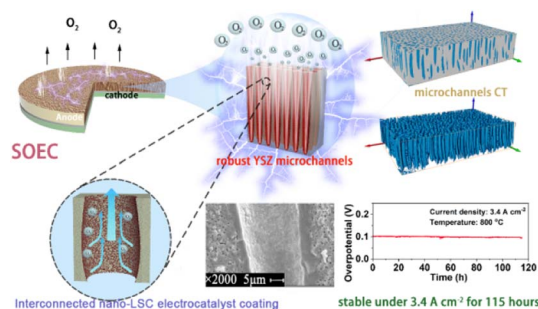


PAPERS

17298

Solid oxide electrolyzer positive electrodes with a novel microstructure show unprecedented stability at high current densities

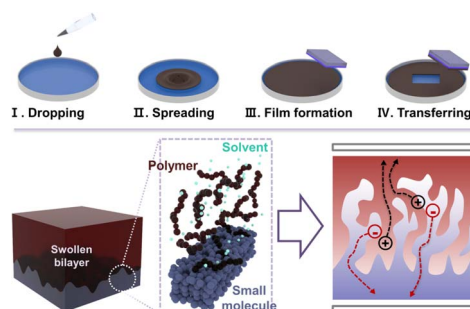
Qing Ni, Yu Li, Zongchao Zhu, Zhexiang Yu, Dong Xu, Xiaoming Hua, Yi Zhen, Lin Ge* and Lei Bi*



17307

Pseudo-bilayered inverted organic solar cells using the Marangoni effect

Jihwan Jo, Seonju Jeong, Dongchan Lee, Seungjin Lee, Bumjoon J. Kim, Shinuk Cho and Jung-Yong Lee*



CORRECTION

17316

Correction: Stabilizing the $\text{Li}_{1.4}\text{Al}_{0.4}\text{Ti}_{1.6}(\text{PO}_4)_3/\text{Li}$ interface with an *in situ* constructed multifunctional interlayer for high energy density batteries

Can Huang, Shuo Huang, Aolai Wang, Ziyang Liu, Dexuan Pei, Jianhe Hong, Shuen Hou, Levente Vitos and Hongyun Jin*

