

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.

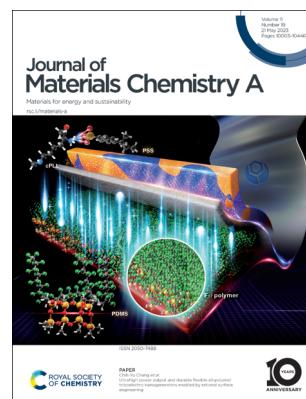
IN THIS ISSUE

ISSN 2050-7488 CODEN JMCAET 11(19) 10003-10446 (2023)



Cover

See Xiuqing Hao *et al.*,
pp. 10164–10173. Image
reproduced by permission of
Xiuqing Hao from *J. Mater.
Chem. A*, 2023, **11**, 10164.



Inside cover

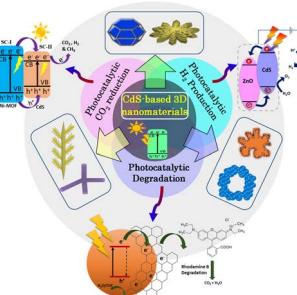
See Chih-Yu Chang *et al.*, pp. 10174–10183. Image reproduced by permission of Chih-Yu Chang from *J. Mater. Chem. A*, 2023, 11, 10174.

REVIEWS

10015

CdS based 3D nano/micro-architectures: formation mechanism, tailoring of visible light activities and emerging applications in photocatalytic H₂ production, CO₂ reduction and organic pollutant degradation

Jai Prakash,* Pragati Kumar, Nupur Saxena, Zonghua Pu,
Zhangsen Chen, Ankit Tyagi, Gaixia Zhang
and Shuhui Sun*



10065

The performance of and promotion strategies for degradable polymers in triboelectric nanogenerators

Caixia Gao, Wangshu Tong,* Yingge Zhang, Jiahe Zhang,
Songling Liu and Yihe Zhang*



Editorial Staff**Executive Editor**

Michaela Muehlberg

Deputy Editor

Geraldine Hay

Editorial Production Manager

Jonathon Watson

Senior Publishing Editor

Isobel Tibbets

Development Editor

Rose Wedgbury

Publishing Editors

Matthew Blow, Chris Dias, Hemma Fathima, Juan Gonzalez, Ellie Griffiths, Rob Hindle, Sam Howell, Ash Hyde, Francesca Jacklin, Evie Karkera, Shruti Karnik, Sophie Koh, Tamara Kosikova, Brian Li, Sam Mansell, Carole Martin, Kirsty McRoberts, Yasmine 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 0WF.

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 0WF, 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

Goutami 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

David Lou, Nanyang Technological University, Singapore

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

Shizhang Qiao, University of Adelaide, Australia

Jennifer Rupp, Massachusetts Institute of Technology, USA

Miriam Unterlass, University of Konstanz, 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

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. Berlinguet, University of British Columbia, Canada

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

E. Bucher, University of Leoben, Austria

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

A. Chatterpadhyay, IIT Guwahati, India

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

W. Chueh, Stanford University, USA

S. Cussen, University of Sheffield, UK

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

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 Womans 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. Lotsch, 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

Z. Schnepp, 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. Ukk, Sungkyunkwan University, Korea

E. Unger, Lung 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

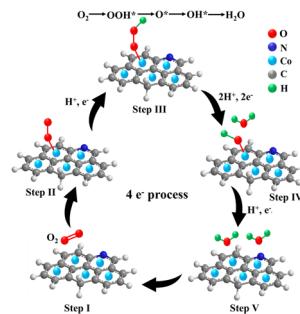


REVIEWS

10095

Understanding the mechanism and synergistic interaction of cobalt-based electrocatalysts containing nitrogen-doped carbon for $4 e^-$ ORR

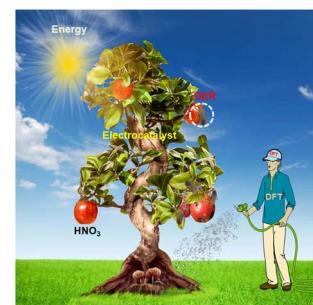
Fatima Nasim and Muhammad Arif Nadeem*



10125

Progress of electrochemical synthesis of nitric acid: catalyst design, mechanistic insights, protocol and challenges

Ashadul Adalder, Sourav Paul and Uttam Kumar Ghorai*

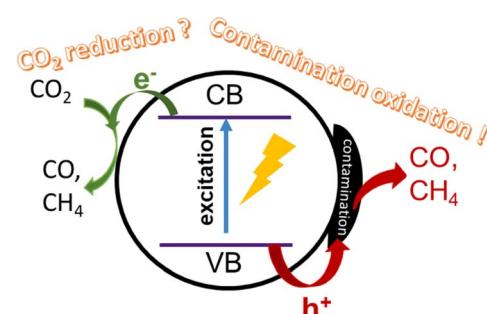


COMMUNICATIONS

10149

How carbon contamination on the photocatalysts interferes with the performance analysis of CO_2 reduction

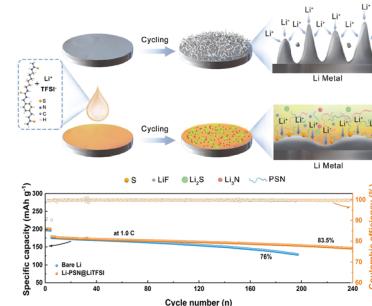
Jiakang You, Mu Xiao, Siqi Liu, Haijiao Lu, Peng Chen, Zhi Jiang, Wenfeng Shangguan, Zhiliang Wang* and Lianzhou Wang*



10155

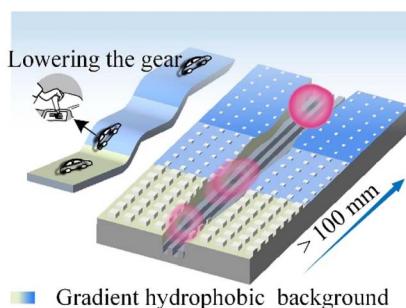
A polythiourea protective layer for stable lithium metal anodes

Xiaoya He, Zhu Liu, Yulian Yang, Zhiyong Wang, Yuanmao Chen, Qicheng Zhang, Zhangqin Shi, Yihong Tan,* Xinyang Yue* and Zheng Liang*



PAPERS

10164



Achieving ultralong directional liquid transportation spontaneously with a high velocity

Qiankai Liu, Jie Zhang, Pengcheng Sun, Jianping Wang, Wei Zhao, Guolong Zhao, Ni Chen, Yinfei Yang, Liang Li, Ning He, Zuankai Wang and Xiuqing Hao*

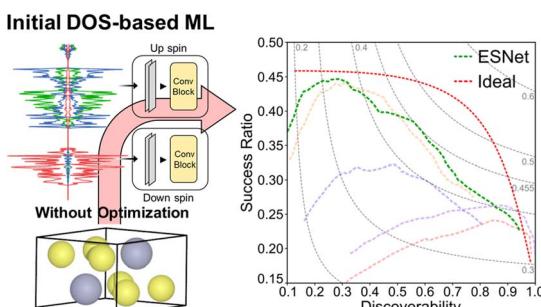
10174



Ultrahigh power output and durable flexible all-polymer triboelectric nanogenerators enabled by rational surface engineering

Ying-Ying Chen, T. S. T. Balamurugan, Chih-Yu Chang,* Chih-Yuan Hsu, Chih-Yu Fang, Yi-Shan Liu and Li-Fu Ho

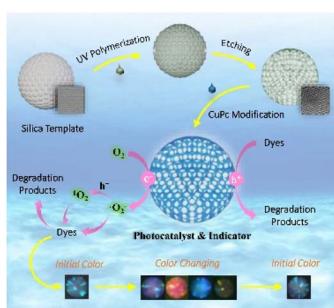
10184



A chemically inspired convolutional neural network using electronic structure representation

Dong Hyeon Mok, Daeun Shin, Jonggeol Na* and Seoin Back*

10195



Copper phthalocyanine modified hydrogel inverse opal beads for enhanced photocatalytic removal of dyes

Fengtong Shen, Jingzhen Wang, Libin Wang, Linlin Zang,* Qing Xu, Liguo Sun* and Yanhong Zhang*



PAPERS

10204

Melamine sponge templated synthesis of nickel nanoparticles encapsulated in B, N co-doped carbon nanotubes towards the selective electrosynthesis of hydrogen peroxide

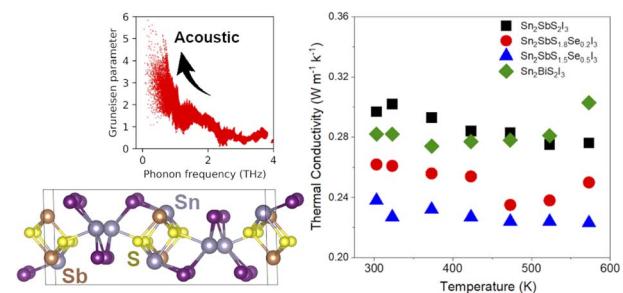
Hui Xu, Shengbo Zhang, Xinyuan Zhang, Min Xu, Jing Geng, Miaomiao Han* and Haimin Zhang*



10213

Ultralow thermal conductivity in the mixed-anion solid solution $\text{Sn}_2\text{SbS}_{2-x}\text{Se}_x\text{I}_3$

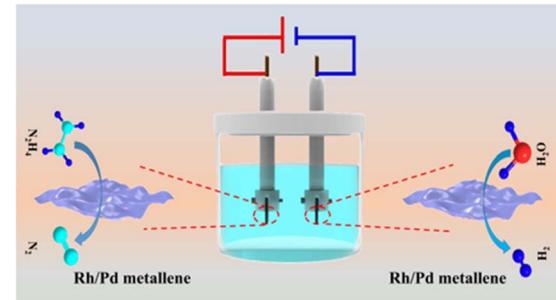
Justin Mark, Wenhao Zhang, Kazuhiko Maeda, Takafumi Yamamoto, Hiroshi Kageyama and Takao Mori*



10222

Heterointerface engineering of Rh/Pd metallene for hydrazine oxidation-assisted energy-saving hydrogen production

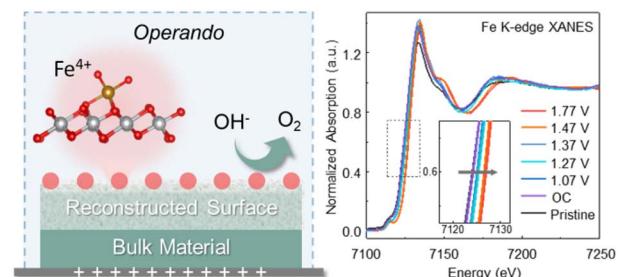
Ziqiang Wang, Guanghui Yang, Pengjun Tian, Kai Deng, Hongjie Yu, You Xu, Xiaonian Li, Hongjing Wang* and Liang Wang*



10228

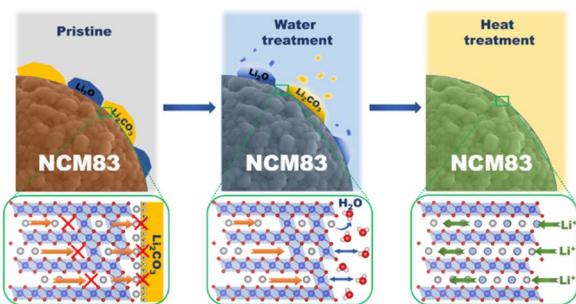
Dynamically activating Ni-based catalysts with self-anchored mononuclear Fe for efficient water oxidation

Zhiyuan Zhang, Yuting Luo, Kun Wang, Qiangmin Yu, Xin Kang, Yingqi Liu, Ke Xie, Zhengxing Lv, Zhibo Liu, Fengning Yang, Heming Liu, Ke Liu, Jiong Li, Guangmin Zhou, Wencai Ren, Hui-Ming Cheng, Jia Li,* Shuo Zhang* and Bilu Liu*



PAPERS

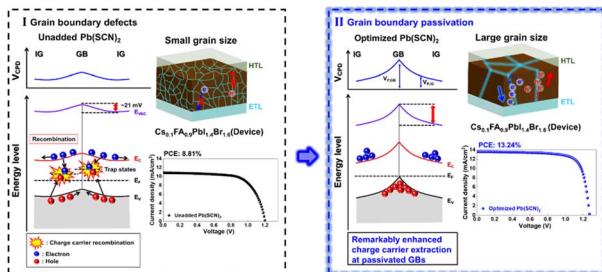
10239



Fast charge storage kinetics by surface engineering for Ni-rich layered oxide cathodes

Jiacheng Wang, Zhenyu Zhang, Weitao He, Zhixuan Wang, Suting Weng, Quan Li, Xuefeng Wang, Suelen Barg, Liquan Chen, Hong Li and Fan Wu*

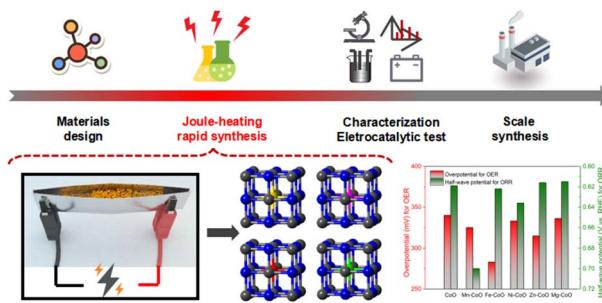
10254



Wide-bandgap perovskites for multijunction solar cells: improvement of crystalline quality of $\text{Cs}_{0.1}\text{FA}_{0.9}\text{PbI}_{1.4}\text{Br}_{1.6}$ by using lead thiocyanate

Thuy Thi Nguyen, Jihyun Kim, Yeon Soo Kim, Bich Phuong Nguyen and William Jo*

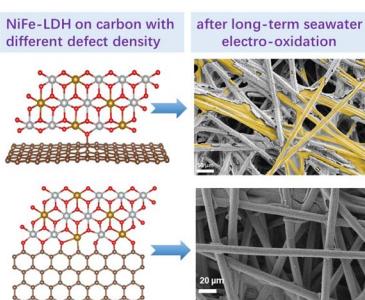
10267



Rapid synthesis of doped metal oxides via Joule heating for oxygen electrocatalysis regulation

Yajing Li, Han Wu, Jinfeng Zhang, Qi Lu, Xiaopeng Han, Xuerong Zheng, Yida Deng* and Wenbin Hu

10277



Effects of carbon defects on interfacial anchoring of NiFe-LDH for seawater electro-oxidation

Heng Xu, Shi-Jun Xie, Chao Lv, Jun-Tao Li, Yao Zhou* and Shi-Gang Sun*

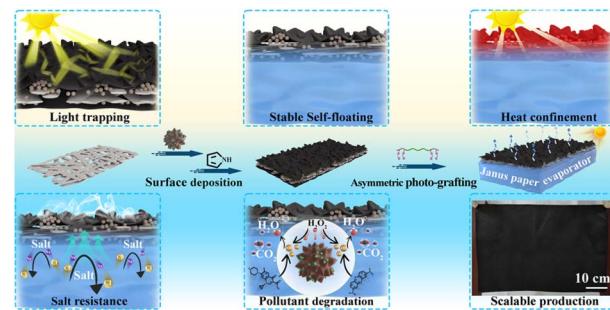


PAPERS

10287

Toward multitasking solar desalination: a Janus and scalable paper evaporator with light trapping, heat confinement, salt resistance, and pollutant degradation

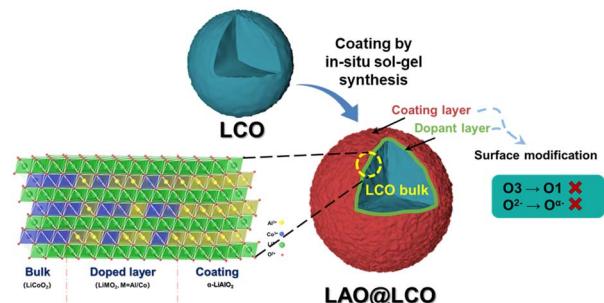
Xin Wang,* Zilong Li, Shuyang Xing, Wei Kuang, Cuihua Dong and Yingying Liu*



10297

Epitaxial growth of a single hexagonal layered α -LiAlO₂ coating on a high-voltage LiCoO₂ cathode material for enhanced stability

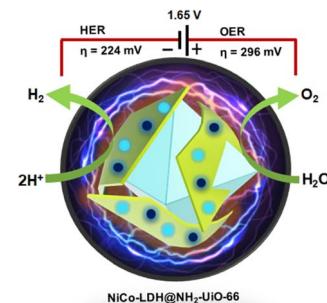
Jiahui Zheng, Yong Wang, Mengmeng Qin, Lidong Sun, Cong Peng, Yu Li* and Wei Feng*



10309

An ultrathin 2D NiCo-LDH nanosheet decorated NH₂-UiO-66 MOF-nanocomposite with exceptional chemical stability for electrocatalytic water splitting

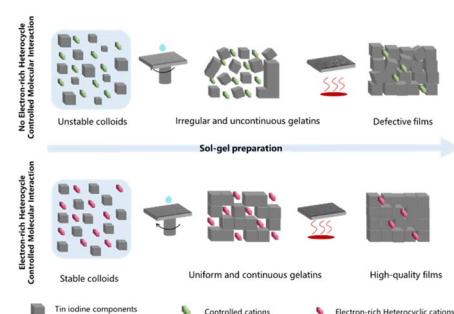
Saddam Sk, Ragunath Madhu, Deepak S. Gavali, Vidha Bhasin, Ranjit Thapa, Shambhu Nath Jha, Dibyendu Bhattacharyya, Subrata Kundu* and Ujjwal Pal*



10319

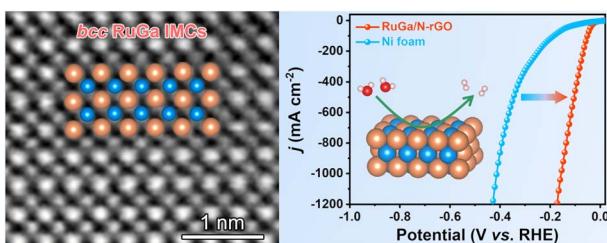
Molecular interaction modulating Ruddlesden–Popper tin-based perovskite crystallization

Han Pan,* Yong Zheng, Wenqing He, Wenxing Yang,* Xiu Gong, Xiaodong Liu, Qiang Wei, Yan Liu, Yan Shen and Mingkui Wang*



PAPERS

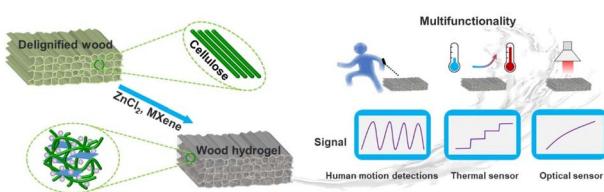
10328



Atomically dispersed ruthenium sites with electron-rich environments in intermetallic compounds for high-current-density hydrogen evolution

Huaifang Zhang, Chuanqi Cheng, Jin Zhou, Chaoqun Ma, Peidong Shi, Haoming Wu, Pengfei Yin, Wenbin Cao, Jing Xia, Lijie Zhu,* An-Liang Wang* and Qipeng Lu*

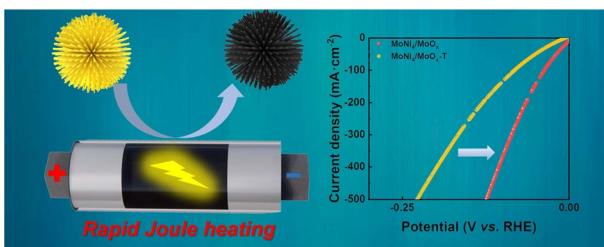
10337



Construction of MXene functionalized wood-based hydrogels using $ZnCl_2$ aqueous solution for flexible electronics

Zhongguo Wang, Xiong-Fei Zhang,* Lian Shu and Jianfeng Yao*

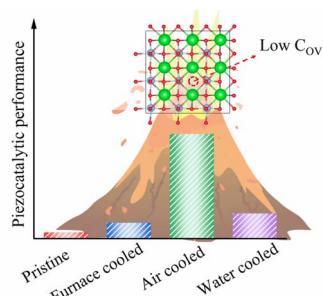
10346



Rapid synthesis of efficient Mo-based electrocatalyst for the hydrogen evolution reaction in alkaline seawater with 11.28% solar-to-hydrogen efficiency

Zhan Zhao, Jianpeng Sun, Zizhen Li, Xiaofeng Xu, Zisheng Zhang, Chunhu Li, Liang Wang and Xiangchao Meng*

10360



Significantly enhanced piezocatalytic activity of $BaTiO_3$ by regulating the quenching process

Cheng-Chao Jin,* Jun-Di Ai, Dai-Ming Liu, Li-Ning Tan, Liang Cao, Bing-Lin Shen, Xu-Ting Qiu and Ling-Xia Zhang*

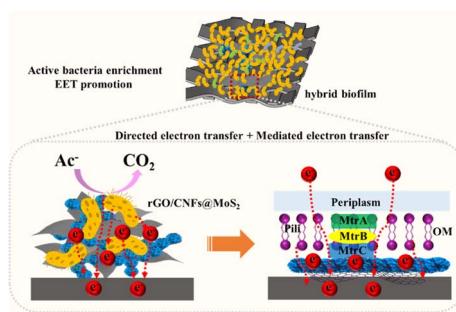


PAPERS

10371

Nanoflower-like MoS₂ anchored on electrospun carbon nanofiber-interpenetrated reduced graphene oxide as a microbial fuel cell anode achieving high power density

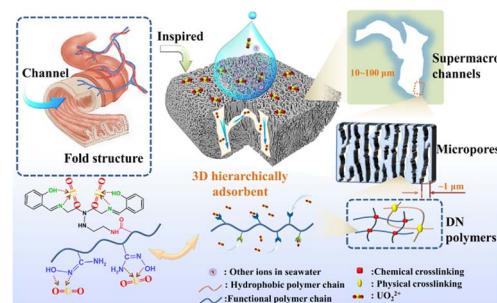
Yuanfeng Liu, Tingli Ren, Zijing Su and Congju Li*



10384

A 3D hierarchical porous adsorbent constructed by cryo-polymerization for ultrafast uranium harvesting from seawater

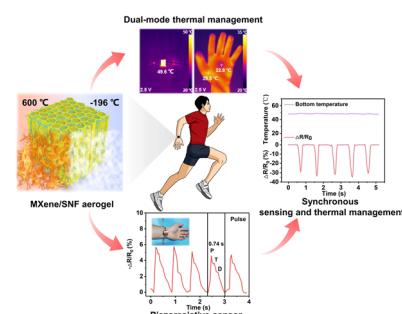
Dagang Li, Yaozu Liao,* Zheng Chen, Xixin Chang, Xu Zhang, Chongcheng Chen, Chang Cui, Zilei Zhang, Constantin Muhire, Weiwu Tang, Dongxiang Zhang,* Jinying Li and Xiyan Xu*



10396

An extreme condition-resistant superelastic silica nanofiber/MXene composite aerogel for synchronous sensing and thermal management

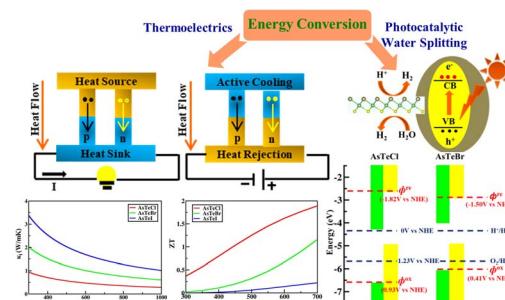
Jiafei Ren, Xing Huang, Ruolin Han, Guangxin Chen, Zheng Zhou* and Qifang Li*



10413

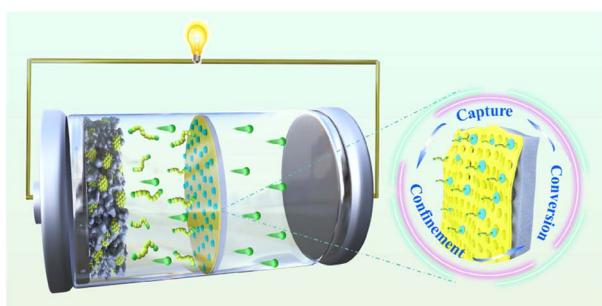
As-based ternary Janus monolayers for efficient thermoelectric and photocatalytic applications

Poonam Chauhan, Jaspreet Singh and Ashok Kumar*



PAPERS

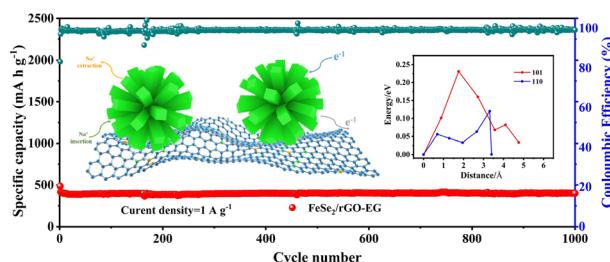
10425



Developing a MXene quantum dot-based separator for Li-S batteries

Ke Yang, Chan Li, Haoyuan Qi, Yunfei Dai, Yuhong Cui and Yibo He*

10435

Effect of solvent on the crystal phase, morphology, and sodium storage performance of FeSe₂

Manman Ren,* Haoting Zang, Shilei Cao, Hongling Guo, Jihui Zhang, Weiliang Liu, Jinshui Yao, Xu Zhang* and Zhen Zhou

