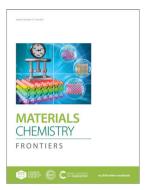
# **MATERIALS** CHEMISTRY

## **FRONTIERS**

# rsc.li/frontiers-materials

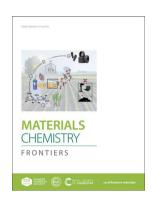
### IN THIS ISSUE

ISSN 2052-1537 CODEN MCFAC5 7(11) 2095-2288 (2023)



### Cover

See Mu Li, Zeren Li et al., pp. 2102-2119. Image reproduced by permission of Zeren Li from Mater. Chem. Front., 2023, 7, 2102.



### Inside cover

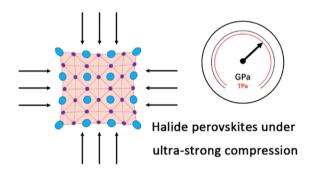
See Tizazu H. Mekonnen et al., pp. 2208-2224. Image reproduced by permission of Tizazu H. Mekonnen from Mater. Chem. Front., 2023, 7, 2208.

### **REVIEWS**

### 2102

### Halide perovskites and high-pressure technologies: a fruitful encounter

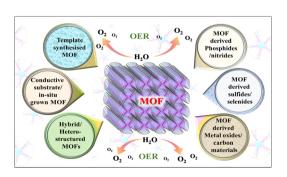
Fang Xu, Yongtao Zou, Yanmeng Dai, Mu Li\* and Zeren Li\*



### 2120

Recent developments in transition metal-based MOFs for electrocatalytic water splitting emphasizing fundamental and structural aspects

Ragunath Madhu, Arun Karmakar, Krishnendu Bera, Sreenivasan Nagappan, Hariharan N Dhandapani, Aditi De, Suprobhat Singha Roy and Subrata Kundu\*



#### **EDITORIAL STAFF**

**Executive Editor** 

Wenjun Liu

Kailin Deng

Cheng Du

**Editorial Production Manager** 

Helen Saxton

Senior Publishing Editor

Becky Webb

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

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: MaterChemFrontiersPROD@rsc.org

For pre-submission queries please contact Wenjun Liu, Executive Editor. Email: MaterChemFrontiersED@rsc.org

Materials Chemistry Frontiers (electronic: ISSN 2052-1537) 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

2023 Annual (electronic) subscription price: £1,369; US\$2,247. 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 W1I 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



# **MATERIALS** CHEMISTRY

# FRONTIFRS

An international, high impact journal for cutting-edge researches from all disciplines of materials chemistry.





### rsc.li/frontiers-materials

Published in collaboration with the Chinese Chemical Society and Institute of Chemistry, Chinese Academy of Sciences

#### Editor-in-Chief

Shu-Hong Yu, University of Science and Technology of China, China

#### Associate Editors

Shu Seki, Kvoto University, Japan Andrea Tao, University of California, San Diego, USA

Dan Wang, Institute of Process Engineering, Chinese Academy of Sciences, China Guillaume Wantz, Université de Bordeaux,

Huanghao Yang, Fuzhou University, China

#### Members

Feihe Huang, Zhejiang University, China Zhen Li, Wuhan University, China Marina A. Petrukhina, University at Albany, USA Emilie Ringe, University of Cambridge, UK

Kazuo Tanaka, Kyoto University, Japan

### **Advisory Board**

Takuzo Aida, The University of Tokyo, Japan J Paul Attfield, University of Edinburgh, UK Guillermo C Bazan, UC Santa Barbara, USA Liming Ding, National Center for Nanoscience and Technology, China

Xinliang Feng, Technische Universität Dresden, Germany

Jiaxing Huang, Northwestern University, USA Parameswar K. Iyer, Indian Institute of Technology Guwahati, India Samson Jenekhe, University of Washington,

Hua Kuang, Jiangnan University, China Mario Leclerc, Université Laval, Canada Xingjie Liang, National Center for Nanoscience John Reynolds, Georgia Institute of and Techonolgy, China Bin Liu, National University of Singapore,

Singapore Dongsheng Liu, Tsinghua University, China

Shaoqin Liu, Harbin Institute of Technology,

Xianjun Loh, Institute of Materials Research

and Engineering, Singapore Mark J MacLachlan, University of British Columbia, Canada

Krzysztof Matyjaszewski, Carnegie Mellon University, USA Klause Müllen, Max Planck Institute for

Polymer Research, Germany Thuc Quyen Nguyen, University of California, Santa Barbara, USA

Kyoko Nozaki, The University of Tokyo, Japan Aniun Oin, South China University of Technology, China Olof Ramström, University of Massachusetts

Lowell, USA Technology, USA

Ullrich Scherf, University of Wuppertal, Germany

Patrick Théato, Karlsruhe Institute of Technology, Germany Christoph Weder, University of Fribourg, Switzerland

Karen L. Wooley, Texas A&M University, USA James Wuest, Université de Montréal, Canada Dongsheng Xu. Peking University, China Jiannian Yao, Institute of Chemistry, Chinese Academy of Sciences, China

Juyoung Yoon, Ewha Womans University, South Korea

Jihong Yu, Jilin University, China Deqing Zhang, Institute of Chemistry, Chinese Academy of Sciences, China

Hua Zhang, City University of Hong Kong. Qichun Zhang, City University of Hong Kong,

China Tierui Zhang, Technical Institute of Physics

and Chemistry, China Xi Zhang, Tsinghua University, China Yuliang Zhao, National Center for Nanoscience

and Technology, China Weihong Zhu, East China University of Science & Technology, China

Tayebeh Ameri, University of Munich, Germany

Derva Baran, King Abdullah University of Science and Technology, Saudi Arabia Xiaoyu Cao, Xiamen University, China Changle Chen, University of Science and Technology of China, China Sijie Chen, Karolinska Institutet, Hong Kong,

Dan Ding, Nankai University, China Kenneth Graham, University of Kentucky, USA Xinggui Gu, Beijing University of Chemical Technology, China Yuning Hong, La Trobe University, Australia

Zhong'an Li, Huazhong University of Science and Technology, China

Yingying Lu, Zhejiang University, China T. N. Narayanan, Tata Institute of Fundamental Research, India

Shohei Saito, Kyoto University, Japan Youhong Tang, Flinders University, Australia Takaya Terashima, Kyoto University, Japan Reji Varghese, Indian Institute of Science Education and Research, India

Jiangyan Wang, Institute of Process Engineering, Chinese Academy of Sciences, China

Yan Wei, Peking University School and Hospital of Stomatology, China Haihua Xiao, Institute of Chemistry, Chinese Academy of Sciences, China Yurui Xue, Shandong University, China Jing Yu, Nanyang Technological University, Singapore

Guoqing Zhang, University of Science and Technology of China, China

### Information for Authors

Full details on how to submit material for publication in Materials Chemistry Frontiers are given in the Instructions for Authors (available  $from \ \textbf{http://www.rsc.org/authors}). Submissions should be made via the \\ for non-commercial purposes, or criticism or review, as permitted \\ for non-commercial purposes, or criticism or review, as permitted \\ for non-commercial purposes, or criticism or review, as permitted \\ for non-commercial purposes, or criticism or review, as permitted \\ for non-commercial purposes, or criticism or review, as permitted \\ for non-commercial purposes, or criticism or review, as permitted \\ for non-commercial purposes, or criticism or review, as permitted \\ for non-commercial purposes, or criticism or review, as permitted \\ for non-commercial purposes, or criticism or review, as permitted \\ for non-commercial purposes, or criticism or review, as permitted \\ for non-commercial purposes, or criticism or review, as permitted \\ for non-commercial purposes, or criticism or review, as permitted \\ for non-commercial purposes, or criticism or review, as permitted \\ for non-commercial purposes, or criticism or review, as permitted \\ for non-commercial purposes, or criticism or review, as permitted \\ for non-commercial purposes, or criticism or review, as permitted \\ for non-commercial purposes, or criticism or review, as permitted \\ for non-commercial purposes, or criticism or review, as permitted \\ for non-commercial purposes, or criticism or review, as permitted \\ for non-commercial purposes, or criticism or review, as permitted \\ for non-commercial purposes, or criticism or review, as permitted \\ for non-commercial purposes, or criticism or review, as permitted \\ for non-commercial purposes, or criticism or review, as permitted \\ for non-commercial purposes, or criticism or review, as permitted \\ for non-commercial purposes, or criticism or review, as permitted \\ for non-commercial purposes, or criticism or review, as permitted \\ for non-commercial purposes, or criticism or review \\ for non-commercial purposes, or criticism or review \\ for non-commercial purposes, or criticism or review \\ for non-commercial purposes, or critic$ journal's homepage: rsc.li/frontiers-materials

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 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.

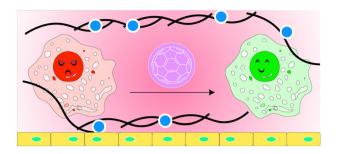
Registered charity number: 207890

### **REVIEWS**

### 2153

# Interactions between fullerene derivatives and biological systems

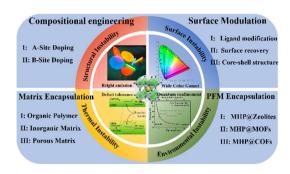
Mark John Siringan, Abhiram Dawar and Jianyuan Zhang\*



### 2175

# Stability improvements of metal halide perovskite nanocrystals and their optoelectrical applications

Yuhua Wang,\* Jiejun Ren, Xiaopeng Zhou and Gangyi Zhang

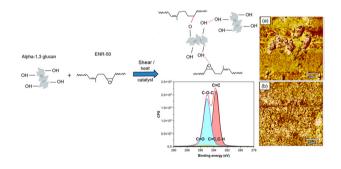


### **RESEARCH ARTICLES**

### 2208

Sustainable natural rubber composites: masterbatch development of epoxidized natural rubber grafted to designed enzymatic polysaccharides

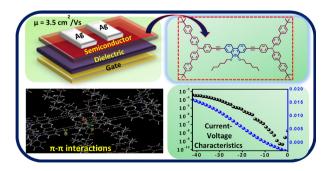
Azin Adibi, Leonardo Simon, Christian Lenges and Tizazu H. Mekonnen\*



### 2225

Acetylene bridged alkoxyphenanthrene and triarylamine-based triads for low threshold voltage with high mobility OFETs

Balu Balambiga, Panneerselvam Devibala, Deivendran Harshini, Predhanekar Mohamed Imran and Samuthira Nagarajan\*



### **RESEARCH ARTICLES**

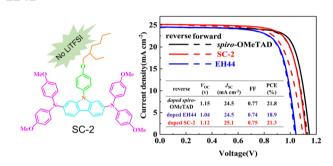
### 2235



### Tin-based organic-inorganic metal halides with a reversible phase transition and thermochromic response

Gele Teri, Hao-Fei Ni, Qing-Feng Luo, Xiao-Ping Wang, Jun-Qin Wang, Da-Wei Fu\* and Qiang Guo\*

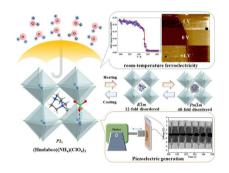
### 2241



### Low-cost and LiTFSI-free diphenylaminesubstituted hole transporting materials for highly efficient perovskite solar cells and modules

Shengli Su, Pin Lv, Min Hu,\* Yuxi Zhang, Huiyu Yin, Yanqing Zhu, Junye Pan, Yulong Wang, Wangnan Li,\* Yaoguang Rong, Zhiliang Ku, Fuzhi Huang, Yi-Bing Cheng and Jianfeng Lu\*

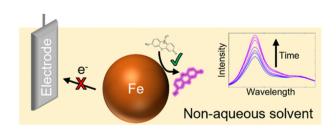
### 2251



# A room-temperature moisture-stabilized metal-free energetic ferroelectric material for piezoelectric generation

Jun Wang, Xiao-Xian Chen, Le Ye, Ya-Ping Gong, Yu Shang and Wei-Xiong Zhang\*

### 2260



## Reduction reactions at metal/non-aqueous interfaces can be sensed with the turn-on fluorophore resazurin

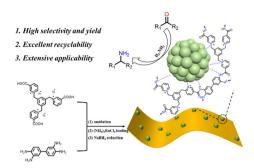
Zachary Gatland, Daniel Madrid, Mark Siegel and Lydia Kisley\*

### **RESEARCH ARTICLES**

### 2266

# lonic polyamide boosting Ru efficiency in reductive amination of carbonyl compounds

Qizhi Hu, Hongzhong Xu, Yue Wu, Shi Jiang,\* Jun Wang\* and Yu Zhou\*



### 2277

# A hollow viologen-based porous organic polymer for the catalytic cycloaddition of CO<sub>2</sub>

Hao Luo, Shun Wang, Xianyu Meng, Gang Yuan, Xiaowei Song\* and Zhiqiang Liang\*

