

# Journal of Materials Chemistry C

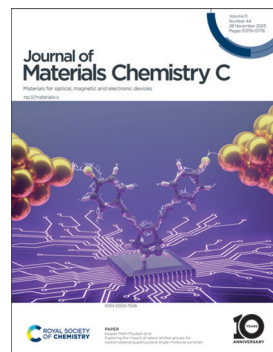
Materials for optical, magnetic and electronic devices

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

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.

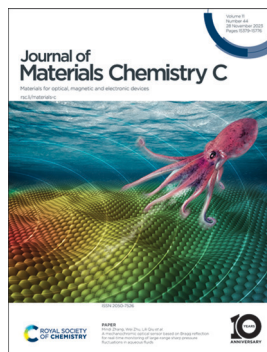
## IN THIS ISSUE

ISSN 2050-7526 CODEN JMCCCX 11(44) 15379–15776 (2023)



### Cover

See Kasper Moth-Poulsen *et al.*, pp. 15412–15418. Image reproduced by permission of Zacharias Liasi from *J. Mater. Chem. C*, 2023, **11**, 15412.



### Inside cover

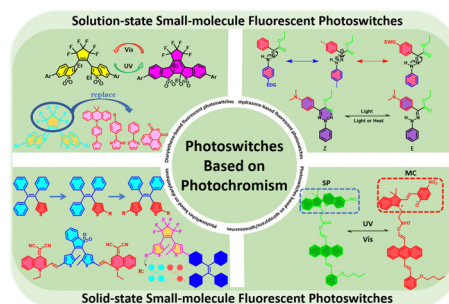
See Mindi Zhang, Wei Zhu, Lili Qiu *et al.*, pp. 15419–15425. Image reproduced by permission of Lili Qiu from *J. Mater. Chem. C*, 2023, **11**, 15419.

## REVIEW

15393

### Recent advances in small-molecule fluorescent photoswitches with photochromism in diverse states

Yuzhen Wu, Yuqing Zhu, Chuangye Yao, Jiale Zhan, Penglei Wu, Zhengdong Han, Jiaqi Zuo, Hui Feng and Zhaosheng Qian\*

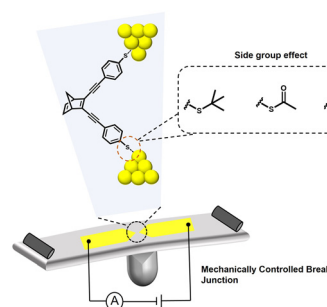


## PAPERS

15412

### Exploring the impact of select anchor groups for norbornadiene/quadracyclane single-molecule switches

Shima Ghasemi, Luca Ornago, Zacharias Liasi, Magnus Bukhave Johansen, Theo Juncker von Buchwald, Andreas Erbs Hillers-Bendtsen, Sebastiaan van der Poel, Helen Hölzel, Zhihang Wang, Françoise M. Amombo Noa, Lars Öhrström, Kurt V. Mikkelsen, Herre S. J. van der Zant, Samuel Lara-Avila and Kasper Moth-Poulsen\*



## Editorial Staff

### Executive Editor

Michaela Mühlberg

### Deputy Editor

Geraldine Hay

### Editorial Production Manager

Jonathon Watson

### Senior Publishing Editor

Fiona Iddon

### Development Editor

Rose Wedgbury

### Publishing Editors

Matthew Blow, Sam Howell, Evie Karkera, Carole Martin,

Kirsty McRoberts

### Editorial Assistant

Daniel Smith

### Publishing Assistant

Jane Paterson

### Publisher

Sam Keltie

For queries about submitted papers, please contact

Jonathon Watson, Editorial Production Manager

in the first instance. E-mail: [materialsC@rsc.org](mailto:materialsC@rsc.org)

For pre-submission queries please contact

Michaela Mühlberg, Executive Editor.

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

Journal of Materials Chemistry C (electronic: ISSN 2050-7534) 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](mailto:orders@rsc.org)

2023 Annual (electronic) subscription price: £2521; \$4046.

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)

# Journal of Materials Chemistry C

[rsc.li/materials-C](http://rsc.li/materials-C)

*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 C* covers materials with applications in optical, magnetic and electronic devices.

## Editorial Board

### Editor-in-Chief

Natalie Stingelin, Georgia Institute of Technology, USA

### Associate Editors

A. S. Achalkumar, Indian Institute of

Technology, India

Rachel Crespo-Otero, University College

London, UK

Renaud Demadrille, Interdisciplinary

Research Institute of Grenoble, France

Antonio Facchetti, Northwestern University,

USA

Unjong Jeong, POSTECH, South Korea

Oana Jurchescu, Wake Forest University, USA

Mingzhu Li, Technical Institute of Physics and Chemistry, Chinese Academy of Sciences, China

Martyn McLachlan, Imperial College

London, UK

Kasper Moth-Poulsen, Chalmers University

of Technology, Sweden

Ana Nogueira, University of Campinas, Brazil

Erin Ratcliff, University of Arizona, USA

Federico Rosei, University of Trieste, Italy

Yana Vayznof, Technical University of Dresden, Germany

Maia Vergniory, Max Planck Institute for Chemical Physics of Solids, Germany

Ni Zhao, Chinese University of Hong Kong, Hong Kong

Zhiguo Xia, South China University of

Technology, China

Hao-Li Zhang, Lanzhou University, China

## Advisory Board

Z. Bao, Stanford University, USA

L. Biniek, Institut Charles Sadron - Strasbourg,

France

H. Bronstein, University of Cambridge, UK

P. Carbone, University of Manchester, UK

J. Casado, University of Malaga, Spain

R. Chandrasekar, University of Hyderabad,

India

L. X. Chen, Northwestern University, USA

Y.-J. Cheng, National Chiao Tung University,

Taiwan

M. Chhowalla, University of Cambridge, UK

C. Chi, National University of Singapore,

Singapore

L. Chua, National University of Singapore,

Singapore

P. Data, Silesian University of Technology,

Poland

O. Dautel, University of Montpellier, France

F. Dias, Durham University, UK

M. Fourmigué, University of Rennes, France

G. Frey, MIT WPU Campus, Israel

A. Fukazawa, Kyoto University, Japan

C. F. O. Graeff, UNESP, Brazil

M. Green, King's College London, UK

E. von Hauff, VU Amsterdam, The Netherlands

S. Heutz, Imperial College London, UK

L. Hueso, CIC nanoGUNE, Spain

C. S. Hwang, Seoul National University, South

Korea

M. Jeffries-El, Boston University, USA

A. Köhler, University of Bayreuth, Germany

H. Kuang, Jiangnan University, China

T. Kusamoto, Institute for Molecular Science,

Japan

M. Lira-Cantú, Catalan Institute of

Nanoscience and Nanotechnology, Spain

M. Loi, University of Groningen, The

Netherlands

Y.-L. Loo, Princeton University, USA

S. Marder, University of Colorado Boulder, USA

M. Mas-Torrent, Institute of Materials Science

of Barcelona, Spain

I. McCulloch, University of Oxford, UK

J. Milic, University of Fribourg, Switzerland

E. Moons, Karlstad University, Sweden

H. Mori, University of Tokyo, Japan

C. Müller, Chalmers University of Technology,

Sweden

T.-Q. Nguyen, University of California, Santa

Barbara, USA

J. Ouyang, National University of Singapore,

Singapore

T. Penfold, Newcastle University, UK

I. Perepichka, Institute of Flexible Electronics

of Northwestern Polytechnical University,

Xi'an, China

D. Qin, Georgia Institute of Technology, USA

C. Risko, University of Kentucky, USA

N. Robertson, University of Edinburgh, UK

A. Salleo, Stanford University, USA

P. Samori, University of Strasbourg, France

C. Santato, Polytechnique Montréal, Canada

A. Sastre-Santos, Miguel Hernández University

of Elche, Spain

D. Scanlon, University College London, UK

U. Schwingenschlög, King Abdullah University

of Science and Technology, Saudi Arabia

R. Seshadri, University of California, Santa

Barbara, USA

R. Sessoli, University of Florence, Italy

C. Silva, Georgia Institute of Technology, USA

P. Skabara, University of Glasgow, UK

Y. Song, Institute of Chemistry, CAS, China

J. Travaš-Sejdic, University of Auckland, New

Zealand

A. Troisi, University of Liverpool, UK

K. Vandewal, Hasselt University, Belgium

C. Weder, University of Fribourg, Switzerland

G. Welch, University of Calgary, Canada

W.-Y. Wong, The Hong Kong Polytechnic

University, China

Y. Yin, University California Riverside, USA

A. Zayats, King's College London, UK

X. Zhan, Peking University, China

Q. Zhang, City University of Hong Kong,

Hong Kong

## Information for Authors

Full details on how to submit material for publication in Journal of Materials Chemistry C 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-c](http://rsc.li/materials-c). 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

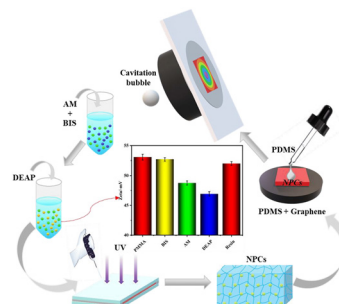


## PAPERS

15419

# A mechanochromic optical sensor based on Bragg reflection for real-time monitoring of large-range sharp pressure fluctuations in aqueous fluids

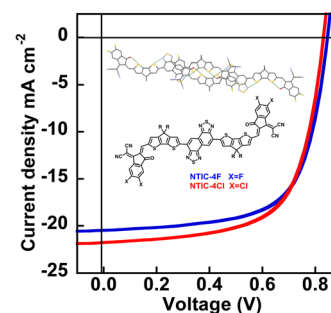
Wenxiang Zheng, Zhenkun Tan, Jing Fan, Zihui Meng, Mindi Zhang,\* Biao Huang, Xiyu Jia, Feng Ma, Wei Zhu,\* Shushan Wang and Lili Qiu\*



15426

# Design and synthesis of non-fused non-fullerene acceptors containing naphthobisthiadiazole for organic solar cells

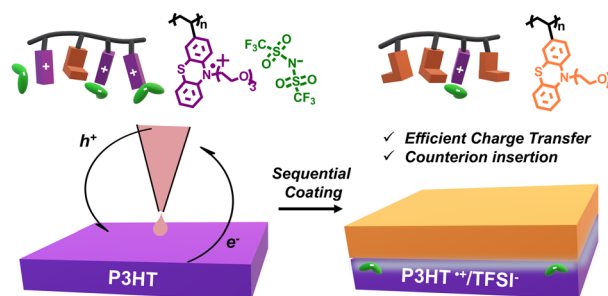
Yuanfeng Li, Difei Zhang, Zhenqiang Huang, Tianyang Zhang, Nan Zheng, Feng Peng, Lei Ying\* and Fei Huang\*



15435

# Interfacial doping of semiconducting polymers with phenothiazine-based polymeric ionic liquids

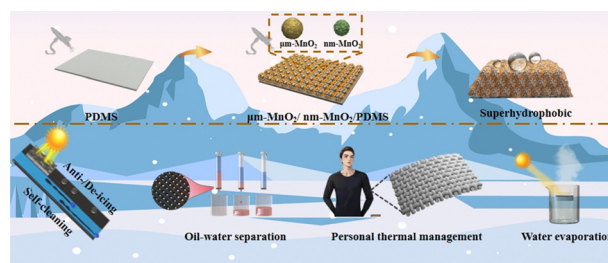
Saejin Oh, Phong H. Nguyen, Thi M. Tran, Audra J. DeStefano, Kan Tagami, Dafei Yuan, Andrei Nikolaev, Marcus Condarcure, Songi Han, Javier Read de Alaniz\* and Michael L. Chabinyc\*



15443

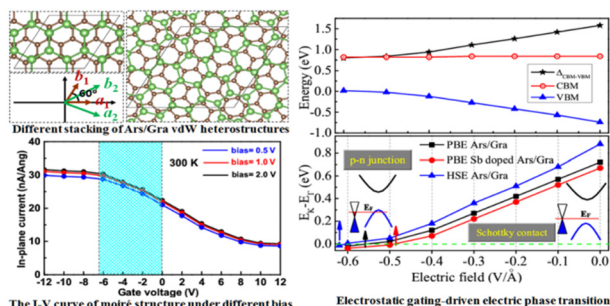
# Superhydrophobic coating with a micro- and nano-sized MnO<sub>2</sub>/PDMS composite structure for passive anti-icing/active de-icing and photothermal applications

Jialun Li, Fei Yu, Yi Jiang, Liying Wang, Yaodong Liu, Xijia Yang, Xuesong Li\* and Wei Lü\*



## PAPERS

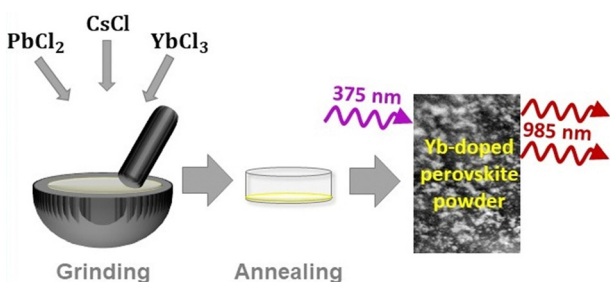
15454



### Electrostatic gating-driven transition from Schottky contact to p-n junction in moiré patterned Ars/Gra heterostructures

Chunxiang Zhao, Shuai Zhang, Chunyao Niu, Fei Wang, Bin Cui, Chong Li\* and Yu Jia

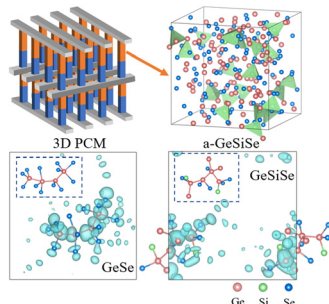
15463



### Facile synthesis of ytterbium doped cesium lead halide perovskite powder

Simona Streckaitė, Lukas Miklušis, Karolina Maleckaitė, Lamiaa Abdelrazik, Vidmantas Jašinskas, Vidas Pakštas, Audrius Drabavičius, Danielis Rutkauskas, Marius Franckevičius and Vidmantas Gulbinas\*

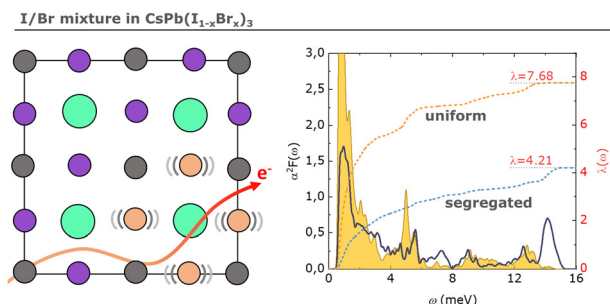
15473



### Unravelling the atomic mechanisms of tetrahedral doping in chalcogenide glass for electrical switching materials

Rongchuan Gu, Meng Xu,\* Yongpeng Liu, Yinghua Shen, Chong Qiao, Cai-Zhuang Wang, Kai-Ming Ho, Songyou Wang, Ming Xu\* and Xiangshui Miao

15482



### Phase segregation affects electron-phonon coupling in perovskite solar cell materials

Ilhan Yavuz



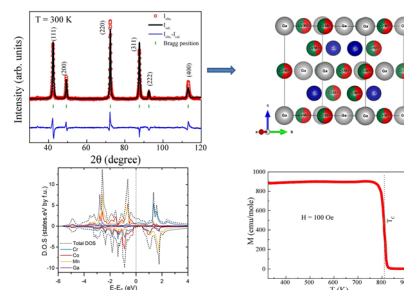


## PAPERS

15489

## CoMnCrGa: a novel ferromagnetic material with high spin-polarization for room temperature spintronics

Shuvankar Gupta, Sudip Chakraborty, Vidha Bhasin, Santanu Pakhira, Shovan Dan, Celine Barreateau, Jean-Claude Crivello, S. N. Jha, Maxim Avdeev, D. Bhattacharyya, V. Paul-Boncour and Chandan Mazumdar\*

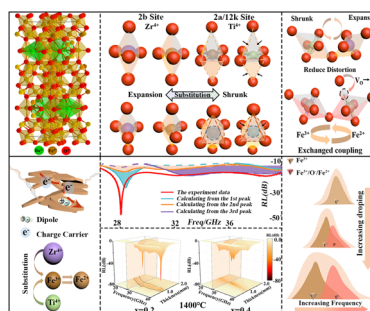


Robust Half-metallicity in disordered quaternary Heusler alloy CoMnCrGa

15500

## Abating dopant competition between dual high-valence ions in single-phased barium ferrite towards ultra-broad microwave absorption

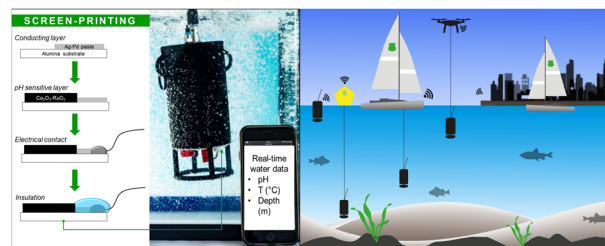
Chuyang Liu, Yilin Hao, Shiqi Zheng, Gang Fang, Jing Li, Shan Tao, Yujing Zhang\* and Piya Du\*



15512

## A high-performance pH-sensitive electrode integrated with a multi-sensing probe for online water quality monitoring

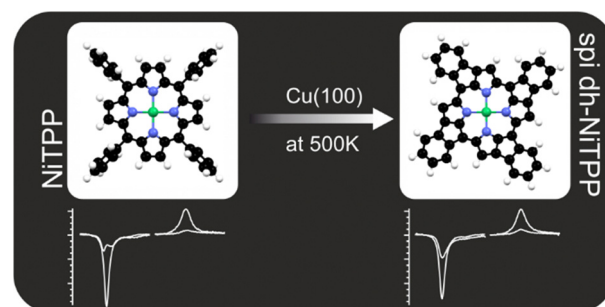
Kiranmai Uppuluri, Dorota Szwagierczak\*, Llewellyn Fernandes, Krzysztof Zaraska, Ilja Lange, Beata Synkiewicz-Musialska and Libu Manjakkal\*



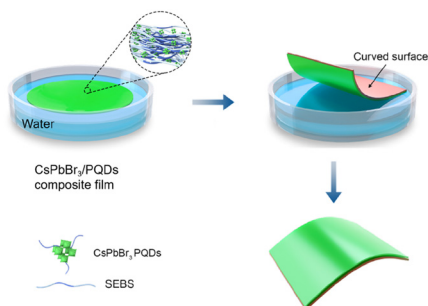
15521

## Extended $\pi$ -conjugation: a key to magnetic anisotropy preservation in highly reactive porphyrins

Iulia Cojocariu\*, Silvia Carlotto\*, Daniel Baranowski, Matteo Jugovac, Jan Dreiser, Luca Schio, Luca Floreano, Maurizio Casarin, Vitaliy Feyer\* and Claus M. Schneider



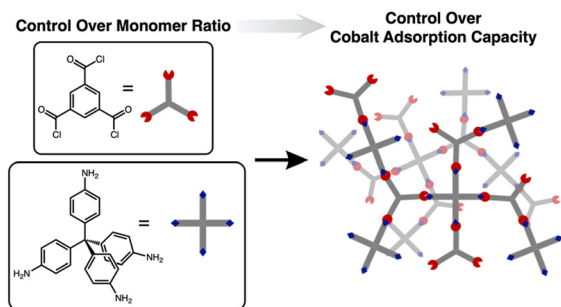
15531



### Preparation of freestanding and ultrastable CsPbX<sub>3</sub> perovskite quantum dots/SEBS composite films for curved and flexible surfaces

Yin Lv, Shuhua Tu and Min Chen\*

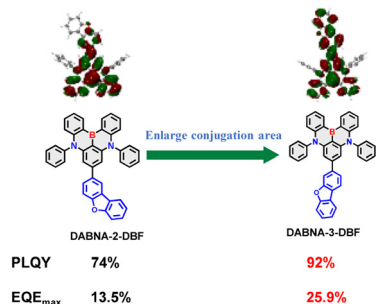
15541



### Carbonyl-rich porous organic polymers for cobalt adsorption from water

Min Chieh Yang, Devin S. Rollins, Dale L. Huber, Jou-Tsen Ou, Michael R. Baptiste, Andrea N. Zeppuhar, Fu Chen and Mercedes K. Taylor\*

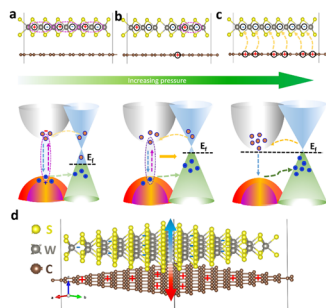
15548



### Regioisomeric effects of dibenzofuran on the properties of boron–nitrogen multiple resonance emissive materials

Hongyang Li, Hao Yan,\* Lingqiang Meng, Xiaopeng Zhang, Changchun Kuang, Zhiming Meng, Yaowu He, Hong Xu, Xinkang Zhang, Youxuan Zheng, Chaoyi Yan\* and Hong Meng\*

15555



### High carrier mobility and strong electron–phonon coupling in graphene–WS<sub>2</sub> heterobilayers under pressure

Jiapeng Zhen, Qiushi Huang, Ying Liu,\* Shihui Zhang, Hongliang Dong, Kehong Lv, Jing Qiu\* and Guanjuan Liu\*

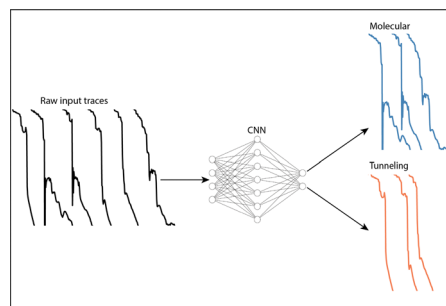


## PAPERS

15564

# A generalized neural network approach for separation of molecular breaking traces

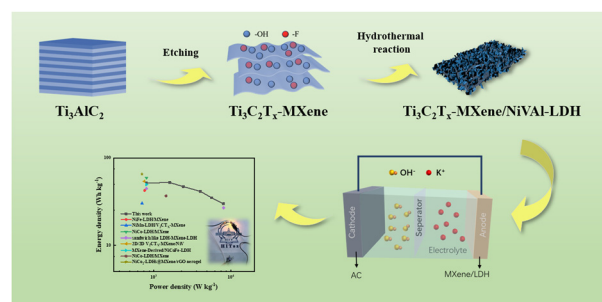
Frederik van Veen,\* Luca Ornago,  
Herre S.J. van der Zant\* and Maria El Abbassi



15571

# Synergistic coupling of NiAl-Layered double hydroxide with few-layered $\text{Ti}_3\text{C}_2\text{T}_x$ -MXene nanosheets for superior asymmetric supercapacitor performance

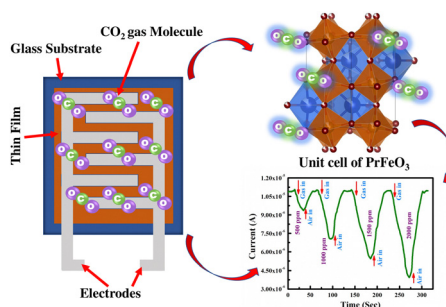
Xinsheng Zhou, Zhuoran Hou, Hua-Yu Zhang\* and Jie Yu



15581

# Cobalt-doped praseodymium *ortho* ferrite as a promising nanomaterial for carbon dioxide gas sensing

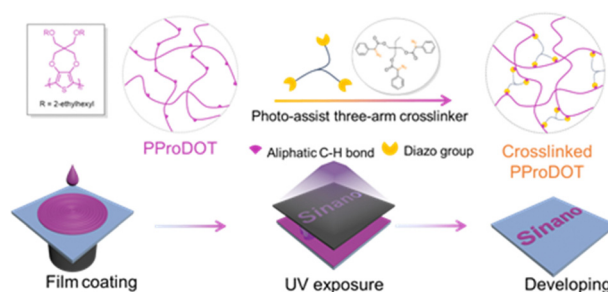
Keval Bharati, Prabhat Ranjan Tiwari, Rahul Pratap Singh, Bala, Ajeet Singh, B. C. Yadav and Santosh Kumar\*



15591

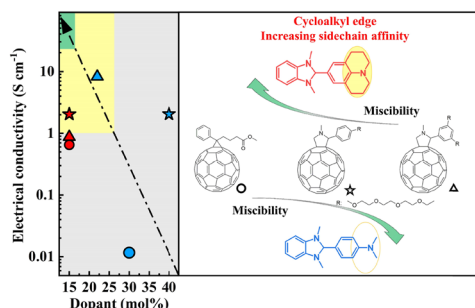
# Photolithographically patterned and highly stable electrochromic displays enabled by a photo-assisted cross-linker

Chenchao Huang, Yuan-Qiu-Qiang Yi,\* Zishou Hu, Shuo Zhang, Xinzhou Wu, Xiaolian Chen, Wenya Xu, Wenming Su\* and Zheng Cui



## PAPERS

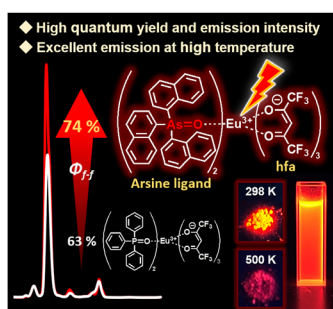
15599



### A julolidine functionalized benzimidazoline n-dopant: optimizing molecular doping in fullerene derivatives by modulating miscibility

Chenglong Li, Wei Wang, Chun Zhan,\* Qisheng Zhou, Defu Dong and Shengqiang Xiao\*

15608

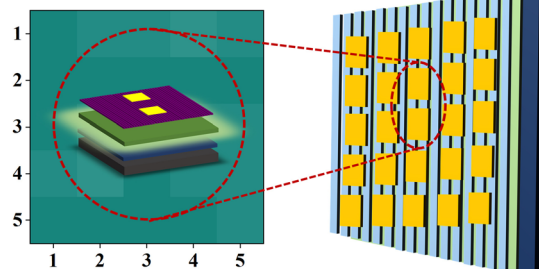


### Intensive emission of Eu(III) β-diketonate complexes with arsine oxide ligands

Haruki Shimoji, Toshiki Fujii, Akifumi Sumida, Yuichi Kitagawa, Yasuchika Hasegawa, Hiroaki Imoto\* and Kensuke Naka\*

15616

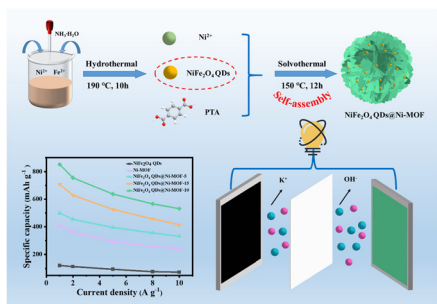
### Peak photocurrent



### Highly uniform photonic synapse arrays based on TIPS-pentacene nanowires/CsPbBr₃ heterojunctions

Hongyi Hong, Zihong Shen, Zunxian Yang,\* Yuliang Ye, Bingqing Ye, Yuanqing Zhou, Qiaocan Huang, Wenbo Wu, Zongyi Meng, Zhiwei Zeng, Songwei Ye, Zhiming Cheng, Qianting Lan, Jiaxiang Wang, Ye Chen, Hui Zhang, Tailiang Guo, Fushan Li, Zhenzhen Weng and Yongyi Chen

15624



### NiFe₂O₄ quantum dots anchored on flower-like Ni-MOF with enhanced electrochemical performance for supercapacitors

Jiaxi Xu, Hao Guo,\* Yanrui Hao, Jiaying Tian, Yinsheng Liu, Henglong Ren and Wu Yang\*

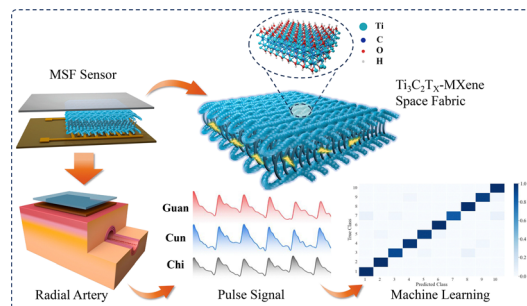




15638

## Ti<sub>3</sub>C<sub>2</sub>T<sub>x</sub>-MXene/PET textile-based flexible pressure sensor for wearable pulse monitoring

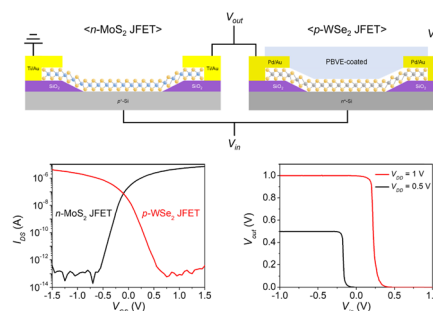
Qingchao Zhang, Huinan Zhang, Jie Liang, Xuefeng Zhao, Bo Li, Junbin Zang, Libo Gao, Zhidong Zhang\* and Chenyang Xue



15649

## A high-performance logic inverter achieved using mixed-dimensional WSe<sub>2</sub>/n<sup>+</sup>-Si and MoS<sub>2</sub>/p<sup>+</sup>-Si junction field-effect transistors

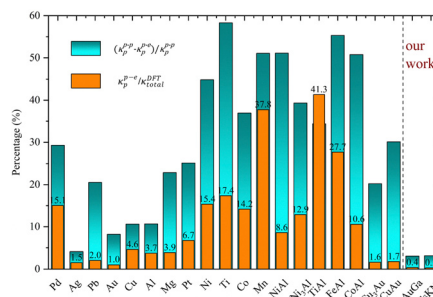
Yoonsok Kim, Taeyoung Kim, Wonchae Jeong, Mun Seok Jeong\* and Eun Kyu Kim\*



15657

## Anti-bonding mediated record low and comparable-to-air lattice thermal conductivity of two metallic crystals

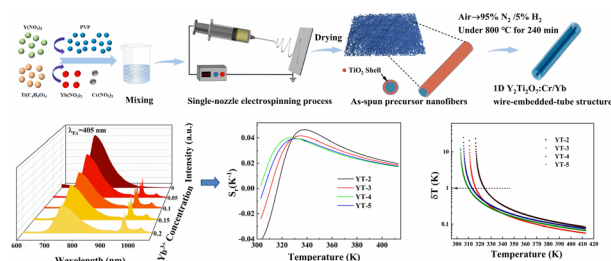
Zhonghua Yang, Wenbo Ning, Alejandro Rodriguez, Lihua Lu, Junxiang Wang, Yagang Yao, Kunpeng Yuan\* and Ming Hu\*



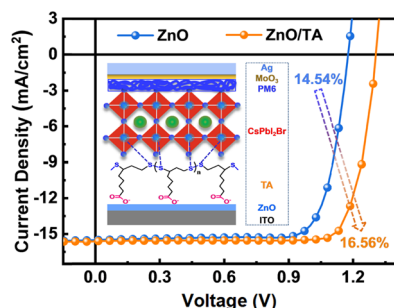
15669

## Electrospinning preparation and high near-infrared temperature sensing performance of one-dimensional Y<sub>2</sub>Ti<sub>2</sub>O<sub>7</sub>:Cr<sup>3+</sup>/Yb<sup>3+</sup> nano wire-embedded-tube structures with low Cr<sup>3+</sup> concentrations

Zhanwen Han, Hongquan Yu,\* Xiao Gao, Baojiu Chen and Jiashi Sun\*



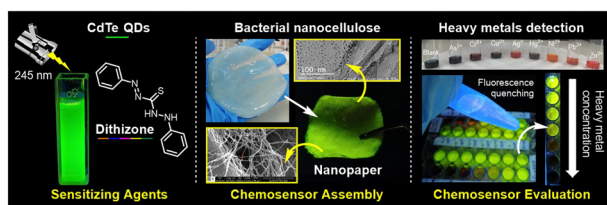
15682



### Crosslinked thioctic acid as a multifunctional buried interface modifier for high-performance inorganic perovskite solar cells

Xiaohui Liu,\* Ning Liu, Zhongyu Liu, Jianwei Wang, Like Huang, Ziyang Hu, Jing Zhang and Yuejin Zhu\*

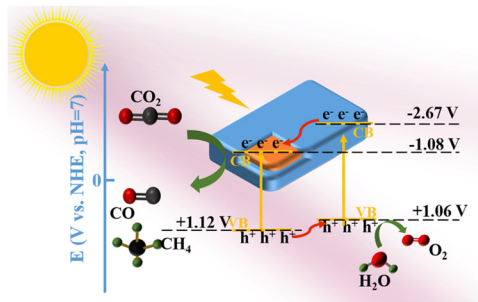
15690



### Bacterial nanocellulose and CdTe quantum dots: assembled nanopaper for heavy metal detection in aqueous solution

Ines Hernández Celi, Paula T. Peña González and Carlos A. Martínez Bonilla\*

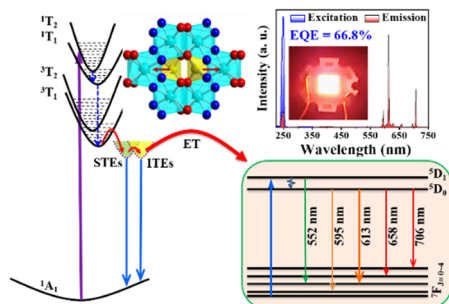
15700



### Self-assembly of MAPbBr<sub>3</sub>/Pb-MOF heterostructures with enhanced photocatalytic CO<sub>2</sub> reduction performance and stability

Dan-Yang Zhou, Wan-Ting Su, Xin-Yu Li, Tao Hong, Guang-Yu Pan, Mei-Ling Xu, Fu-Tian Liu\* and Kui Li\*

15706



### A highly efficient UV-to-red-light conversion by LuNbO<sub>4</sub>:Eu<sup>3+</sup> phosphors through exciton-assisted host-activator energy transfer

Fei Xiong, Wen Liu, Zuimin Jiang, Zhu Zhu and Wanbiao Hu\*

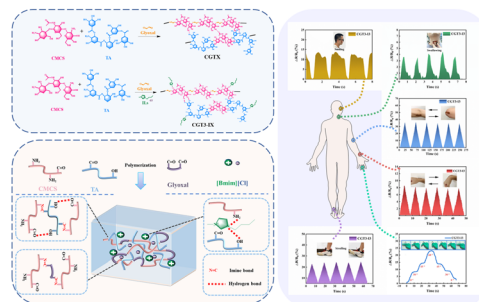


## PAPERS

15720

# A highly stretchable and sensitive carboxymethyl chitosan-based hydrogel for flexible strain sensors

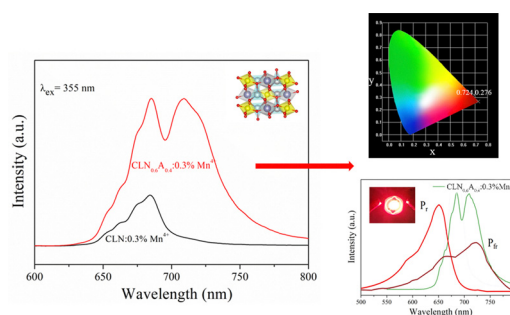
Haote Liu, Lin Cao, Xiao Wang, Congjie Xu, Haoling Huo, Bixia Jiang, Hong Yuan,\* Zhidan Lin\* and Peng Zhang\*



15731

# An Al<sup>3+</sup>-incorporated Ca<sub>2</sub>LuNbO<sub>6</sub>:Mn<sup>4+</sup> oxide phosphor with dramatic deep-red and far-red emission bands

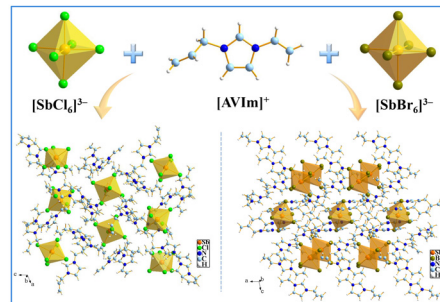
Jiayue Wu, Ziqing Yin, Shikao Shi\* and Lianshe Fu



15742

# Zero-dimensional antimony halides with tunable photoluminescence via halogen ligand modulation

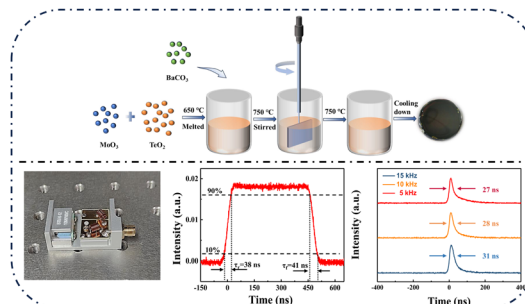
Zhaohui Huang,\* Enzhi Zhao, Ping Qi and Aixin Song\*



15750

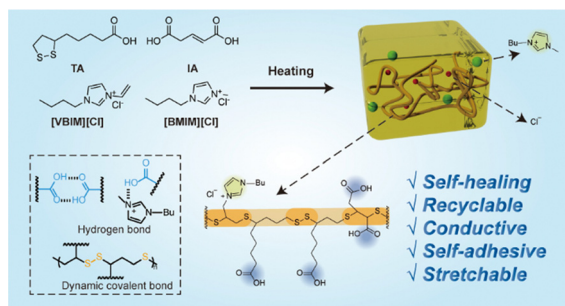
# BaO–TeO<sub>2</sub>–MoO<sub>3</sub> glass: excellent candidate for acousto-optic modulators with high diffraction efficiency, fast response, and stable operation

Fuai Hu, Feifei Guo, Zheng Wang, Xutang Tao and Zeliang Gao\*



## PAPERS

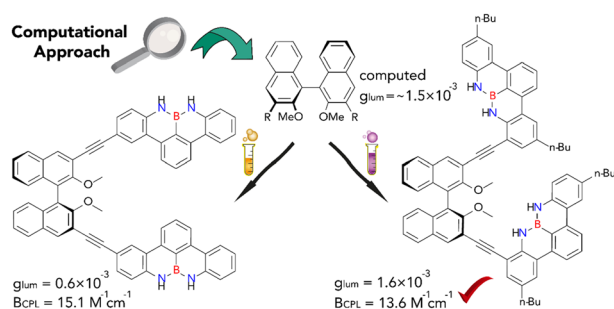
15759



### Dynamic disulfide bonds facilitated fabrication of a multifunctional liquid-free elastomer for recyclable soft electronics

Cheng Xu, Yong Sun, Zhiming Zhu, Junji Zhang\* and Wei Xu\*

15767



### Fruitful interplay between theory and experiment in the design of circularly polarized luminescent materials

Mario R. Rapp, Paul Ziemann, Francesco Zinna, Lorenzo Di Bari and Holger F. Bettinger\*

## CORRECTION

15774

### Correction: Copper particle-free ink with enhanced performance for inkjet-printed flexible UWB antennas

Wendong Yang,\* Zhichao Dong, Zihao Guo and Haoqiang Sun

