

Journal of Materials Chemistry C

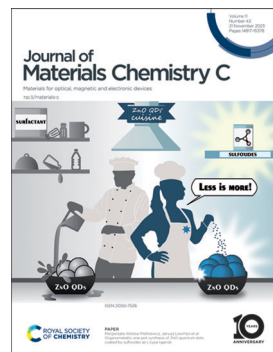
Materials for optical, magnetic and electronic devices

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.

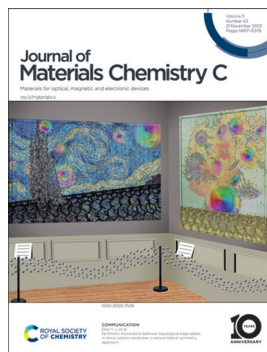
IN THIS ISSUE

ISSN 2050-7526 CODEN JMCCCX 11(43) 14917–15378 (2023)



Cover

See Małgorzata Wolska-Pietkiewicz, Janusz Lewiński *et al.*, pp. 15016–15029. Image reproduced by permission of Maria Jędrzejewska from *J. Mater. Chem. C*, 2023, 11, 15016.



Inside cover

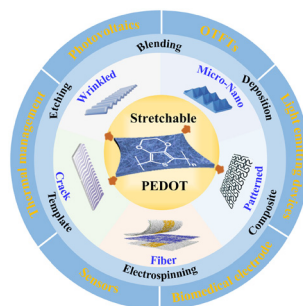
See Elise Y. Li *et al.*, pp. 15001–15007. Image reproduced by permission of Chi-You Liu and Elise Y. Li from *J. Mater. Chem. C*, 2023, 11, 15001.

REVIEWS

14930

Recent advances in the construction and application of stretchable PEDOT smart electronic membranes

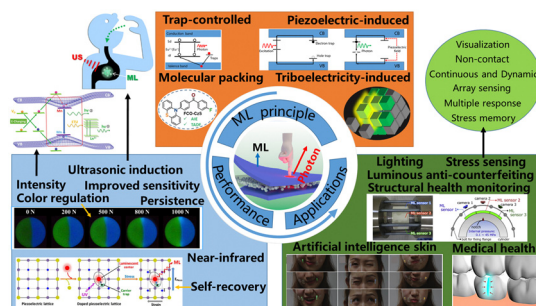
Jiahua Chen, Chunfa Ye, Tianyu Cang, Rui Gao and Xiaoyan Li*



14968

Principles, properties, and sensing applications of mechanoluminescence materials

Junwen Yu, Quanwang Niu, Yun Liu, Yanyan Bu, Hui Zou and Xiangfu Wang*



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

For pre-submission queries please contact Michaela Mühlberg, Executive Editor. E-mail: 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 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: £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

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 C

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 Vergnori, 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

C. Bai, Chinese Academy of Sciences, China

E. Bittner, University of Houston, USA

T. Bunning, Air Force Research Laboratory,

USA

J. Casado, University of Malaga, Spain

R. Chandrasekar, University of Hyderabad,

India

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

Taiwan

M. Chhowalla, Rutgers - The State University

of New Jersey, USA

C. Chi, National University of Singapore,

Singapore

L. Chua, National University of Singapore,

Singapore

D. Evans, Beijing University of Chemical

Technology, China

M. Green, King's College London, UK

E. von Hauf, VU Amsterdam, Netherlands

L. Hueso, CIC nanoGUNE, Spain

C. S. Hwang, Seoul National University, Korea

M. Kanatzidis, Northwestern University, USA

T. Kato, The University of Tokyo, Japan

J. Kido, Yamagata University, Japan

H. Kuang, Jiangnan University, China

T. Kusamoto, Institute for Molecular Science,

Japan

M. Jeffries-EL, Boston University, USA

M. Lira-Cantú, Catalan Institute of

Nanoscience and Nanotechnology, Spain

S. Marder, University of Colorado Boulder,

USA

I. McCulloch, University of Oxford, UK

H. Mori, University of Tokyo, Japan

J. Ouyang, National University of Singapore,

Singapore

N. Robertson, University of Edinburgh, UK

P. Samori, Université de Strasbourg, France

R. Seshadri, University of California,

Santa Barbara, USA

R. Sessoli, University of Florence, Italy

Z. Shuai, Tsinghua University, China

C. Silva, Georgia Institute of Technology, USA

J. Snyder, Northwestern University, Illinois,

USA

C. Weder, University of Fribourg, Switzerland

G. Welch, University of Calgary, Canada

W. Wong, Hong Kong Polytechnic University,

Hong Kong

P. Woodward, Ohio State University, USA

Y. Yin, UC 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. 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

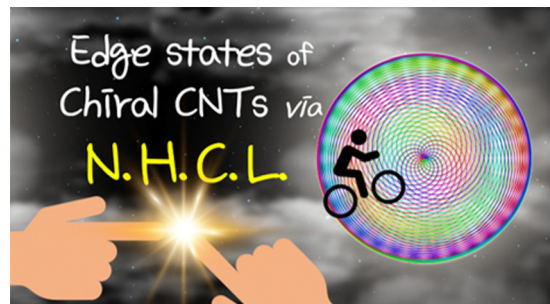


COMMUNICATIONS

15001

Spintronic interactions between topological edge states in chiral carbon nanotubes: a natural helical symmetry approach

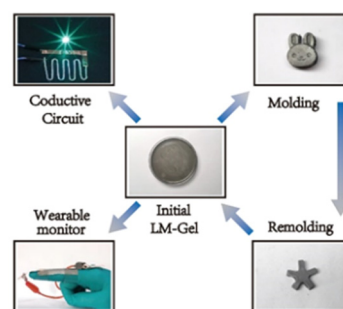
Jung-Yin Hsiao, Chi-You Liu and Elise Y. Li*



15008

Liquid metal-gel (LM-Gel) with conductivity and deformability

Xingchao Li, Kai Hou, Dezhao Hao, Yue Long* and Kai Song*

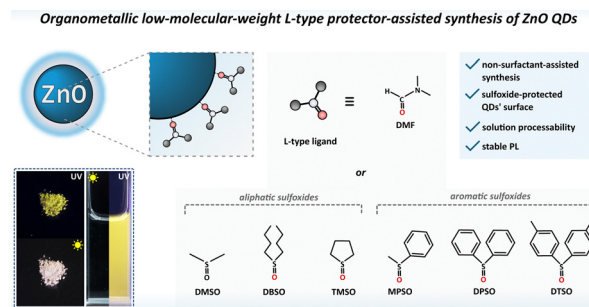


PAPERS

15016

Organometallic one-pot synthesis of ZnO quantum dots coated by sulfoxides as L-type ligands

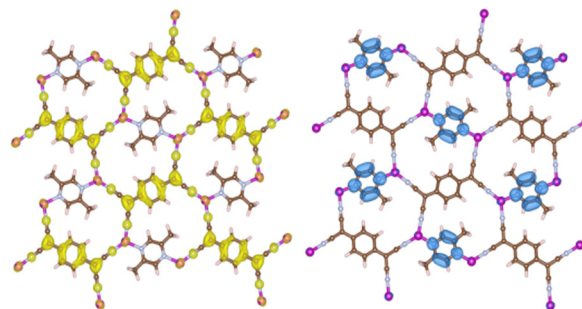
Maria Jędrzejewska, Małgorzata Wolska-Pietkiewicz,* Zygmunt Drużyński and Janusz Lewiński*



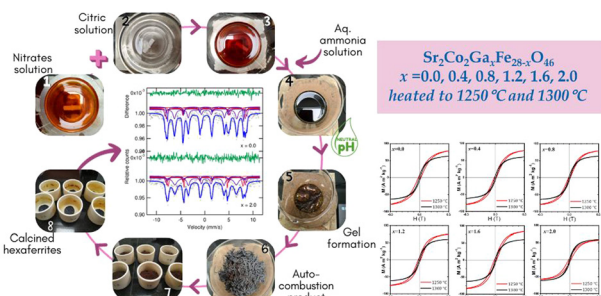
15030

Electrical conductivity and DFT investigations of a 2D Cu^I-TCNQ^{II-} framework

Ashley L. Sutton, Brendan F. Abrahams,* Christopher J. Commons, A. David Dharma, Lars Goerigk, Simon G. Hardin, Timothy A. Hudson and Richard Robson



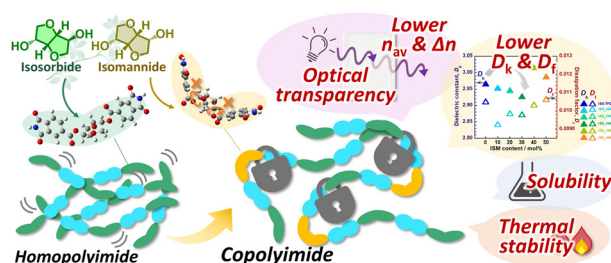
15035



Gallium-substituted X-type hexagonal ferrites $\text{Sr}_2\text{Co}_2\text{Ga}_x\text{Fe}_{28-x}\text{O}_{46}$: effect of substitution and heating temperature on phase formation and magnetic and dielectric properties

Ayushi G. Patel, Robert C. Pullar, Sher Singh Meena and Rajshree B. Jotania*

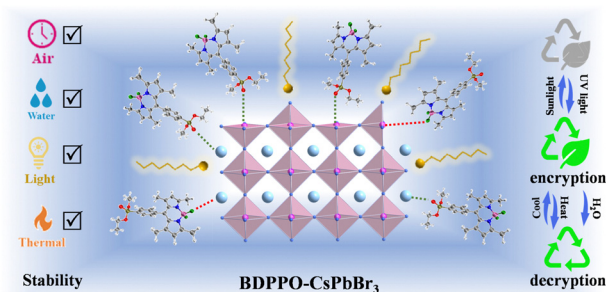
15053



Enhancing optical, dielectric, and thermal properties of bio-based polyimides incorporating isomannide with a bent and sterically constrained conformation

Ririka Sawada and Shinji Ando*

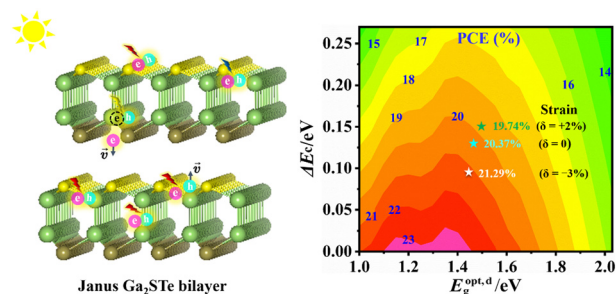
15065



Dual functional phosphate-ester BODIPY regulation achieved stable CsPbBr_3 nanocrystals for optical anti-counterfeiting

Xiaoxia Feng,* Ruicong Li, Jinli Liu, Qian Ma, Yixin Yang, Wenyan Zhang and Jiacheng Liu

15074



Electronic and optical properties of Janus Ga_2STe bilayer: a promising candidate for excitonic solar cell

Huabing Shu* and Xiaomei Liu

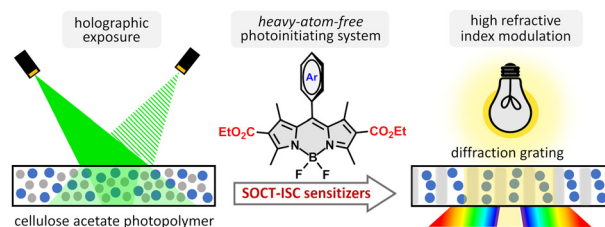


PAPERS

15084

Diethoxycarbonyl-BODIPYs as heavy-atom-free photosensitizers for holographic recording in cellulose acetate photopolymer

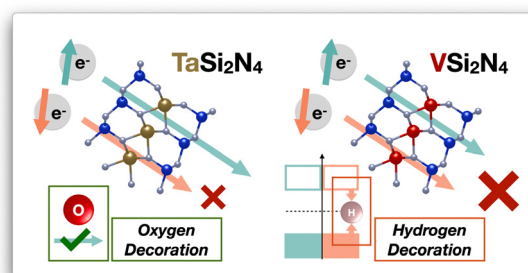
Aimee Sheehan, Tatsiana Mikulchyk, Catherine S. P. De Castro, Safakath Karuthedath, Wejdan Althobaiti, Metodej Dvoracek, Sabad-e-Gul, Hugh J. Byrne, Frédéric Laquai, Izabela Naydenova and Mikhail A. Filatov*



15097

Electronic structure and optical spectra of MSi_2N_4 ($\text{M} = \text{Mo}, \text{Ta}, \text{V}$) materials with single-atom decoration: a first-principles study

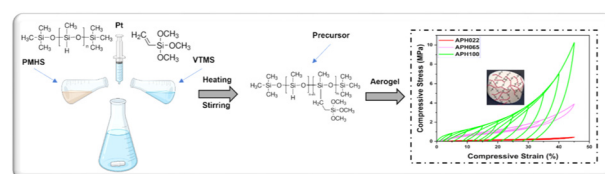
Tzu-Cheng Wu, Yin-Song Liao, Jui-Cheng Kao* and Jyh-Pin Chou*



15106

Super-hydrophobic and resilient hybrid silica aerogels for thermal insulation, energy harvesting, and electrical applications in harsh environments

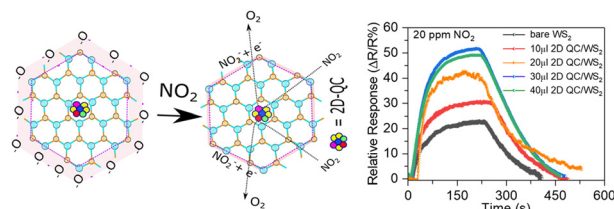
Sasan Rezaei, Hosseinali Omranpour, Zeineb Ben Rejeb, Maryam Fashandi, Ali Reza Monfared, Reza Rahmati, Mohammad M. Rastegardoost, Hani E. Naguib and Chul B. Park*



15119

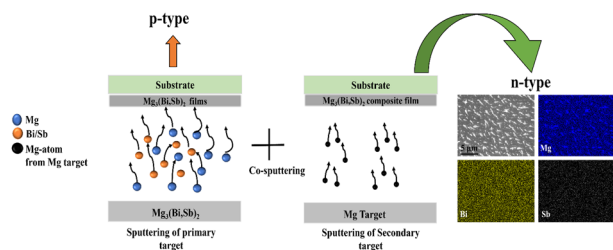
1T and 2H mixed phase WS_2 nanoflakes decorated with quasicrystal nanosheets for NO_2 sensors

Sumit Kumar, Mustaque A. Khan, Shashank Shekhar Mishra, Rajneesh Chaurasiya, Nipun Sharma, Meng Gang, Chandra S. Tiwary, Krishanu Biswas* and Mahesh Kumar*



PAPERS

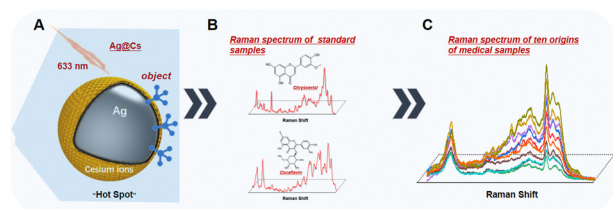
15130



Realizing enhanced thermoelectric performance in an n-type $\text{Mg}_3(\text{Bi,Sb})_2$ -based film

Sahiba Bano, Ying Peng, Takashi Aizawa, Raju Chetty and Takao Mori*

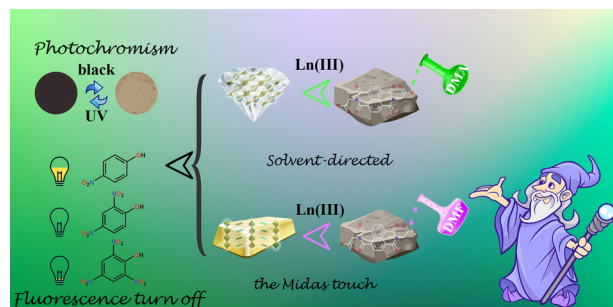
15138



A new method for rapid identification of traditional Chinese medicine based on a new silver sol: using the SERS spectrum for quality control of flavonoids and flavonoid glycosides in *Potentilla discolor* Bge.

Menghan Du, Zeqi Sun, Minzhen Xie, Siqi Gu, Yongchao Chen and Qi Wang*

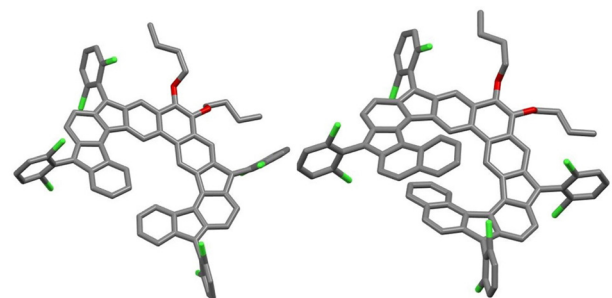
15149



A study on controlling structural topologies in coordination networks: solvent-directed synthesis and distinct variations in optical properties

Zi-Xin You, Yao Xiao, Qing-Lin Guan, Ting Zhang, Yong-Heng Xing* and Feng-Ying Bai*

15160



Quinodimethane embedded expanded helicenes and their open-shell diradical dications/dianions

Qing Jiang, Yi Han, Ya Zou and Chunyan Chi*

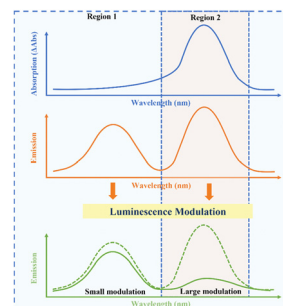


PAPERS

15169

Temporal dynamic photochromic materials for advanced anticounterfeiting

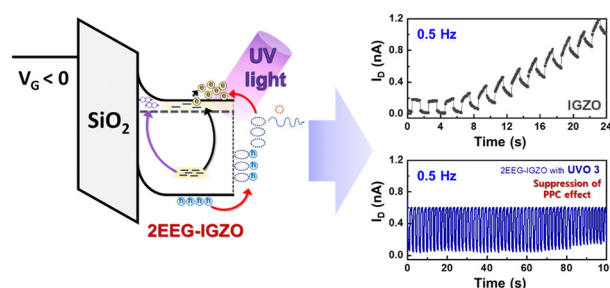
Wei Tang,* Ping Liang, Xiaoxue Wang, Chen Zhang, Geng Wang, Chen Liang and Mingxiang Guan*



15178

A chemically treated IGZO-based highly visible-blind UV phototransistor with suppression of the persistent photoconductivity effect

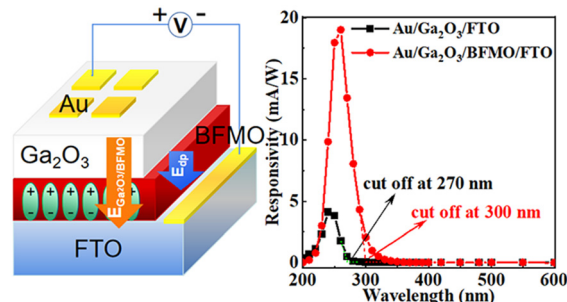
Min Gye Kim, Jun Hyung Jeong, Jin Hyun Ma, Min Ho Park, Seunghwan Kim, Soohyung Park and Seong Jun Kang*



15197

Ferroelectric enhanced Ga₂O₃/BFMO-based deep ultraviolet photovoltaic detectors with dual electric fields for photogenerated carrier separation

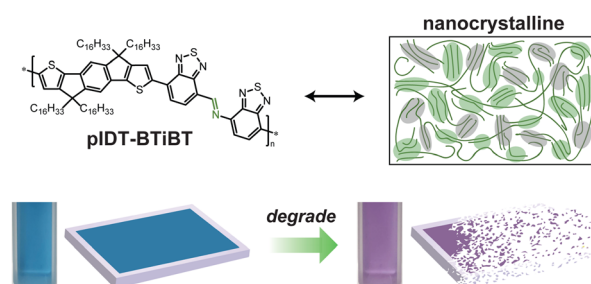
Yingying Cheng, Jiaxing Mao, Hongyi Zhu, Yanhui Dong, Jian Chen,* Mingkai Li, Yinmei Lu* and Yunbin He*



15205

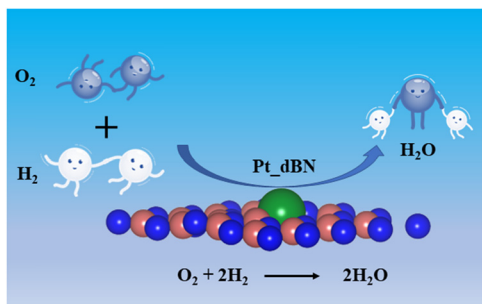
Degradable semiconducting polymers without long-range order for on-demand degradation of transient electronics

Jerika A. Chiong, Lukas Michalek, Amnahir E. Peña-Alcántara, Xiaozhou Ji, Nathaniel J. Schuster and Zhenan Bao*



PAPERS

15215



Platinum-adsorbed defective 2D monolayer boron nitride: a promising electrocatalyst for O_2 reduction reaction

Lokesh Yadav and Srimanta Pakhira*

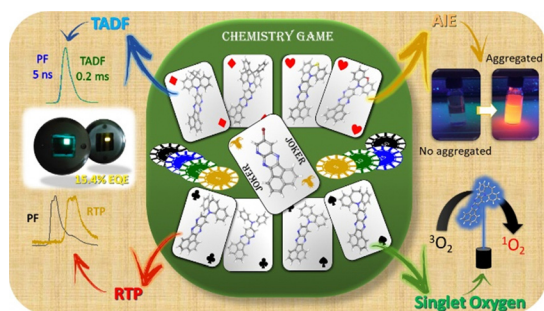
15233



Convolutional neural networks driving thermally enhanced upconversion luminescence for temperature sensing: achieving high accuracy and robustness across a wide temperature range

Wei Xu,* Junqi Cui, Fengze Bai, Longjiang Zheng, Chunhai Hu, Zhiguo Zhang, Zhen Sun and Yungang Zhang

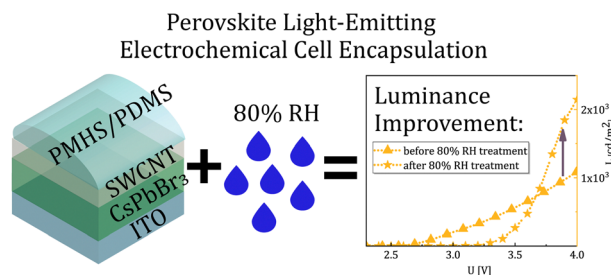
15246



Multifunctional properties of D–A luminophores based on acenaphtopyrido[2,3-*b*]pyrazine core: photophysics, photochemistry, and efficient solution-processed OLEDs

Welisson de Pontes Silva, Nicolas Oliveira Decarli, Leandro Espindola, Karol Erfurt, Agata Blacha-Grzechnik, Piotr Pander,* Mieczyslaw Lapkowski* and Przemyslaw Data*

15261



Enhancing the CsPbBr₃ PeLEC properties via PDMS/PMHS double-layer polymer encapsulation and high relative humidity stress-aging

M. Baeva, A. S. Miroshnichenko, R. Kenesbay, D. M. Mitin, V. V. Fedorov, D. S. Gets, D. V. Krasnikov, A. G. Nasibulin, S. Makarov, I. S. Mukhin* and R. M. Islamova*

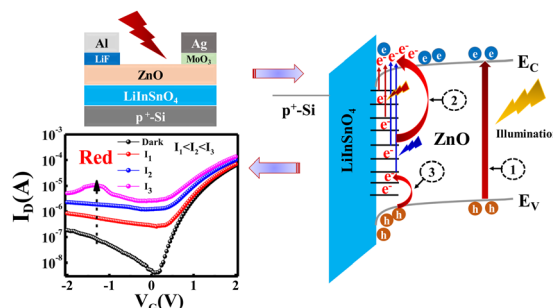


PAPERS

15276

Enhanced sub-band gap photosensitivity by an asymmetric source–drain electrode low operating voltage oxide transistor

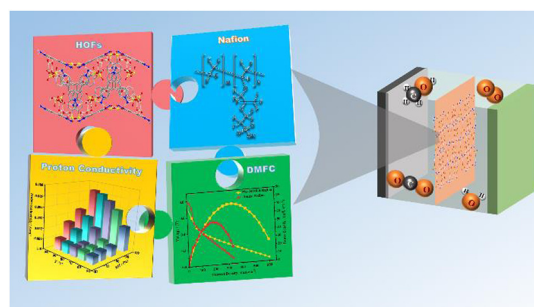
Utkarsh Pandey, Akhilesh Kumar Yadav, Nila Pal, Pijush Kanti Aich and Bhola N. Pal*



15288

Proton conduction of an ionic HOF with multiple water molecules and application as a membrane filler in direct methanol fuel cells

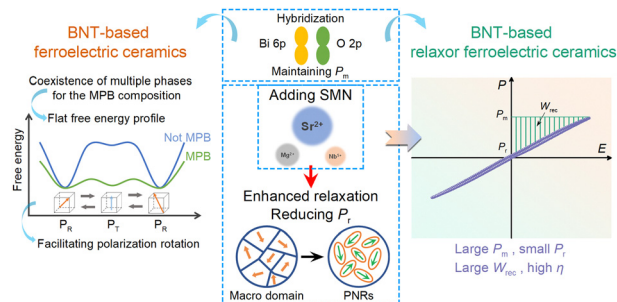
Fang Zhao, Li-Hui Cao* and Can Ji



15294

Enhanced energy storage properties in BNT-based ceramics with a morphotropic phase boundary modified by Sr(Mg_{1/3}Nb_{2/3})O₃

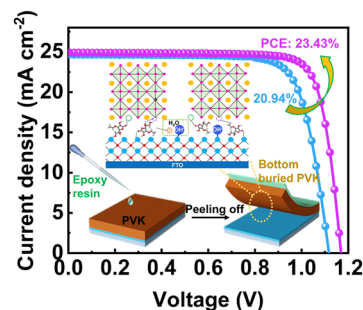
Tianyu Liu, Bo Yan, Jinxu Ma, Qiang He, Linan An* and Kepi Chen*



15303

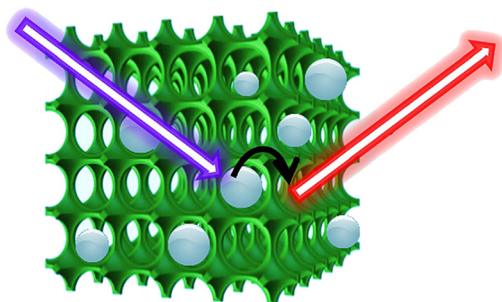
Synergistically modifying electron transport layers and bottom buried perovskite layers of perovskite solar cells

Xiangheng Liu, Zhengyan He, Honglei Yu, Shufang Zhang,* Changlin Yao, Qi Zhang and Ping Chen*



PAPERS

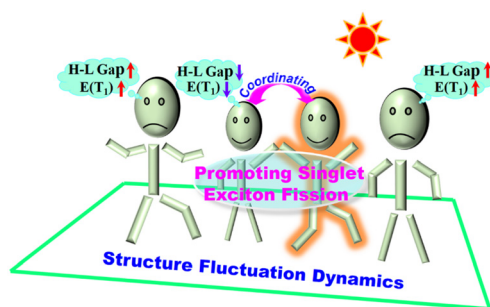
15312



Preferable forward energy transfer in $\text{Tb}(\text{C}_{12}\text{H}_8\text{N}_2)_2(\text{NO}_3)_3@ \text{Ca}_{0.9}\text{Eu}_{0.1}\text{MoO}_4$ hierarchical porous composites via the interface

Rui Rui Yang,* Fangrui Cheng* and Bang Lan

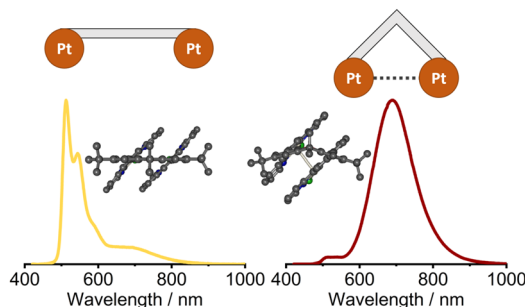
15322



Dynamic cooperativity of chromophores in promoting singlet fission in perylene-3,4,9,10-tetracarboxylic diimide crystals

Lijuan Xue, Haibei Huang and Yuxiang Bu*

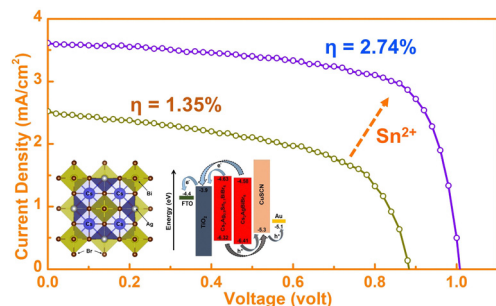
15335



Rigidly linked dinuclear platinum(II) complexes showing intense, excimer-like, near-infrared luminescence

Piotr Pander,* Melissa T. Walden, Rebecca J. Salthouse, Amit Sil, Dmitry S. Yufit, Fernando B. Dias* and J. A. Gareth Williams*

15347



Heterovalent tin ion-regulated bromobismuth double perovskite-based fully-inorganic solar cells

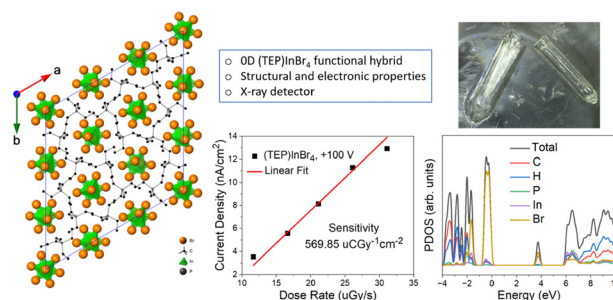
Anurag Dehingia, Ujjal Das and Asim Roy*



15357

Crystal growth, structural and electronic characterizations of zero-dimensional metal halide (TEP)InBr₄ single crystals for X-ray detection

Zheng Zhang, Tony M. Pugliano, Da Cao, Doup Kim, Roshan S. Annam, Dilruba A. Popy, Tamanna Pinky, Ge Yang, Jivtesh Garg, Mario F. Borunda and Bayram Saparov*



15366

A novel narrow-band blue-emitting phosphor with high efficiency and thermal stability for WLEDs and FEDs

Qiang Zhang, Xin Ding, Haoyang Wang, Bin Liu* and Yuhua Wang*

