

Materials Advances

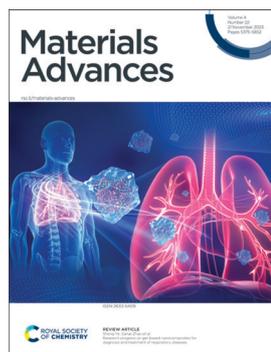
An open access journal publishing across the breadth of materials science

rsc.li/materials-advances

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 2633-5409 CODEN MAADC9 4(22) 5375-5852 (2023)



Cover

See Sheng Ye, Dahai Zhao *et al.*, pp. 5431-5452.
Image reproduced by permission of Jing Ye from *Mater. Adv.*, 2023, 4, 5431.



Inside cover

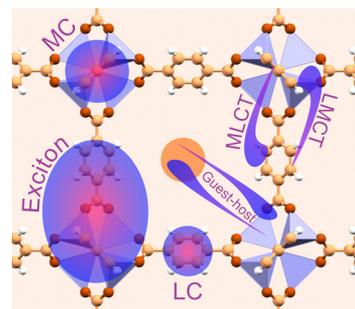
See Thomas E. Kodger *et al.*, pp. 5535-5545.
Image reproduced by permission of Thomas E. Kodger from *Mater. Adv.*, 2023, 4, 5535.

PERSPECTIVES

5388

Simulating excited states in metal organic frameworks: from light-absorption to photochemical CO₂ reduction

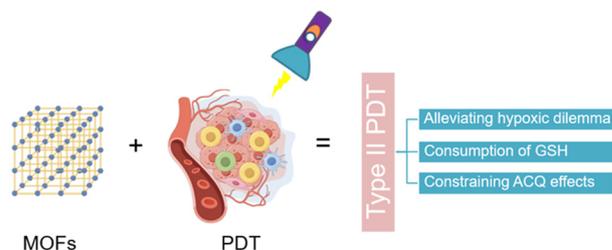
Michael Ingham, Alex Aziz, Devis Di Tommaso* and Rachel Crespo-Otero*



5420

An oxygen-generating metal organic framework nanoplatform as a "synergy motor" for extricating dilemma over photodynamic therapy

Meihong Zhang, Yixian Zhou, Biyuan Wu, Chao Lu,* Guilan Quan,* Zhengwei Huang,* Chuanbin Wu and Xin Pan



Editorial Staff**Executive Editor**

Jeremy Allen

Deputy Editor

Hannah Kerr

Editorial Production Manager

Daniella Ferlucio

Assistant Editors

Zita Zachariah, Serra Arslanac Sengelen and Zifei Lu

Editorial Assistant

Rosie Hague

Publishing Assistant

Allison Holloway

Publisher

Neil Hammond

For queries about submitted papers, please contact Daniella Ferlucio, Editorial Production Manager in the first instance. E-mail: materialsadvances@rsc.org

For pre-submission queries please contact Jeremy Allen, Executive Editor. E-mail: materialsadvances-rsc@rsc.org

Materials Advances (electronic: ISSN 2633-5409) is published 24 times a year by the Royal Society of Chemistry, Thomas Graham House, Science Park, Milton Road, Cambridge, UK CB4 0WF.

Materials Advances is a Gold Open Access journal and all articles are free to read. Please email orders@rsc.org to register your interest or contact 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

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

Materials Advances

rsc.li/materials-advances

Materials Advances publishes experimental and theoretical work across the breadth of materials science.

Editorial Board**Editors-in-Chief**

Anders Hagfeldt, EPFL, Switzerland
Jeroen Cornelissen, University of Twente, The Netherlands
Natalie Stingelin, Georgia Institute of Technology, USA

Associate Editors

A. S. Achalkumar, Indian Institute of Technology, India
Veronica Augustyn, North Carolina State University, USA
Viola Birss, University of Calgary, Canada
Kaushik Chatterjee, Indian Institute of Science, India
Elizabeth Cosgriff-Hernandez, University of Texas at Austin, USA
Rachel Crespo-Otero, Queen Mary University of London, UK
Gemma-Louise Davies, University College London, UK
Goutam De, S N Bose National Centre for Basic Sciences, India
Renaud Demadrille, Interdisciplinary Research Institute of Grenoble, France
Håkan Engqvist, Uppsala University, Sweden
Antonio Facchetti, Northwestern University and Flexterra Corporation, USA

Ghim Wei Ho, National University of Singapore, Singapore
Yun Jeong Hwang, Korea Institute of Science and Technology, South Korea
Unyong Jeong, POSTECH, South Korea
Ji Jian, Zhejiang University, China
Oana Jurchescu, Wake Forest University, USA
Kisuk Kang, Seoul National University, South Korea
Subrata Kundu, Central Electrochemical Research Institute (CECRI), India
Dan Li, Jinan University, China
Mingzhu Li, Technical Institute of Physics and Chemistry, Chinese Academy of Sciences, China
Shaoqin Liu, Harbin Institute of Technology, China
David Lou, Nanyang Technological University, Singapore
Yi-Chun Lu, The Chinese University of Hong Kong, Hong Kong
Martyn McLachlan, Imperial College London, UK
Yoshiko Miura, Kyushu University, Japan
Kasper Moth-Poulsen, Chalmers University of Technology, Sweden
Ana Flavia Nogueira, University of Campinas,

Brazil
Erin Ratcliff, University of Arizona, USA
Federico Rosei, University of Trieste, Italy
Jennifer Rupp, Massachusetts Institute of Technology, USA
Miriam Unterlass, Vienna University of Technology, Austria
Yana Vaynzof, Technical University of Dresden, Germany
Maia Vergniory, Max Planck Institute for Chemical Physics of Solids, Germany
Jessica Winter, Ohio State University, USA
Lydia Wong, Nanyang Technological University, Singapore
Li-Zhu Wu, Technical Institute of Physics and Chemistry, China
Zhiguo Xia, South China University of Technology, China
Yusuke Yamauchi, University of Queensland, Australia
Chengzhong Yu, University of Queensland, Australia
Haoli Zhang, Lanzhou University, China
Ni Zhao, Chinese University of Hong Kong, Hong Kong
Zhen Zhou, Nankai University, China

Advisory Board

Please see the Materials Advances journal webpage for full details of our advisory board: rsc.li/materials-advances

Information for Authors

Full details on how to submit material for publication in Materials Advances 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-advances

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

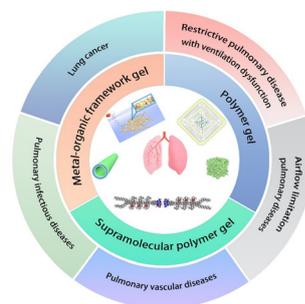


REVIEWS

5431

Research progress on gel-based nanocomposites for diagnosis and treatment of respiratory diseases

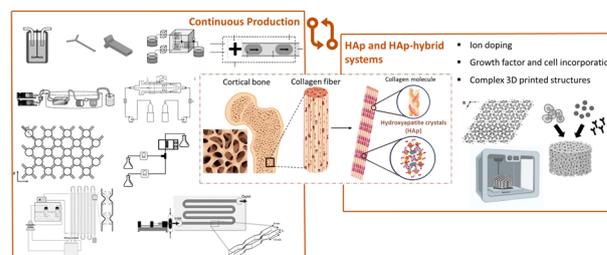
Jing Ye, Wenjing Pei, Jing Zhu, Ping Li, Hui Liu, Lei Gao, Changxiu Ma, Rongrong Gu, Sheng Ye* and Dahai Zhao*



5453

Tackling current production of HAp and HAp-driven biomaterials

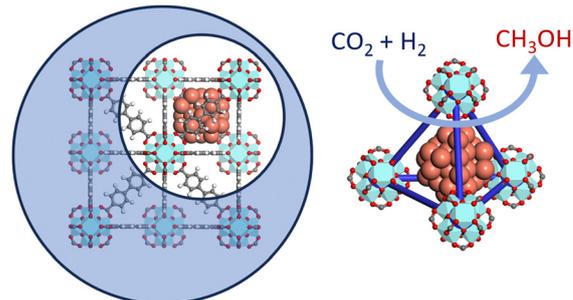
Anabela Veiga, Sara Madureira, João B. Costa,* Filipa Castro, Fernando Rocha and Ana L. Oliveira*



5479

Direct CO₂ to methanol reduction on Zr₆-MOF based composite catalysts: a critical review

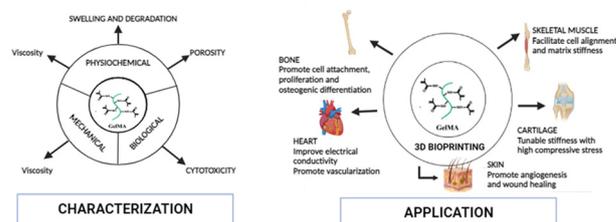
Elif Tezel, Dag Kristian Sannes, Stian Svelle, Petra Ágota Szilágyi* and Unni Olsbye*



5496

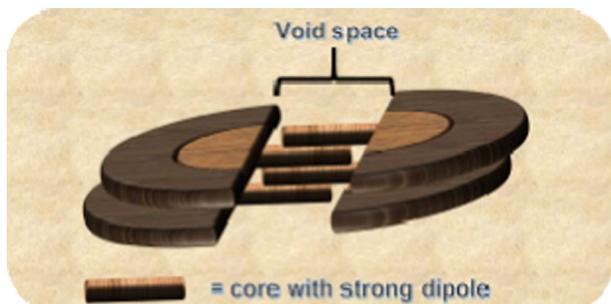
An insight into synthesis, properties and applications of gelatin methacryloyl hydrogel for 3D bioprinting

Rudra Nath Ghosh, Joseph Thomas, Vaidehi B. R., Devi N. G., Akshitha Janardanan, Pramod K. Namboothiri and Mathew Peter*



COMMUNICATION

5530

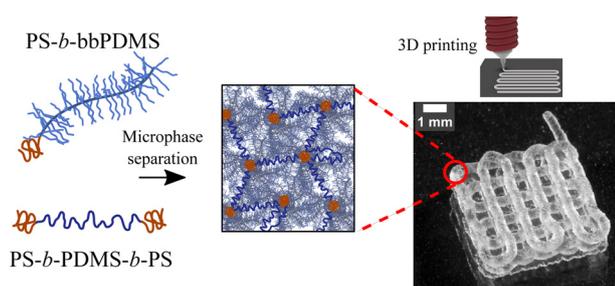


Direct evidence of mesogenic dendrons with free void space by Brunauer–Emmett–Teller (BET) isotherms

Yao-Chih Lu, Jun-Cheng Wang, Yun-He Yang and Long-Li Lai*

PAPERS

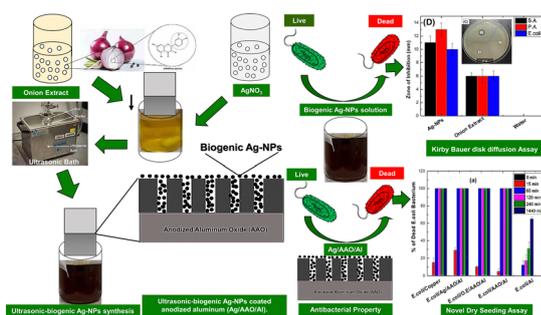
5535



3D printable soft and solvent-free thermoplastic elastomer containing dangling bottlebrush chains

Vahid Asadi, Renee Dolleman, Jasper van der Gucht and Thomas E. Kodger*

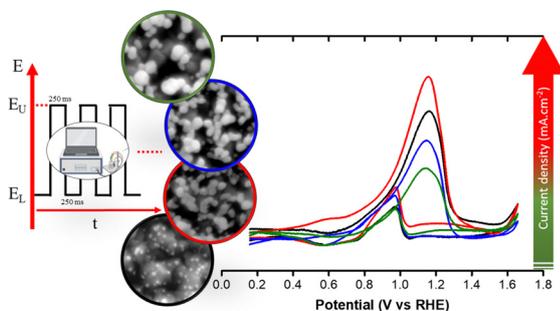
5546



Ultrasonic–biogenic synthesis of silver on anodized aluminum with superior antibacterial properties

Henry Agbe,* Dilip Kumar Sarkar, X.-Grant Chen and David Dodoo-Arhin

5556



Square-wave pulse electrodeposition of gold nanoparticles for ethanol electrooxidation

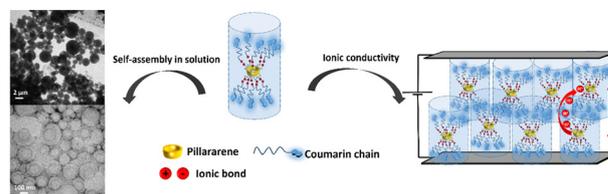
Setia Budi,* Annisa Auliya, Suci Winarsih, Mohammad Hamzah Fauzi and Yusmaniar



5564

Ionic self-assembly of pillar[5]arenes: proton-conductive liquid crystals and aqueous nanoobjects with encapsulation properties

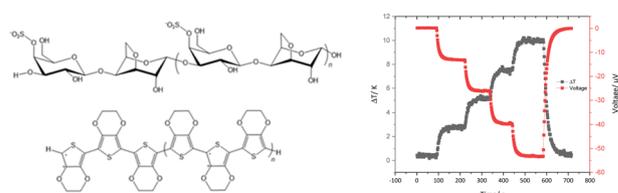
Iván Marín, Rosa I. Merino, Joaquín Barberá, Alberto Concellón and José L. Serrano*



5573

Conducting poly(3,4-ethylenedioxythiophene) materials with sustainable carrageenan counter-ions and their thermoelectric properties

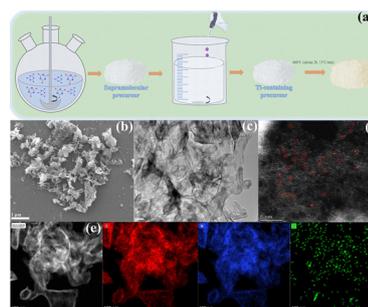
Zhongnan Duan, Joseph Phillips, Letizia Liirò-Peluso, Simon Woodward, Oleg Makarovskiy, Michael P. Weir, H. Jessica Pereira* and David B. Amabilino*



5585

Application of single-atom Ti-doped g-C₃N₄ in photocatalytic H₂O₂ production

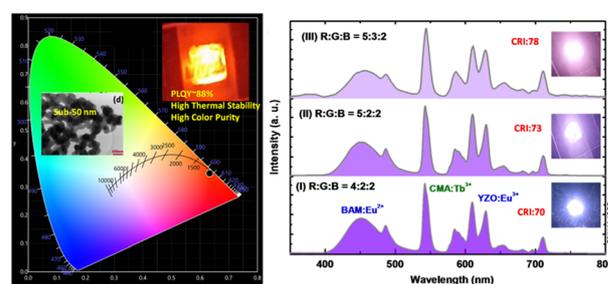
Tinglei Wang, Jiayu Xin, Zhen Li, Yong Fan* and Yu Wang*



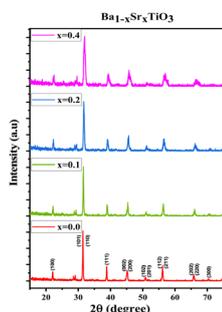
5594

Ultra-bright and thermally stable deep red emitting doped yttrium zirconate nanoparticles for tunable white LEDs and indoor plant growth

Reshmi Thekke Parayil, Santosh Kumar Gupta,* Malini Abraham, Subrata Das, Shreyas S. Pitale, Kathi Sudarshan and Manoj Mohapatra



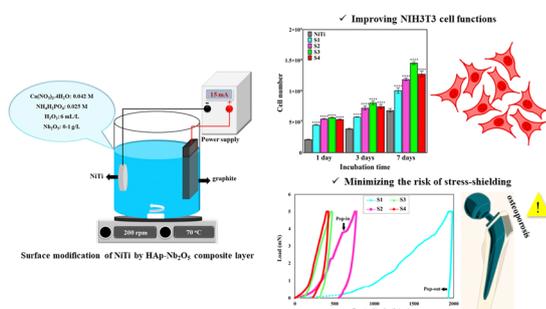
5605



Structural and dielectric characterization of synthesized nano-BSTO/PVDF composites for smart sensor applications

Marwa M. Hussein,* Samia A. Saafan, H. F. Abosheisha, Amira A. Kamal, Abd El-razek Mahmoud, Di Zhou, Sergei V. Trukhanov,* Tatiana I. Zubar, Alex V. Trukhanov and Moustafa A. Darwish*

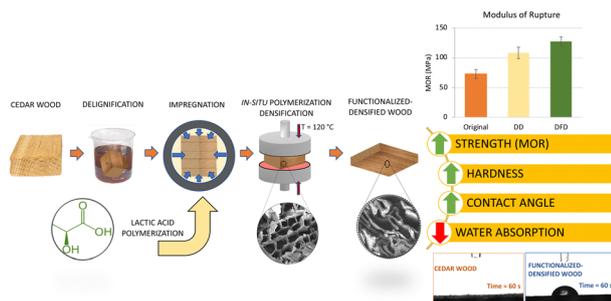
5618



Encouraging tribomechanical and biological responses of hydroxyapatite coatings reinforced by various levels of niobium pentoxide particles

Mir Saman Safavi,* Jafar Khalil-Allafi,* Amir Motallebzadeh, Cristina Volpini, Vida Khalili and Livia Visai*

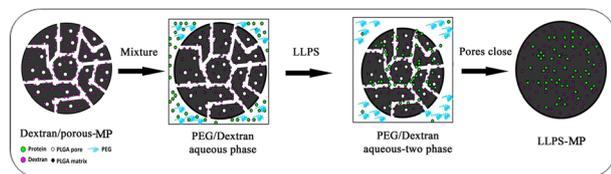
5633



Poly(lactic acid)/wood-based *in situ* polymerized densified composite material

Akash Madhav Gondaliya, Kieran Foster and E. Johan Foster*

5643



Liquid–liquid phase separation for microencapsulation of native cytokine to enhance immune activation

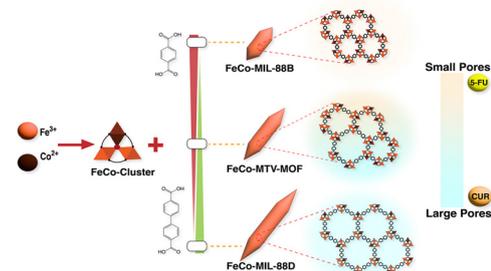
Zhenhua Hu, Li Cheng, Qiuling Chen, Tianqing Xin and Xiaoyan Wu*



5653

A multivariate metal–organic framework based pH-responsive dual-drug delivery system for chemotherapy and chemodynamic therapy

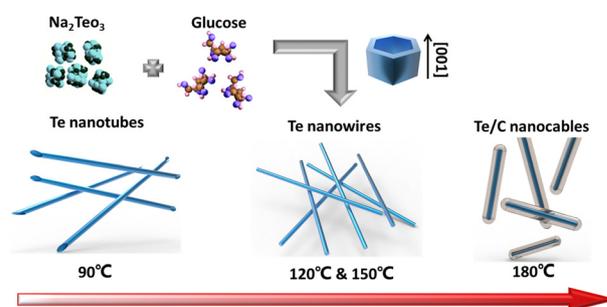
Muhammad Usman Akbar, Arslan Akbar, Umair Ali Khan Saddozai, Malik Ihsan Ullah Khan, Muhammad Zaheer* and Muhammad Badar*



5668

Morphology-controlled green synthesis of tellurium nanostructures and applications of Te/MXene hybrid structures

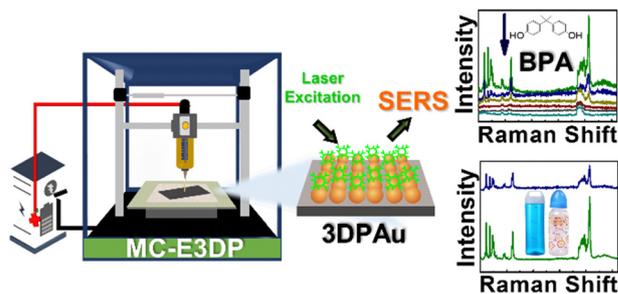
Mengchen Xu, Jinshu Li, Qingshan Yang, Lu Jiang, Jiaqi He, Dawei He,* Yongsheng Wang* and Yajie Yang*



5674

Meniscus-confined capping-free 3D printed gold nanoparticles for quantitative SERS detection of bisphenol A

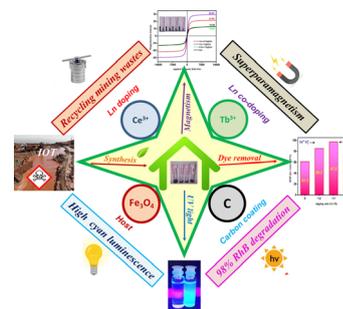
Netrapal Singh, Manoj Kumawat, Hafsa Siddiqui, Koyalada Bhavani Srinivas Rao, Satendra Kumar, Manoj Goswami, Sathish Natarajan, Mohammed Akram Khan, Avanish Kumar Srivastava and Surender Kumar*



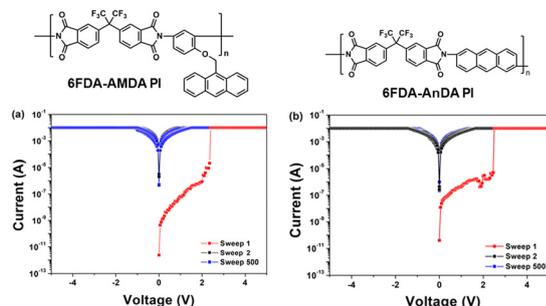
5683

Environmentally benign fabrication of superparamagnetic and photoluminescent Ce, Tb-codoped Fe₃O₄-gluconate nanocrystals from low-quality iron ore intended for wastewater treatment

Utsav Sengupta, Muthaimanoj Periyasamy, Sudipta Mukhopadhyay and Arik Kar*



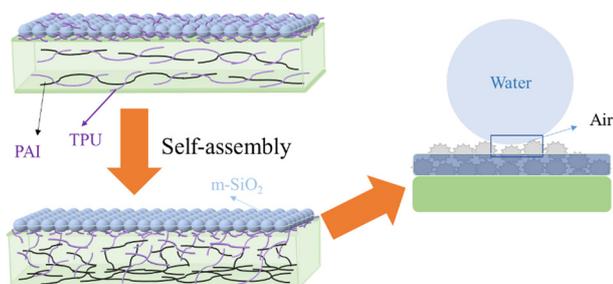
5706



Memory characteristics of anthracene-based polyimides in non-volatile resistive memory devices

Seung-Hyun Lee, Sechang Park, Ju-Young Choi, Yun-Je Choi, Hyung Woo Ji, Hyeoung Joung, Dam-Bi Kim, Kang-Hoon Yoon, Gyumin Ji, Daeho Choi, Jaekang Lee, Ki-Jung Paeng, Jaesung Yang, Soohaeng Cho* and Chan-Moon Chung*

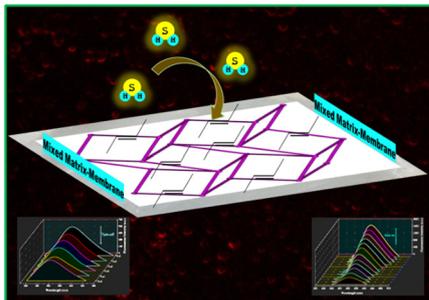
5716



Self-assembly of hierarchical porous structure for stretchable superhydrophobic films by delicately controlling the surface energy

Shuhan Hou, Insub Noh, Meng Yue, Yanbin Wang,* Hyung Do Kim,* Hideo Ohkita* and Biaobing Wang*

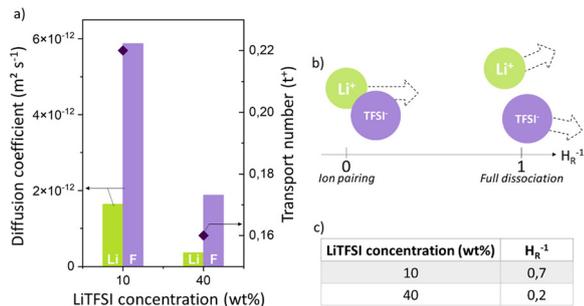
5730



Enhancing the sensitivity of a water stable MOF as a H₂S gas sensor by the fabrication of a mixed-matrix membrane

Mouli Das Dawn, Karabi Nath, Subhajt Saha, Pritam Kumar Roy, Mahitosh Mandal and Kumar Biradha*

5740

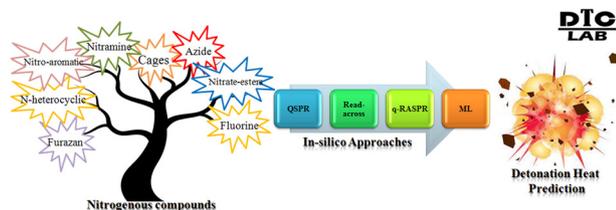


Towards N-rich solid polymer electrolytes for Li-ion batteries?

L. Artigues, M. Deschamps, F. Salles, V. Chaudoy, V. Lapinte and L. Monconduit*



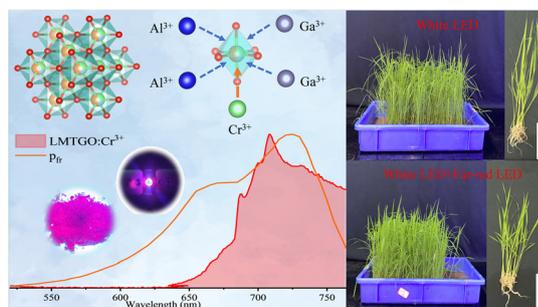
5797



Machine learning-based q-RASPR predictions of detonation heat for nitrogen-containing compounds

Shubham Kumar Pandey, Arkaprava Banerjee and Kunal Roy*

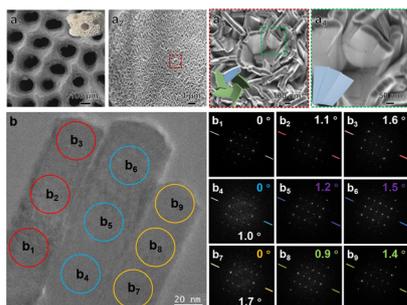
5808



Spectroscopically enhanced far-red phosphor $\text{Li}_2\text{Mg}_3\text{TiO}_6:\text{Cr}^{3+}$ and its application prospects to the cold resistance of rice

Yibiao Ma, Siying Li, Jiaqi Wei, Weifang Liao, Beibei Quan, Maxim S. Molokeev, Ming Cheng, Xiaoyan Chen, Zhi Zhou* and Mao Xia*

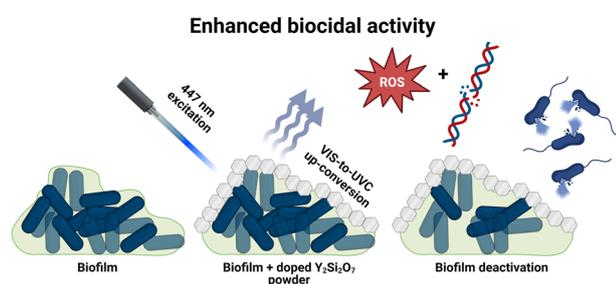
5817



Chiral mesostructured hydroxyapatite on 3D macroporous coralline scaffolds for enantio-selective osteogenesis

Chao Zhou, Anqi Liu, Ping Li, Jing Ai, Lu Han, Shaoyang Zhang, Shuai Chen, Yuanming Ouyang,* Baojie Li,* Shunai Che* and Cunyi Fan*

5827



Enhanced biocidal activity of Pr^{3+} doped yttrium silicates by Tm^{3+} and Yb^{3+} co-doping

Patryk Fałat, Min Ying Tsang, Irena Maliszewska, Szymon J. Zelewski, Bartłomiej Cichy, Tymish Y. Ohulchansky, Marek Samoć, Marcin Nyk and Dominika Wawrzyńczyk*



5838

Rapid microwave synthesis of sustainable magnetic framework composites of UTSA-16(Zn) with Fe₃O₄ nanoparticles for efficient CO₂ capture

John Luke Woodliffe, Amy-Louise Johnston, Michael Fay, Rebecca Ferrari, Rachel L. Gomes, Ed Lester, Ifty Ahmed and Andrea Laybourn*

