

# Materials Advances

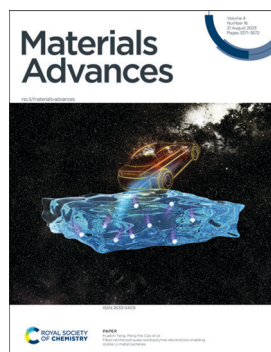
An open access journal publishing across the breadth of materials science

[rsc.li/materials-advances](https://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.

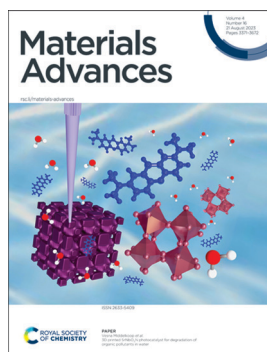
## IN THIS ISSUE

ISSN 2633-5409 CODEN MAADC9 4(16) 3371-3672 (2023)



### Cover

See Huabin Yang, Peng-Fei Cao *et al.*, pp. 3452–3460. Image reproduced by permission of Zhenxi Li from *Mater. Adv.*, 2023, 4, 3452.



### Inside cover

See Vesna Middelkoop *et al.*, pp. 3461–3472. Image reproduced by permission of Antonio Iborra-Torres & Vesna Middelkoop from *Mater. Adv.*, 2023, 4, 3461.

## REVIEWS

3380

### Silicon quantum dots: surface matter, what next?

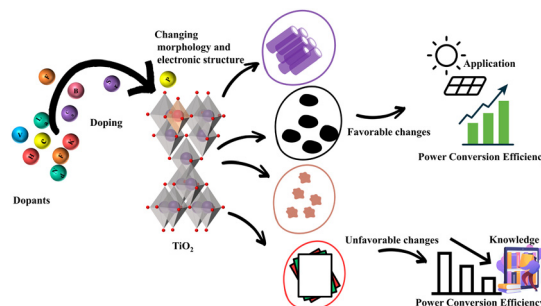
Deski Beri



3399

### Quantitative framework development for understanding the relationship between doping and photoelectrochemical energy conversion of $\text{TiO}_2$

Aparna Markose, Debanita Das and Prasanth Ravindran\*



## Editorial Staff

### Executive Editor

Jeremy Allen

### Deputy Editor

Hannah Kerr

### Editorial Production Manager

Christopher Goodall

### Assistant Editors

Zita Zachariah and Serra Arslançan Sengelen

### Editorial Assistant

Rosie Hague

### Publishing Assistant

Allison Holloway

### Publisher

Neil Hammond

For queries about submitted papers, please contact Christopher Goodall, Editorial Production Manager in the first instance. E-mail: [materialsadvances@rsc.org](mailto:materialsadvances@rsc.org)

For pre-submission queries please contact Jeremy Allen, Executive Editor.

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

For marketing opportunities relating to this journal, contact [marketing@rsc.org](mailto:marketing@rsc.org)

# Materials Advances

[rsc.li/materials-advances](http://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 Faccetti, 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, 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  
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](http://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](http://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.

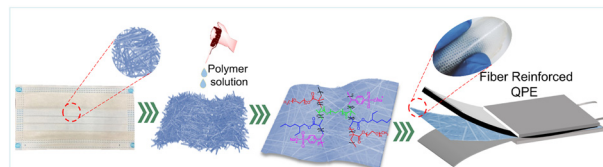
Registered charity number: 207890



3452

### Fiber-reinforced quasi-solid polymer electrolytes enabling stable Li-metal batteries

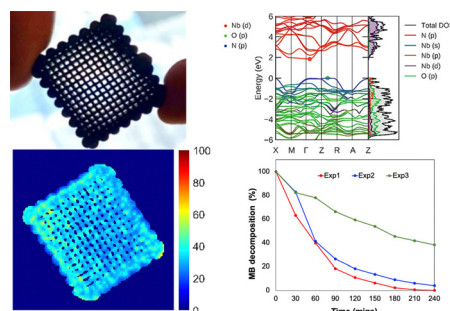
Shilun Gao, Youjia Zhang, Mengxiang Ma, Zhenxi Li, Zongxue Sun, Ming Tian, Huabin Yang\* and Peng-Fei Cao\*



3461

### 3D printed SrNbO<sub>2</sub>N photocatalyst for degradation of organic pollutants in water

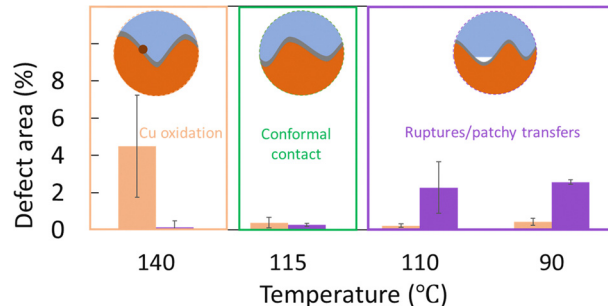
Antonio Iborra-Torres, Matej Huš, Kiem Nguyen, Antonis Vamvakeros, Muhammad Tariq Sajjad, Steven Dunn, Myrjam Mertens, Simon Jacques, Andrew M. Beale, Blaž Likozar, Geoffrey Hyett, Suela Kellici and Vesna Middelkoop\*



3473

### The parameter space for scalable integration of atomically thin graphene with Nafion for proton exchange membrane (PEM) applications

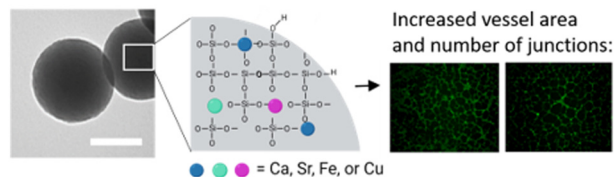
Pavan Chaturvedi, Nicole K. Moehring, Thomas Knight, Rahul Shah, Ivan Vlasiouk and Piran R. Kidambi\*



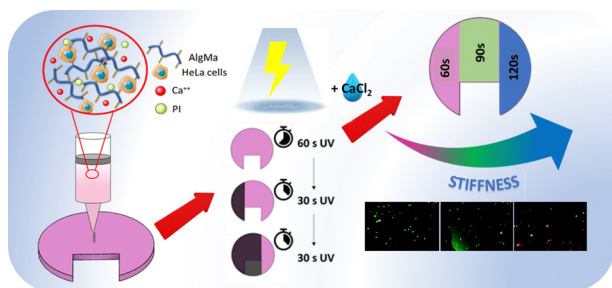
3482

### Laser-based ion doping is a suitable alternative to dope biologically active ions into colloidal bioglass nanoparticles

Pichaporn Sutthavas, Matthias Schumacher, Martyna Nikody, Vijayanthi Ramesh, Jurij Jakobi, Elizabeth R. Balmayor, Pamela Habibovic, Christoph Rehbock, Stephan Barcikowski\* and Sabine van Rijt\*



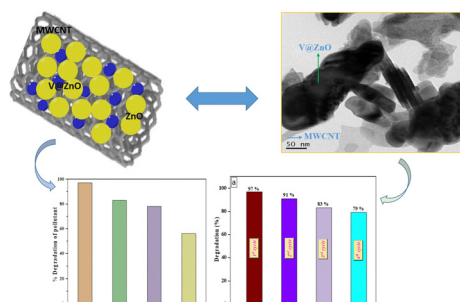
3491



### Development of a tissue construct with spatially controllable stiffness via a one-step 3D bioprinting and dual-crosslinking process

Giorgia Pagnotta, Maila Beconi, Marco Malferrari, Donatella Aiello, Anna Napoli, Luana Di Lisa, Stefano Grilli, Stefania Rapino\* and Maria Letizia Focarete\*

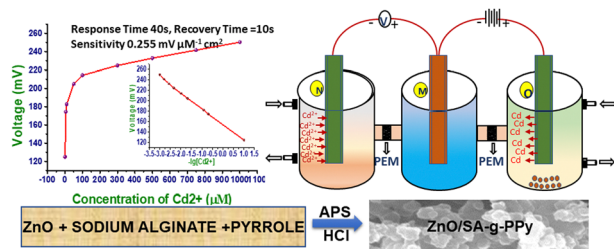
3506



### A comparative study on the photo-removal of a few selected priority organic pollutants in aqueous suspension using vanadium-doped-ZnO/MWCNT

Mohtaram Danish, Ziyaur Rasool, Haider Iqbal, Reesha Fatima, Shubham Kumar and Mohammad Muneer\*

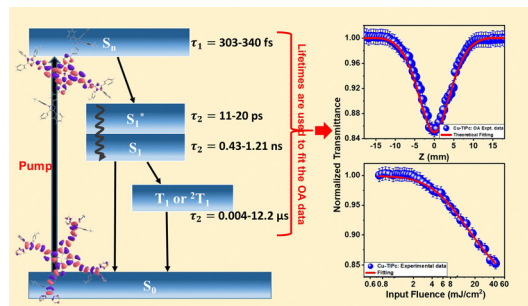
3521



### Potential mediated electrochemical recycling and sensing of cadmium ions in wastewater over ZnO/SA-g-PPy biocomposite

Sandeep Verma, Ashok K. Sharma\* and Saroj K. Shukla\*

3532



### Novel metallated imidazole phthalocyanines: synthesis, ultrafast excited-state carrier dynamics and multiphoton absorption properties

Md Soif Ahmed, Kalavala Shivaprakash Srivishnu, Chinmoy Biswas, Dipanjan Banerjee, Prabhakar Chetti, Venugopal Rao Soma, Lingamallu Giribabu\* and Sai Santosh Kumar Raavi\*

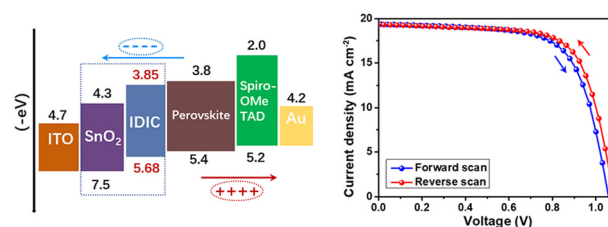


## PAPERS

3551

### High-performance Ruddlesden–Popper two-dimensional perovskite solar cells using integrated electron transport materials of tin oxide and indacenodithiophene

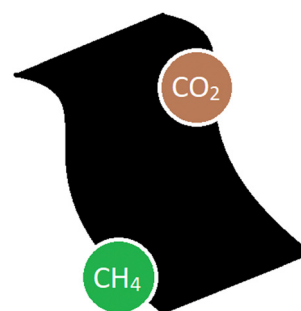
Zhihai Liu, Lei Wang, Hao Zhao, Yibin Wei, Xiaoyin Xie\* and Ping Chen\*



3559

### A simple, sustainable route to flexible microporous carbon cloth for energy storage applications

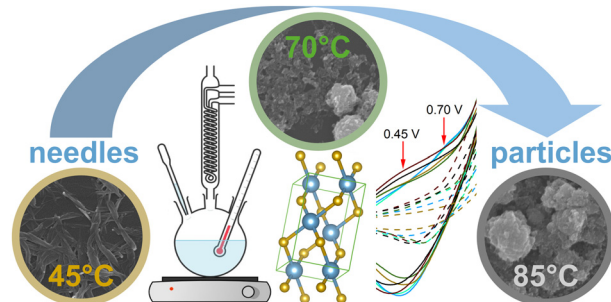
Thria Alkhaldi, L. Scott Blankenship and Robert Mokaya\*



3572

### Temperature-modulated solution-based synthesis of copper oxide nanostructures for glucose sensing

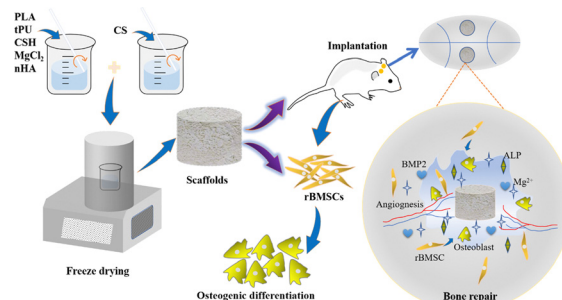
Yujia Zhu, Carolina Vigil-Hernandez, Curran Kalha, Nathalie Kanchena Fernando, Steve Firth, Gemma-Louise Davies, Katarzyna Bialas, Despina Moschou and Anna Regoutz\*



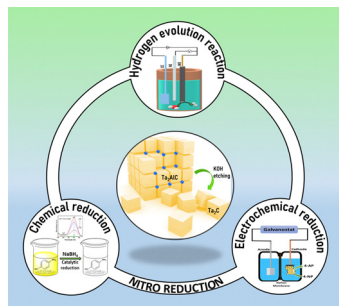
3583

### A PLA-tPU based magnesium ion incorporated CSH/nHA bioactive porous composite scaffold for critical bone defect repair

Zhi Shi, Guobin Huang, Zhongming Li, Zhenkai Lou, Zhiqiang Gong, Xin Wang, Chengyong Li\* and Bing Wang\*



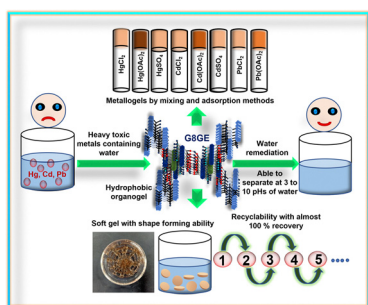
3593



### Fluorine-free synthesized tantalum carbide (Ta<sub>2</sub>C Mxene) as an efficient electrocatalyst for water reduction and nitro compound reduction

Aathilingam Vijayaprabakaran and  
Murugavel Kathiresan\*

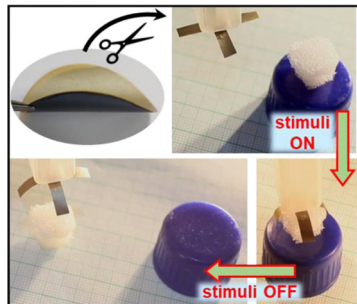
3603



### Design and synthesis of hydrophobic mixed organogels with complementary hydrogen-bond donor-acceptor sites: removal of heavy metal ions Hg<sup>2+</sup>, Cd<sup>2+</sup> and Pb<sup>2+</sup> from aqueous solution

Reena Kyarikwal, Ritika Munjal, Probal Nag,  
Sivaranjana Reddy Vennapusa and  
Suman Mukhopadhyay\*

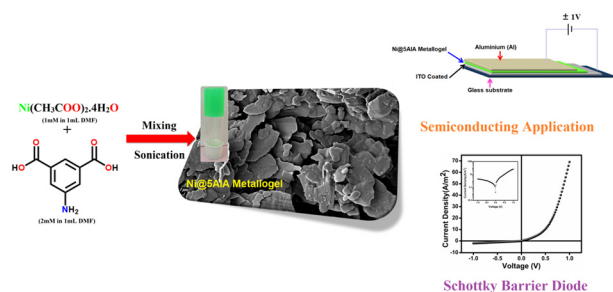
3619



### Light and solvent-driven actuator of clay and vanadium pentoxide nanosheets

Partha Pratim Saikia, Priyanku Garg, Kiran Mayawad,  
Tumpa Paul, Arindom Bikash Neog,  
Bhaskar Jyoti Sarmah, Kalyan Raidongia and  
Raj Kumar Gogoi\*

3628



### A semiconducting supramolecular novel Ni(II)-metallogel derived from 5-aminoisophthalic acid low molecular weight gelator: an efficient Schottky barrier diode application

Baishakhi Pal, Subhendu Dhibar,\* Ritam Mukherjee,  
Subham Bhattacharjee, Partha Pratim Ray\* and  
Bidyut Saha\*

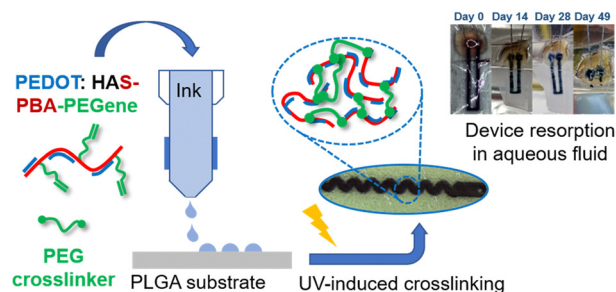


## PAPERS

3636

### A cross-linkable and resorbable PEDOT-based ink using a hyaluronic acid derivative as dopant for flexible bioelectronic devices

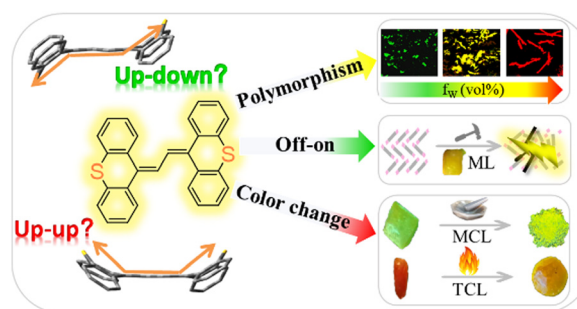
Maxime Leprince, Simon Regal, Pascal Mailley, Fabien Sauter-Starace, Isabelle Texier\* and Rachel Auzély-Velty



3645

### Mechanochromic, thermoresponsive and triboluminescence behaviors of one divinyl thioxanthene based AIE luminogen with variable conformations

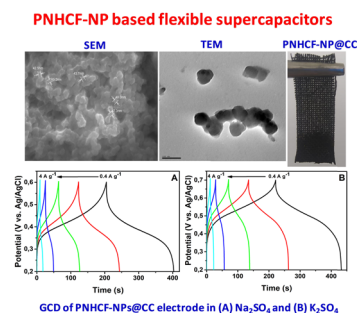
Nengni Xu, Wenhua Xu, Meng Sun, Yi Yuan, Xinjun Luan,\* Ying Wang and Hui Wang\*



3654

### High-performance flexible supercapacitors based on potassium nickel(II) hexacyanoferrates(III) nanoparticles on carbon cloth as an electrode material

L. M. Samyn, T. S. Lessa, R. Suresh Babu,\* A. Kalaivani, T. M. Barbosa and A. L. F. de Barros



3662

### Electrodeposition, composition and properties of cobalt–rhenium alloys coatings

Yuliya Yapontseva, Valeriy Kublanovsky,\* Tetyana Maltseva, Yuri Troshchenkov and Oleksii Vyshnevskyi

