# Nanoscale Horizons

The home for rapid reports of exceptional significance in nanoscience and nanotechnology

# rsc.li/nanoscale-horizons

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 2055-6756 CODEN NHAOAW 8(12) 1597-1712 (2023)



#### Cover

See Chih-Ching Huang, Huan-Tsung Chang et al., pp. 1652-1664. Image reproduced by permission of Chih-Ching Huang from Nanoscale Horiz.. 2023, 8, 1652.



# Inside cover

See José R. Castón, Pedro J. de Pablo et al.. pp. 1665-1676. Image reproduced by permission of María J. Rodríguez Espinosa and Pedro J. de Pablo from Nanoscale Horiz., 2023, 8, 1665.

# **EDITORIALS**

1604

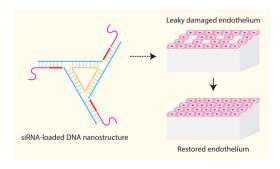
Nanoscale Horizons Emerging Investigator Series: Dr Ahu Gümrah Dumanli-Parry, University of Manchester, UK



#### 1606

# siRNA-loaded DNA nanostructures restore endothelial leakiness

Arun Richard Chandrasekaran\*



# Open Access

#### **Editorial Staff**

Executive Editor

Michaela Mühlberg

#### Managing Editor

Heather Montgomery

**Editorial Production Manager** 

Ionathon Watson

Senior Publishing Editor

Alex Metherell

**Development Editor** 

Matthew Blow, Chris Dias, Hemna Fathima, Rob Hinde, Ash Hyde, Evie Karkera, Tamara Kosikova, Carole Martin, Kirsty McRoberts, Tiffany Rogers, Cat Schofield, Tom Williams

#### Editorial Assistant

Elizabeth So

Assistant Editors

Jie Gao, Yu Zhang

Publisher

Sam Keltie

For queries about submitted papers, please contact Jonathon Watson, Editorial Production Manager in the first instance. E-mail: nanoscalehorizons@rsc.org

For pre-submission queries please contact Michaela Mühlberg, Executive Editor. E-mail: nanoscalehorizons-rsc@rsc.org

Nanoscale Horizons (print: ISSN 2055-6756 electronic: ISSN 2055-6764) is published 12 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

2023 Annual (electronic) subscription price: £2727; \$4500. 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

# **ROYAL SOCIETY OF CHEMISTRY**

# Nanoscale Horizons

# rsc.li/nanoscale-horizons

Nanoscale Horizons is the home for urgent short reports of exceptionally high quality & innovative nanoscience & nanotechnology



Published in collaboration with the National Centre for Nanoscience and Technology, Beijing, China

#### **Editorial Board**

Katharina Landfester Max Planck Institute for Polymer Research, Germany

#### Scientific Editors

Katsuhiko Ariga, National Institute for Materials Science (NIMS), Japan Wenlong Cheng, Monash University,

Yves Dufrêne, Université Catholique de

Anna Fontcuberta i Morral, École polytechnique fédérale de Lausanne,

Switzerland Dirk Guldi, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany Zhiyong Tang, National Center for Nanoscience and Technology, China Jinlan Wang, Southeast University, China

Miaofang Chi, Oak Ridge National Laboratory, USA Jin-Hong Park, Sungkyunkwan University,

Miqin Zhang, University of Washington, USA

#### **Advisory Board**

Chunli Bai, Chinese Academy of Sciences,

Uri Banin, Hebrew University of Jerusalem, Israel

Frank Caruso, University of Melbourne, Australia

Cinzia Casiraghi, The University of Manchester, UK Paola Ceroni, University of Bologna, Italy

Chunying Chen, National Center for Nanoscience and Technology, China Xiaodong Chen, Nanyang Technological University, Singapore

Serena Cussen, University of Sheffield, UK Harold Craighead, Cornell University, USA Qing Dai, National Center for Nanoscience

Qing Dai, National Center for Nanoscient and Technology, China Shuai Dong, Southeast University, China Laura Fabris, Rutgers University, USA Andrea Ferrari, University of Cambridge, UK Raju Kumar Gupta, Indian Institute of Technology Kanpur, India Nobuhiko Hosono, University of Tokyo, Japan

Xingyu Jiang, Southern University of Science and Technology, China Rongchao Jin, Carnegie Mellon University,

Dong Ha Kim, Ewha Womans University, South Korea

Jang-Kyo Kim, University of New South Wales, Kostas Kostarelos, University of Manchester,

Yamuna Krishnan, University of Chicago,

Tai Wei David Leong, National University of Singapore, Singapore

Li Li, Northeastern University, USA Quan Li, Chinese University of Hong Kong,

Hong Kong
Xing Yi Ling, Nanyang Technological
University, Singapore
Jie Liu, Duke University, USA Xiaogang Liu, National University of Singapore, Singapore

Renzhi Ma, National Institute for Materials

Science, Japan Stefan Maier, Monash University, Australia Liberato Manna, Istituto Italiano di Tecnologia, Italy Chad Mirkin, Northwestern University, USA

Paul Mulvaney, University of Melbourne,

Catherine Murphy, University of Illinois at Urbana-Champaign, USA Valeria Nicolosi, Trinity College Dublin,

Dong Qin, Georgia Institute of Technology,

Sandra Rosenthal, Vanderbilt University, USA Jungki Ryu, Ulsan National Institute of Science and Technology, Korea Michael Sailor, University of California, San Diego, USA Paolo Samorì, Université de Strasbourg,

Leslie Schoop, Princeton University, USA Ester Segal, Technion - Israel Institute of Technology, Israel

Elena Shevchenko, Argonne National Laboratory, USA Hisanori Shinohara, Nagoya University, Japan Zuzanna Siwy, University of California,

Irvine IISA Sara Skrabalak, Indiana University, USA Francesco Stellacci, École polytechnique fédérale de Lausanne, Switzerland

Ling-Dong Sun, Peking University, China Shouheng Sun, Brown University, USA Sarah Tolbert, University of California, Los Angeles, USA

Jonathan Veinot, University of Alberta, Canada

Umesh Waghmare, Jawaharlal Nehru Centre for Advanced Scientific Research, India Jianfang Wang, Chinese University of Hong Kong, Hong Kong SAR

Sharon Weiss, Vanderbilt University, USA Benjamin Wiley, Duke University, USA Wenzhuo Wu, Purdue University, USA Nobuhiro Yanai, Kyushu University, Japan Stefan Zauscher, Duke University, USA Xiao Cheng Zeng, University of Nebraska-

Lincoln, USA Hongjie Zhang, Changchun Institute of Applied Chemistry, China Hua Zhang, City University of Hong Kong,

Manzhou Zhu, Anhui University, China Jin Zou, University of Queensland, Australia

#### Community Board

Please see the Nanoscale Horizons journal webpage for full details of our Community Board: rsc.li/nanoscale-horizons

# Information for Authors

Full details on how to submit material for publication in Nanoscale Horizons 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/nanoscale-horizons

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.

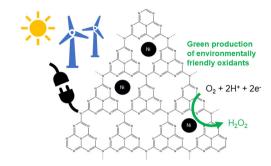
Registered charity number: 207890

# **EDITORIALS**

#### 1608

# Electrifying H<sub>2</sub>O<sub>2</sub> synthesis with g-C<sub>3</sub>N<sub>4</sub>-based single atom catalysts

Jungki Ryu\*

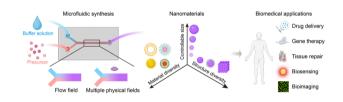


# **REVIEWS**

#### 1610

# Microfluidic synthesis of nanomaterials for biomedical applications

Yanjuan Huang, Chao Liu, Qiang Feng\* and Jiashu Sun\*



# 1628

# The rise of quasi-2D Dion-Jacobson perovskites for photovoltaics

Jieyi Chen, Zihao Zhai,\* Qi Liu and Huiqiong Zhou\*

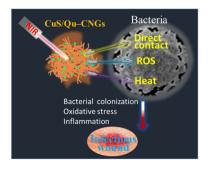


# **COMMUNICATIONS**

#### 1652

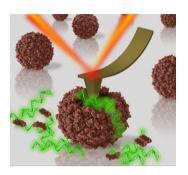
# NIR-activated quercetin-based nanogels embedded with CuS nanoclusters for the treatment of drug-resistant biofilms and accelerated chronic wound healing

Amit Nain, Yu-Ting Tseng, Akash Gupta, Yu-Feng Lin, Sangili Arumugam, Yu-Fen Huang, Chih-Ching Huang\* and Huan-Tsung Chang\*



#### **COMMUNICATIONS**

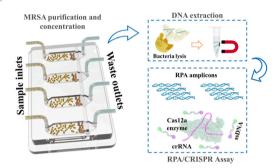
1665



# Mechanical disassembly of human picobirnavirus like particles indicates that cargo retention is tuned by the RNA-coat protein interaction

María J. Rodríguez-Espinosa, Javier M. Rodríguez, José R. Castón\* and Pedro J. de Pablo\*

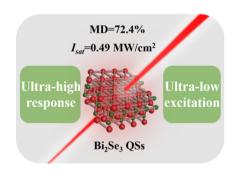
1677



# Pneumatic nano-sieve for CRISPR-based detection of drug-resistant bacteria

Ruonan Peng, Xinye Chen, Fengjun Xu, Richard Hailstone, Yujie Men and Ke Du\*

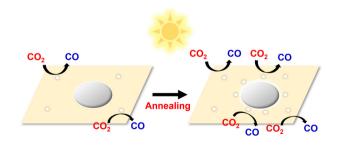
1686



# Quantum-sized topological insulators/semimetals enable ultrahigh and broadband saturable absorption

Zhexue Chen, Xinyu Sui, Zhangqiang Li, Yueqi Li, Xinfeng Liu and Yong Zhang\*

1695



# Defect engineering enhances plasmonic-hot electrons exploitation for CO<sub>2</sub> reduction over polymeric catalysts

Hang Yin, Zhehao Sun, Kaili Liu, Ary Anggara Wibowo, Julien Langley, Chao Zhang, Sandra E. Saji, Felipe Kremer, Dmitri Golberg, Hieu T. Nguyen, Nicholas Cox and Zongyou Yin\*

# COMMUNICATIONS

# 1700

A selenoureido-iminoglycolipid transported by zeolitic-imidazolate framework nanoparticles: a novel antioxidant therapeutic approach

Fátima Guerrero, Andrés Carmona, Victoria Vidal, Ana Franco, Alejandro Martín-Malo, Elena M. Sánchez-Fernández\* and Carolina Carrillo-Carrión\*

