Nanoscale

rsc.li/nanoscale

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 2040-3372 CODEN NANOHL 15(28) 11731-12126 (2023)



Cover See P. A. D. Gonçalves and F. Javier García de Abajo, pp. 11852–11859.

Image reproduced by permission of F. Javier García de Abajo from *Nanoscale*, 2023, **15**, 11852.

EDITORIAL

11744

Outstanding Reviewers for Nanoscale in 2022



REVIEWS

11746

Progress on the *in situ* imaging of growth dynamics of two-dimensional materials

Xiaokai Zhu, Honggang Wang, Kangkang Wang and Liming Xie*



Editorial Staff

Executive Editor Michaela Mühlberg

Managing Editor

Heather Montgomery Editorial Production Manager

Ionathon Watson Senior Publishing Editor

Daniella Ferluccio Development Editor

Edward Gardner

Publishing Editors

Matthew Blow, Chris Dias, Hemna Fathima, Juan Gonzalez, Eleanor Griffiths, Rob Hinde, Sam Howell, Clara Humann, Ash Hyde, Francesca Jacklin, Shruti Karnik, Sophie Koh, Tamara Kosikova, Evie Karkera, Brian Li, Sam Mansell, Carole Martin, Kirsty McRoberts, Tiffany Rogers, Cat Schofield, Charu Storr-Vijay, Manman Wang, Tom Williams, Ella White

Editorial Assistant Elizabeth So

Publishing Assistant Lee Colwill

Assistant Editor

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: nanoscale@rsc.org

For pre-submission queries please contact Michaela Mühlberg, Executive Editor. E-mail: nanoscale-rsc@rsc.org Nanoscale (electronic: ISSN 2040-3372) 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

2023 Annual (electronic) subscription price: £1936/\$3155. 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

Nanoscale

rsc.li/nanoscale

Nanoscale publishes experimental and theoretical work across the breadth of nanoscience and nanotechnology.



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

Editorial Board

Editors-in-Chief

Chunli Bai, National Centre for Nanoscience and Nanotechnology, China Dirk Guldi, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

Associate Editors

Cinzia Casiraghi, University of Manchester, UK Gianaurelio Cuniberti, TU Dresden (Technische Universität Dresden), Germany Qing Dai, National Center for Nanoscience and Technology of China, China Yves Dufrêne, Université Catholique de Louvain, Belgium

Advisorv Board

Zhenan Bao, Stanford University, USA Amanda Barnard, Australian National University, Australia Suryasarathi Bose, Indian Institute of Science

Bangalore, India

Stephanie Brock, Wayne State University, USA Raffaella Buonsanti, EPFL, Switzerland Chunying Chen, National Center for Nanoscience and Technology of China, China Jingyi Chen, University of Arkansas, USA

Wenlong Chen, Monash University, Australia Xiaodong Chen, Nanyang Technological University, Singapore

Serena Cussen, University of Sheffield, UK Mita Dasog, Dalhousie University, Canada Kristen Fichthorn, Penn State University, USA Christy Haynes, University of Minnesota, USA Guohua Jia, Curtin University, Australia Xingyu Jiang, Southern University of Science and Technolog, China

RongChao Jin, Carnegie Mellon University, USA Song Jin, University of Wisconsin, USA

Jesse Jokerst, University of California San Diego, USA

Kourosh Kalantar-zadeh. The University of Sydney, Australia

Yamuna Krishnan, University of Chicago, USA Katharina Landfester, Max Planck Institute for

Polymer Research, Germany

Dattatray Late, CSIR National Chemical

Laboratory, India

Pooi See Lee, Nanyang Technological

University, Singapore Graham Leggett, The University of Sheffield,

Information for Authors

Full details on how to submit material for publication in Nanoscale 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

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.

Dong Ha Kim, Ewha Womens University, Zhiqun Lin, National University of Singapore, Singapore, Singapore

Science, Japan

Janet Macdonald, Vanderbilt University, USA Teresa Pellegrino, Istituto Italiano di Tecnologia, Italy Elena Shevchenko, Argonne National Laboratory, USA Ionathan Veinot, University of Alberta, Canada Umesh Waghmare, Jawaharlal Nehru Centre for Advanced Scientific Research, India Manzhou Zhu, Annhui University, China Jin Zou, The University of Queensland, Australia

Changming Li, Southwest University, China Jie Liu, Duke University, USA Laura Na Liu, Max Planck Institute for Intelligent Systems, Germany Yunqi Liu, Institute of Chemistry, Chinese Academy of Sciences, China Wei Lu, University of Michigan, USA Liberato Manna, Istituto Italiano di

Tecnologia, Italy Anna Fontcuberta i Morral, EPFL, Switzerland Catherine Murphy, University of Illinois at Urbana-Champaign, USA

Kostya (Ken) Ostrikov, Queensland University of Technology, Australia

So-Jung Park, Ewha Womans University, Korea T Pradeep, Indian Institute of Technology

Madras, India Lakshmi Polavarapu, University of Vigo, Spain

Narayan Pradhan, Indian Association for the Cultivation of Science, India Dong Qin, Georgia Institute of Technology,

USA Paolo Samorì, Université de Strasbourg, France Michael Sailor, University of California, San Diego, USA

Zhigang Shuai, Tsinghua University, China Sara Skrabalak, Indiana University, USA Francesco Stellacci, EPFL, Switzerland

Hong-Bo Sun, Jilin University, China Ling-Dong Sun, Peking University, China Shouheng Sun, Brown University, USA Xiaoming Sun, Beijing University of Chemical Technology, China Dmitri Talapin, University of Chicago, USA Zhiyong Tang, National Center for NanoScience and Technology, China

Mauricio Terrones, The Pennsylvania State University, USA Sarah Tolbert, University of California, Los Angeles, USA Ventsislav Valev, University of Bath, UK Miriam Vitiello, CNR Nano, Italy Jianfang Wang, Chinese University of Hong Kong, Hong Kong SAR Benjamin Wiley, Duke University, USA Xiaojun Wu, University of Science and Technology of China, China Yujie Xiong, University of Science and Technology of China, China Hongxing Xu, Wuhan University, China Lin Xu, Nanjing Normal University, China Ya Yang, Beijing Institute of Nanoenergy and Nanosystems, China Jinhua Ye, National Institute for Materials Science, Japan Xiao Cheng Zeng, University of Nebraska-Lincoln, USA Gang Zhang, Agency for Science, Technology and Research, Singapore Hua Zhang, City University of Hong Kong, China Migin Zhang, University of Washington, USA Yuliang Zhao, National Center for Nanoscience and Technology, China

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 sued by the Copyright Licensing Agency in the UK. US copyright law is applicable to users in the USA.

Registered charity number: 207890



This article is licensed under a Creative Commons Attribution 3.0 Unported Licence. Open Access Article. Published on 20 July 2023. Downloaded on 7/19/2025 2:04:44 AM.

Christian Klinke, University of Rostock, Germany Quan Li, The Chinese University of Hong Kong, Hong Kong Singapore Xing Yi Ling, Nanyang Technological University, Singapore Xiaogang Liu, National University of

Renzhi Ma, National Institute for Materials

Andrea Ferrari, University of Cambridge, UK South Korea

REVIEWS

11759

Advanced Pt-based electrocatalysts for the hydrogen evolution reaction in alkaline medium

Wei Ma, Xueyuan Zhang, Wenya Li, Menggai Jiao,* Lili Zhang,* Renzhi Ma and Zhen Zhou



11777

Recent progress in the synthesis of transition metal nitride catalysts and their applications in electrocatalysis

Zheng-Gang Yang, Hui-Min Xu, Ting-Yu Shuai, Qi-Ni Zhan, Zhi-Jie Zhang, Ke Huang, Chunlong Dai and Gao-Ren Li*



11801

Copper-based biological alloys and nanocomposites for enzymatic catalysis and sensing applications

Yaoyang Pu, Shiyue Chen, Yujun Yang* and Xiang Mao*



11813

A review on reactive oxygen species (ROS)-inducing nanoparticles activated by uni- or multi-modal dynamic treatment for oncotherapy

Jinyong Lin, Dong Li, Changhong Li, Ziqi Zhuang, Chengchao Chu, Kostya (Ken) Ostrikov, Erik W. Thompson, Gang Liu and Peiyu Wang*



MINIREVIEW



Plexcitonics: plasmon-exciton coupling for enhancing spectroscopy, optical chirality, and nonlinearity

Yichuan Chen and Mengtao Sun*

COMMUNICATIONS



Multi-plasmon effects and plasmon satellites in photoemission from nanostructures

P. A. D. Gonçalves and F. Javier García de Abajo*



Selective high-order resonance in asymmetric plasmonic nanostructures stimulated by vortex beams

Da-Jie Yang* and Ji-Cai Liu*

PAPERS



Coexistence of Au single atoms and Au nanoparticles on NiAl-LDH for selective electrooxidation of benzyl alcohol to benzaldehyde

Ziheng Song, Tianyang Shen, Yihang Hu, Guihao Liu, Sha Bai, Xiaoliang Sun, Si-Min Xu and Yu-Fei Song*

11875

Dual functionality of ferrocene-based metallopolymers as radical scavengers and nanoparticle stabilizing agents

Nizar B. Alsharif, Tibor Gergo Halmágyi, Mark A. Hempenius, G. Julius Vancso, Corinne Nardin and Istvan Szilagyi*



11884

Interfacial engineering to modulate surface dipoles, work functions and dielectric confinement of halide perovskites

Pooja Basera, Boubacar Traoré, Jacky Even* and Claudine Katan*



11898

LiCoO₂ cathode surface modification with optimally structured Li₃PO₄ for outstanding high-voltage cycling performance

Yuxuan Ji, Jian Wei,* Di Liang, Bing Chen, Xueting Li, Hao Zhang and Zongyou Yin*



11909

Giant magnetic anisotropy of adatoms on the graphane surface

Kuan-Rong Hao, Yang Song and Lizhi Zhang*





Exhaustive classification and systematic free-energy profile study of single-stranded DNA inter-overhang migration

Hon Lin Too and Zhisong Wang*

11927

11945



Secondary ligand-induced orthogonal self-assembly of silver nanoclusters into superstructures with enhanced NIR emission

Enhanced efficiency of water desalination in

nanostructured thin-film membranes with

Korath Shivan Sugi, Amritha P. Sandra, Nonappa, Debasmita Ghosh, Jyoti Sarita Mohanty, Murugesan Paulthangam Kannan, B. S. Sooraj, Pillalamarri Srikrishnarka, Jayoti Roy, Wakeel Ahmed Dar and Thalappil Pradeep*



Reversible

NaOH .k.

Suryasarathi Bose, Brian C. Benicewicz, Sanat K. Kumar and J. K. Basu*

b) Novelty of the membranes



Bioinspired magnetism-responsive hybrid microstructures with dynamic switching toward liquid droplet rolling states

Yucheng Bian, Suwan Zhu, Xin Li,* Yuan Tao, Chenyu Nian, Chenchu Zhang, Yubin Peng, Chuanzong Li, Wei Xiong, Wulin Zhu, Yanlei Hu, Jiawen Li, Jiaru Chu and Dong Wu*

11955

Growth of few-layer WTe₂ by a salt-assisted double-tube chemical vapor deposition method with high infrared photosensitivity

Zhengui Zhao, Fangfei Dong, Yuyan Wang,* Jiacheng Sun, Huanyu Ye, Rongming Wang and Junying Zhang*



11963

A high-index facet gold 12 tip nanostar for an improved electrocatalytic alcohol oxidation reaction with superior CO tolerance

Sanjeevan Rajagopal, Suresh Thangudu and Kuo Chu Hwang*



11972

Locally strained hexagonal boron nitride nanosheets quantified by nanoscale infrared spectroscopy

Fernand E. Torres-Davila, Chance Barrett, Michael Molinari, Muhammad Sajid, Ari P. Seitsonen, Abdelkader Kara* and Laurene Tetard*



11981

Ultra-stable silver nanotriangles: efficient and versatile colorimetric reporters for dipstick assays

Maurice Retout, Bryan Gosselin, Amina Adrović, Pascale Blond, Ivan Jabin* and Gilles Bruylants*





A 3D surface nanomechanical property mapping method with a magnetic-drive orthogonal cantilever probe

Junyuan Geng, Hao Zhang,* Xianghe Meng and Hui Xie*

12000



Phonon polaritons in van der Waals polar heterostructures for broadband strong light-matter interactions

Tianwei Qin, Weiliang Ma, Tao Wang* and Peining Li*

12008 Oriented conjugation STORM Antibody conjugated nanoPMOs Cancer cell targeting and intracellular degradation

Super-resolution imaging of antibody-conjugated biodegradable periodic mesoporous organosilica nanoparticles for targeted chemotherapy of prostate cancer

Pradip Das,* Silvia Pujals,* Lamiaa M. A. Ali, Magali Gary-Bobo, Lorenzo Albertazzi and Jean-Olivier Durand

12025



Investigating the thermal stability of ultra-small Ag, Au and AuAg alloy nanoparticles embedded in a silica matrix

Hemant Jatav, Maja Mičetic, Anusmita Chakravorty, Ambuj Mishra, Matthias Schwartzkopf, Andrei Chumakov, Stephan V. Roth and Debdulal Kabiraj*

12038

Periodic trends in the structural, electronic, and transport properties of electrenes

Mohammad Rafiee Diznab, Erin R. Johnson* and Jesse Maassen*



12048

Modifying a D-A- π -A-D HTM system for higher hole mobility by the *meta*-substitution strategy to weaken the electron-donating ability of the donor unit: a DFT study

Ke-Li Wang, Qun-Gui Wang, Cui-E Hu,* Yan Cheng,* Guang-Fu Ji and Xiang-Rong Chen



12064

Ru-doped WO₃ enabling efficient hydrogen oxidation reaction in alkaline media

Hai Liu, Zhuang Zhang, Mengxuan Li, Yaping Li,* Yun Kuang and Xiaoming Sun*



12071

Carrier tuning of 2D electron gas in field-effect devices based on Al_2O_3/ZnO heterostructures

Xinyi Zhu, Tianbao Zhang, Yongjie He, Yuhang Liu* and Hao Zhu*







Two-dimensional ferromagnetic semiconductors of monolayer $BiXO_3$ (X = Ru, Os) with direct band gaps, high Curie temperatures, and large magnetic anisotropy

Hongbo Wu, Fengxian Ma, Zhixue Tian, Ying Liu, Yalong Jiao* and Aijun Du



An ionic liquid synthesis route for mixed-phase sodium titanate (Na2Ti3O7 and Na2Ti6O13) rods as an anode for sodium-ion batteries

Pooja Kumari, Yining Li and Rebecca Boston*



Induced circular dichroism from helicoidal nano substrates to porphyrins: the role of chiral self-assembly

Gautier Duroux, Lucas Robin, Peizhao Liu, Emilie Dols, Matheus De Souza Lima Mendes, Sonia Buffière, Elodie Pardieu, Antoine Scalabre, Thierry Buffeteau, Sylvain Nlate, Reiko Oda, Maria Sara Raju, Matteo Atzori, Cyrille Train, Geert L. J. A. Rikken, Patrick Rosa, Elizabeth A. Hillard* and Emilie Pouget*



Indium doping-assisted monolayer Ga₂O₃ exfoliation for performance-enhanced MOSFETs

Penghui Li, Linpeng Dong,* Chong Li, Bin Lu, Chen Yang, Bo Peng, Wei Wang, Yuanhao Miao* and Weiguo Liu

12116

Origin of p-type conductivity in a WSe₂ monolayer

Yu-Zhou Zhang, Guo-Jun Zhu and Ji-Hui Yang*



CORRECTIONS

12123

Correction: Secondary ligand-induced orthogonal self-assembly of silver nanoclusters into superstructures with enhanced NIR emission

Korath Shivan Sugi, Amritha P. Sandra, Nonappa, Debasmita Ghosh, Jyoti Sarita Mohanty, Murugesan Paulthangam Kannan, B. S. Sooraj, Pillalamarri Srikrishnarka, Jayoti Roy, Wakeel Ahmed Dar and Thalappil Pradeep*

12124

Correction: Label free localization of nanoparticles in live cancer cells using spectroscopic microscopy

Graham L. C. Spicer, Luay Almassalha, Ignacio A. Martinez, Ronald Ellis, John E. Chandler, Scott Gladstein, Di Zhang, The-Quyen Nguyen, Seth Feder, Hariharan Subramanian, Roberto de la Rica, Sebastian A. Thompson* and Vadim Backman*