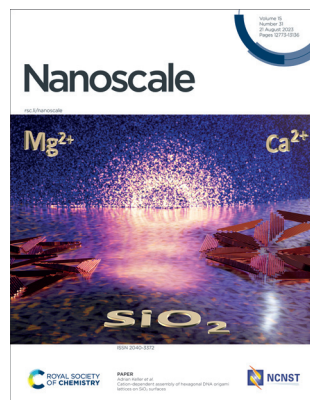


IN THIS ISSUE

ISSN 2040-3372 CODEN NANOHL 15(31) 12773–13136 (2023)



Cover

See Adrian Keller *et al.*,
pp. 12894–12906.

Image reproduced by
permission of Adrian Keller
from *Nanoscale*, 2023, **15**,
12894.



Inside cover

See Pengfei Qi *et al.*,
pp. 12907–12914.

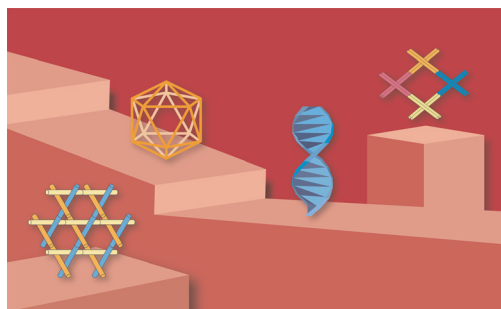
Image reproduced by
permission of Pengfei Qi
from *Nanoscale*, 2023, **15**,
12907.

EDITORIAL

12785

Introduction to emerging concepts in nucleic acids: structures, functions and applications

Dhiraj Bhatia,* Prabal Kumar Maiti,* Xiaogang Liu* and
Arun Richard Chandrasekaran*

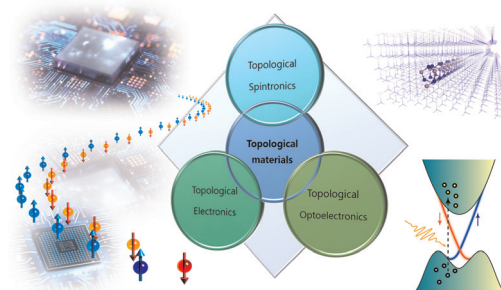


REVIEWS

12787

Topological quantum devices: a review

Kyung-Hwan Jin, Wei Jiang, Gurjyot Sethi and Feng Liu*



Editorial Staff

Executive Editor

Michaela Mühlberg

Managing Editor

Heather Montgomery

Editorial Production Manager

Jonathon Watson

Senior Publishing Editor

Daniella Ferlucio

Development Editor

Edward Gardner

Publishing Editors

Matthew Blow, Chris Dias, Hemna Fathima, Juan Gonzalez, Eleanor Griffiths, Rob Hinde, Ash Hyde, Sam Howell, Francesca Jacklin, Shruti Karnik, Sophie Koh, Tamara Kosikova, Evie Karkera, Brian Li, Sam Mansell, Carole Martin, Kirsty McRoberts, 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 Guld, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

Associate Editors

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

Andrea Ferrari, University of Cambridge, UK
Dong Ha Kim, Ewha Womens University, South Korea
Christian Klink, University of Rostock, Germany
Quan Li, The Chinese University of Hong Kong, Hong Kong
Zhiqun Lin, National University of Singapore, Singapore
Xing Yi Ling, Nanyang Technological University, Singapore
Xiaogang Liu, National University of Singapore, Singapore
Renzhi Ma, National Institute for Materials

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

Advisory 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 Fichtorn, Penn State University, USA
Christy Haynes, University of Minnesota, USA
Guohua Jia, Curtin University, Australia
Xingyu Jiang, Southern University of Science and Technology, 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
Pooi See Lee, Nanyang Technological University, Singapore
Graham Leggett, The University of Sheffield, UK
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 Womens 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 Samori, 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
Miqin Zhang, University of Washington, USA
Yuliang Zhao, National Center for Nanoscience and Technology, China

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.

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

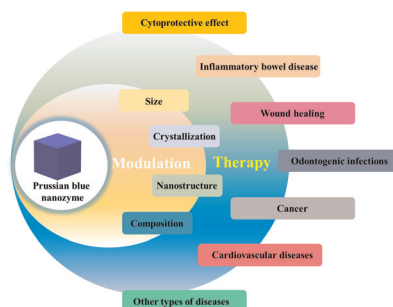


REVIEWS

12818

Prussian blue nanozymes: progress, challenges, and opportunities

Hongliang He, Mengmeng Long, Yifan Duan and Ning Gu*

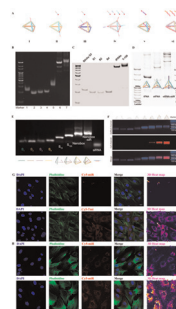


MINIREVIEWS

12840

Functional micro-RNA drugs acting as a fate manipulator in the regulation of osteoblastic death

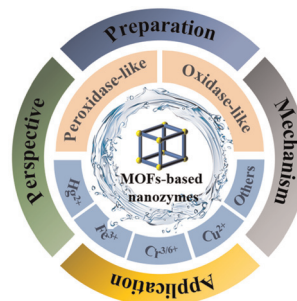
Zhengwen Cai, Fengshuo Liu, Yong Li, Long Bai, Maogeng Feng, Songhang Li, Wenjuan Ma and Sirong Shi*



12853

Advances in the application of metal–organic framework nanozymes in colorimetric sensing of heavy metal ions

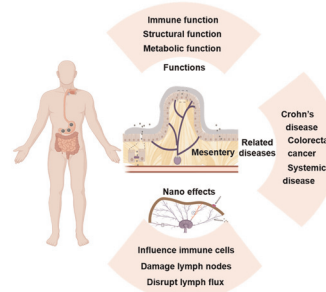
Li Zhang, Xiaoya Bi, Xiaohong Liu, Yi He, Libo Li* and Tianyan You*



12868

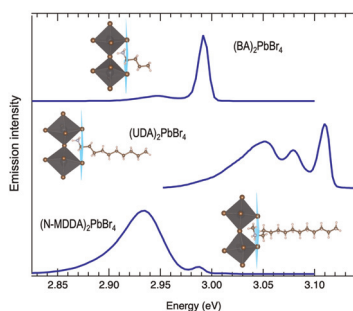
The implication of mesenteric functions and the biological effects of nanomaterials on the mesentery

Guanyu Liu, Lin Bao, Chunying Chen, Jianfu Xu* and Xuejing Cui*



COMMUNICATIONS

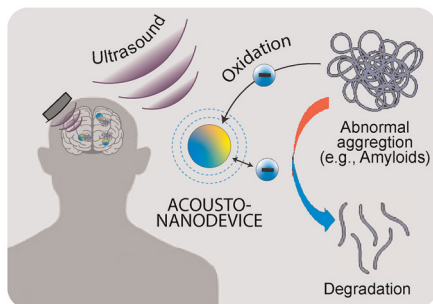
12880



Impact of the organic cation on the band-edge emission of two-dimensional lead–bromide perovskites

Seda Kutkan, Balaji Dhanabalan, Miao-Ling Lin, Ping-Heng Tan, Alexander Schleusener, Milena P. Arciniegas and Roman Krahne*

12889

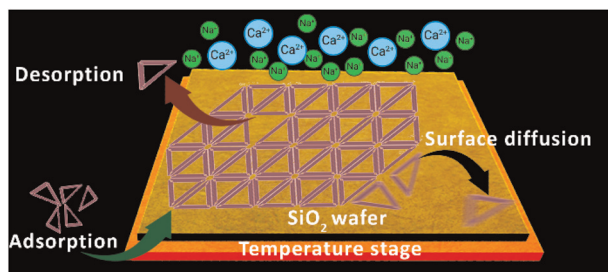


Protein redox by a piezoelectric acousto-nanodevice

Sophia Selvarajan, Hyunji Shim, Eunjeong Byun, Albert Kim* and Seung Hyun Song*

PAPERS

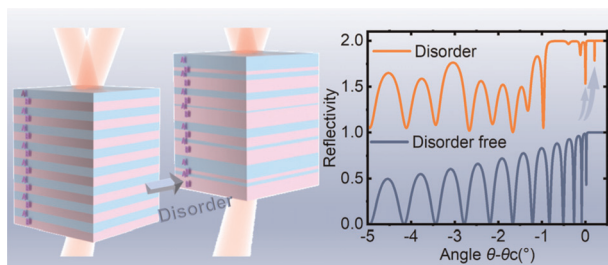
12894



Cation-dependent assembly of hexagonal DNA origami lattices on SiO₂ surfaces

Bhanu Kiran Pothineni, Guido Grundmeier and Adrian Keller*

12907



Anomalous transmission and Anderson localization for alternating propagated and evanescent waves at the deep-subwavelength scale

Changlin Sun, Haiyi Liu, Pengfei Qi,* Liguo Zhu, Lanjun Guo, Lie Lin and Weiwei Liu

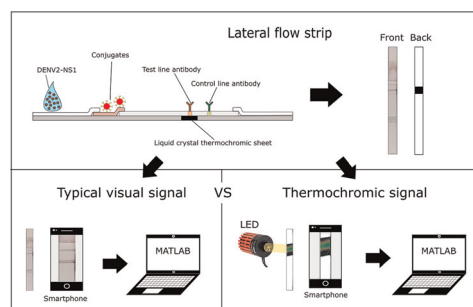


PAPERS

12915

Development of a thermochromic lateral flow assay to improve sensitivity for dengue virus serotype 2 NS1 detection

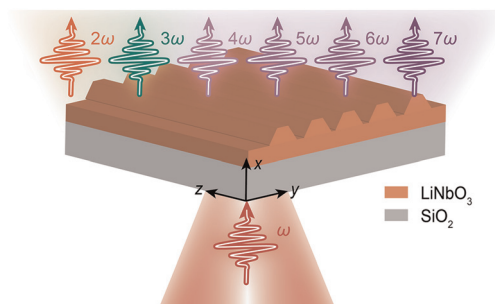
Thithawat Trakoolwilaiwan, Yasuhiro Takeuchi, Terence S. Leung, Matej Sebek, Liudmyla Storozhuk, Linh Nguyen, Le Duc Tung and Nguyen Thi Kim Thanh*



12926

Efficient second- and higher-order harmonic generation from LiNbO₃ metasurfaces

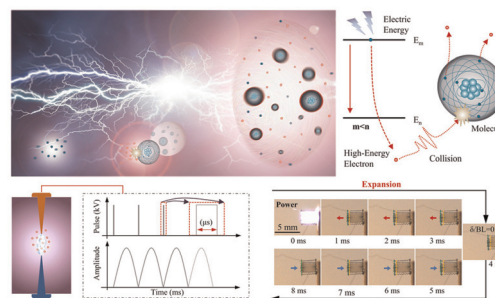
Yun Zhao, Zhaoxi Chen, Cheng Wang,* Yuanmu Yang* and Hong-Bo Sun*



12933

A novel electric stimulus-responsive micro-actuator for powerful biomimetic motions

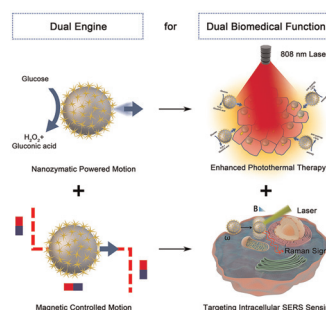
Ruide Yun,* Jingyu Che, Zhiwei Liu, Xiaojun Yan and Mingjing Qi*



12944

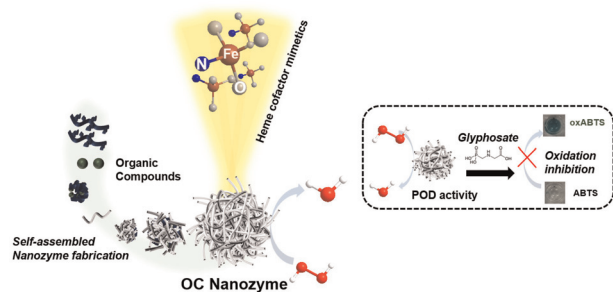
Nanozymatic magnetic nanomotors for enhancing photothermal therapy and targeting intracellular SERS sensing

Shimi Liu, Dandan Xu,* Junling Chen, Na Peng, Tao Ma and Feng Liang*



PAPERS

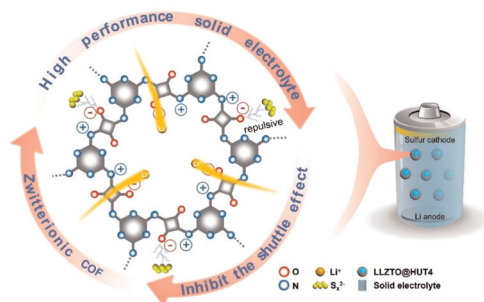
12954



Organic compound-based nanozymes for agricultural herbicide detection

Dong Hoon Lee and Mohammed Kamruzzaman*

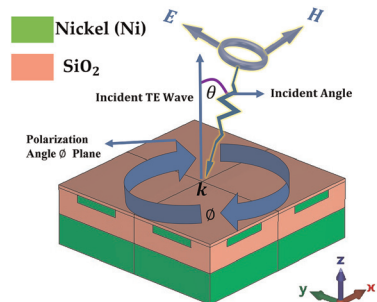
12961



Squaraine-linked zwitterionic COF modified LLZTO nanoparticles for high performance polymer composite electrolytes in Li–S batteries

Shuo Wang, Mengke Li, Gaojie Yan, Zhipeng Yang, Yuchao Guo, Xi Sun, Yue Wang, Yi Feng,* Huili Ding* and Xiaojie Zhang*

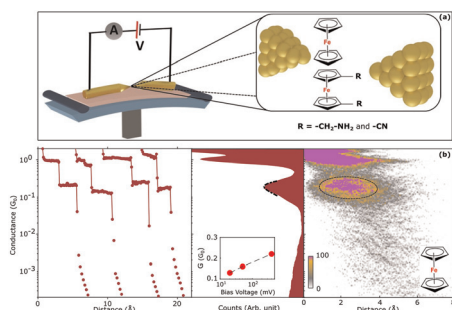
12972



Broadband near unity absorption meta-structure for solar thermophotovoltaic systems and optical window applications

Md Mohiuddin Soliman, Mohammad Tariqul Islam,* Touhidul Alam, Norbahiah Misran, Sharul Kamal Abdul Rahim, Ahmed Alzamil, Muhammad E. H. Chowdhury, Ahmed S. Alshammari, Haitham Alsaif and Mohamed S. Soliman

12995



Resonant transport in a highly conducting single molecular junction via metal–metal covalent bond

Biswajit Pabi, Štěpán Marek, Adwitiya Pal, Puja Kumari, Soumya Jyoti Ray, Arunabha Thakur, Richard Korytár and Atindra Nath Pal*

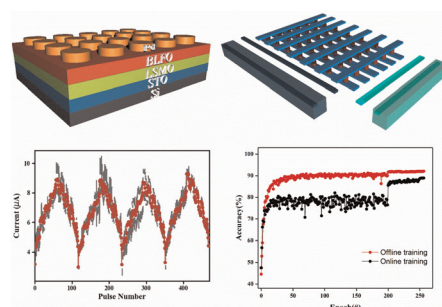


PAPERS

13009

Silicon based $\text{Bi}_{0.9}\text{La}_{0.1}\text{FeO}_3$ ferroelectric tunnel junction memristor for convolutional neural network application

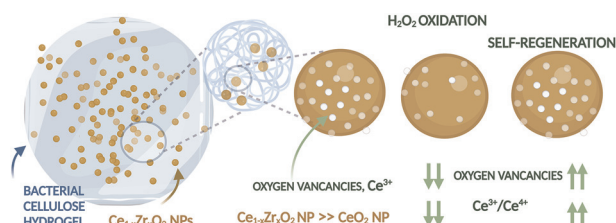
Gongjie Liu, Wei Wang, Zhenqiang Guo, Xiaotong Jia, Zhen Zhao, Zhenyu Zhou, Jiangzhen Niu, Guojun Duan and Xiaobing Yan*



13018

$\text{Ce}_{1-x}\text{Zr}_x\text{O}_2$ nanoparticles in bacterial cellulose, bio-based composites with self-regenerating antioxidant capabilities

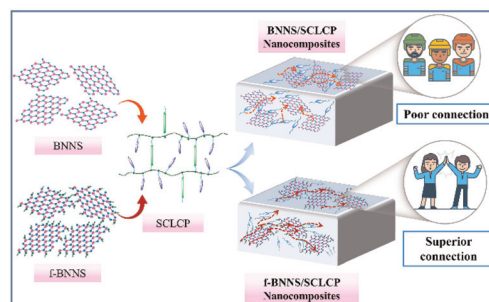
Johanna van Gent* and Anna Roig*



13025

Improved thermal conductivity and excellent electrical insulation properties of polysiloxane nanocomposite-incorporated functional boron nitride sheets *via in situ* polymerization

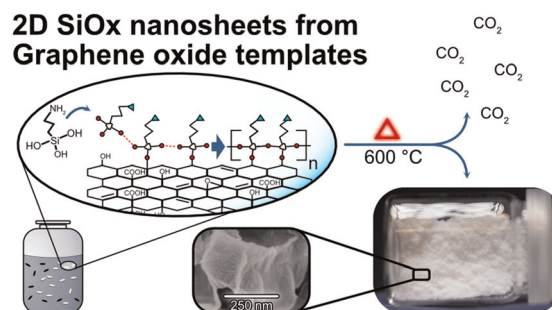
Xiaole Zheng, Yingjie Zhan, Jun Shi, Mangeng Lu and Kun Wu*



13037

Large-scale synthesis of 2D-silica (SiO_x) nanosheets using graphene oxide (GO) as a template material

Björn K. Birdsong, Billy W. Hoogendoorn, Fritjof Nilsson, Richard L. Andersson, Antonio J. Capezza, Mikael S. Hedenqvist, Stefano Farris, Antonio Guerrero and Richard T. Olsson*



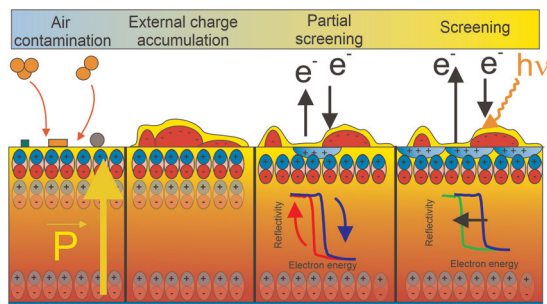
13049



Multifunctional metal selenide-based materials synthesized via a one-pot solvothermal approach for electrochemical energy storage and conversion applications

Bhimanaboina Ramulu, Shaik Junied Arbaz, Manchi Nagaraju and Jae Su Yu*

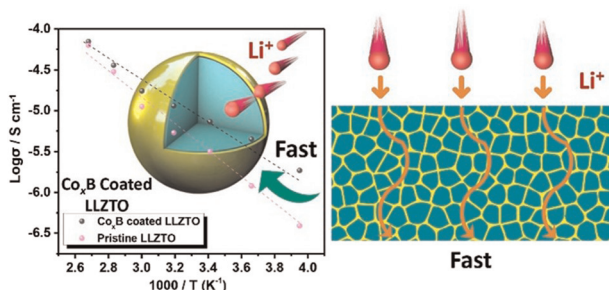
13062



Surface charge dynamics on air-exposed ferroelectric $\text{Pb}(\text{Zr,Ti})\text{O}_3(001)$ thin films

Laura E. Abramiuc,* Liviu C. Tănase, Mauricio J. Prieto, Lucas de Souza Caldas, Aarti Tiwari, Nicoleta G. Apostol, Marius A. Hușanu, Cristina F. Chirilă, Lucian Trupină, Thomas Schmidt, Lucian Pintilie and Cristian M. Teodorescu

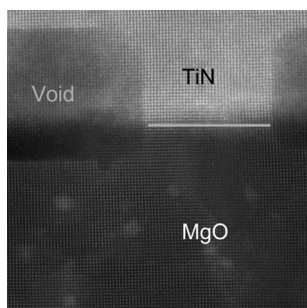
13076



Reactive boride as a multifunctional interface stabilizer for garnet-type solid electrolyte in all-solid-state lithium batteries

Mingzhe Chen,* Jing Zhang, Jiliang Zhang, Binkai Yu, Limin Zhou, Yao Xiao, Xu Gao, Jin Xiao,* Chunsheng Li,* Yan Sun,* Huakun Liu, Shixue Dou and Shulei Chou*

13086



Chemical potential gradient induced formation of Kirkendall voids at the epitaxial TiN/MgO interface

Xiaoman Zhang, W. J. Meng* and Andrew C. Meng*

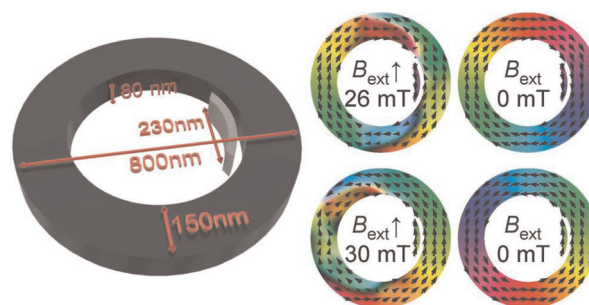


PAPERS

13094

Control of vortex chirality in a symmetric ferromagnetic ring using a ferromagnetic nanoelement

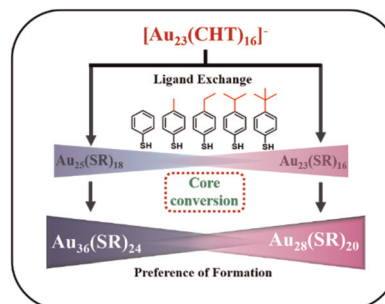
Uladzislau Makartsou,* Mathieu Moalic, Mateusz Zelent, Michał Mruczkiewicz and Maciej Krawczyk*



13102

Control over product formation and thermodynamic stability of thiolate-protected gold nanoclusters through tuning of surface protecting ligands

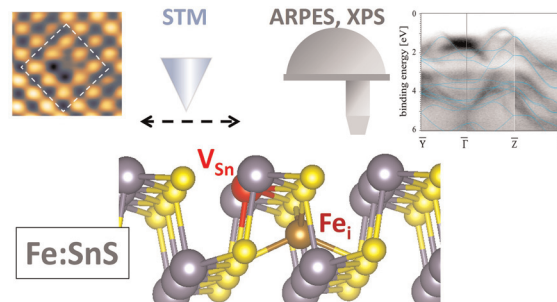
Manju P. Maman, Eyyakkandy Nida Nahan, Greeshma Suresh, Arunendu Das, Akhil S. Nair, Biswarup Pathak and Sukhendu Mandal*



13110

Defect pairing in Fe-doped SnS van der Waals crystals: a photoemission and scanning tunneling microscopy study

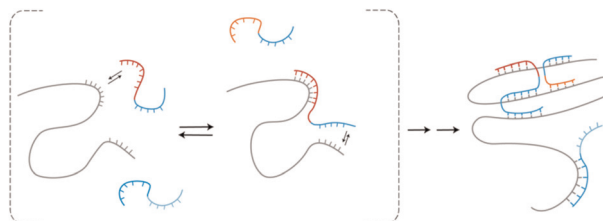
Damla Yesilpinar, Martin Vondráček, Patrik Čermák, Harry Mönig, Jaromír Kopeček, Ondřej Caha, Karel Carva, Čestmír Drašar and Jan Honolka*



13120

Sequence-dependent folding of monolayered DNA origami domains

Sabrina Gambietz, Lena J. Stenke and Barbara Saccà*



CORRECTION

13133

Correction: A graphene/h-BN MEMS varactor for sub-THz and THz applications

Piotr A. Drózdź,* Maciej Haras,* Aleksandra Przewtoka,* Aleksandra Krajewska, Maciej Filipiak, Mateusz Słowikowski, Bartłomiej Stonio, Karolina Czerniak-Łosiewicz, Zygmunt Mierczyk, Thomas Skotnicki and Dmitri Lioubtchenko

