

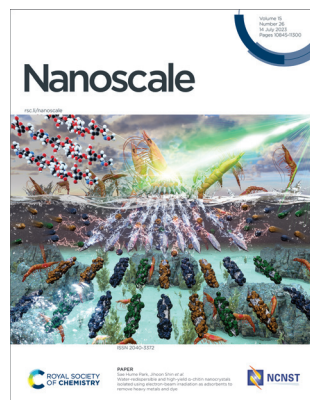
Nanoscale

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

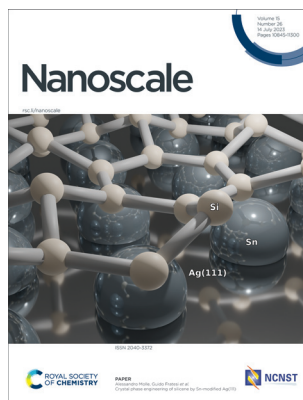
ISSN 2040-3372 CODEN NANOHL 15(26) 10845–11300 (2023)



Cover

See Sae Hume Park, Jihoon Shin *et al.*, pp. 10990–11004.

Image reproduced by permission of Jihoon Shin from *Nanoscale*, 2023, **15**, 10990.



Inside cover

See Alessandro Molle, Guido Fratesi *et al.*, pp. 11005–11012.

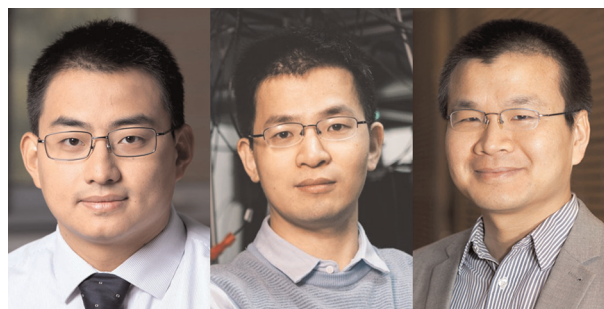
Image reproduced by permission of Alessandro Molle and Guido Fratesi from *Nanoscale*, 2023, **15**, 11005.

EDITORIAL

10858

Introduction to nanoscale quantum technologies

Qing Dai,* Chao-Yang Lu* and Zhipei Sun*

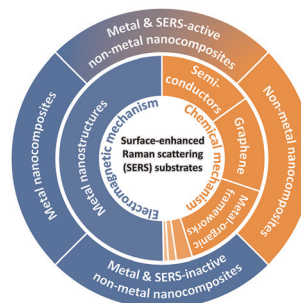


REVIEWS

10860

Material design, development, and trend for surface-enhanced Raman scattering substrates

Yue Ying, Zhiyong Tang and Yaling 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 Guldi, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

Associate Editors

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

Andrea Ferrari, University of Cambridge, UK
Dong Ha Kim, Ewha Womens University, South Korea
Christian Klinker, 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
Renzi 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 Fichthorn, 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
Kouros 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 Skrabalal, 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, without 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

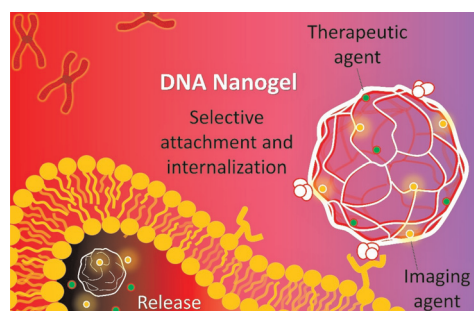


REVIEWS

10882

DNA hydrogels and nanogels for diagnostics, therapeutics, and theragnostics of various cancers

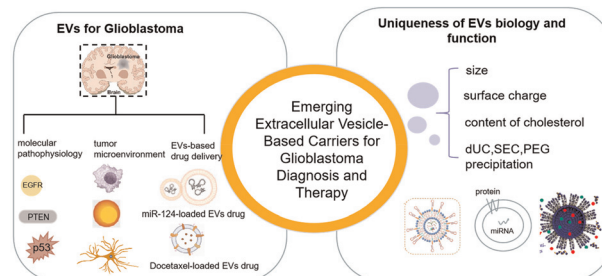
Iman Zare, Reza Taheri-Ledari, Farhad Esmailzadeh, Mohammad Mehdi Salehi, Adibeh Mohammadi, Ali Maleki and Ebrahim Mostafavi*



10904

Emerging extracellular vesicle-based carriers for glioblastoma diagnosis and therapy

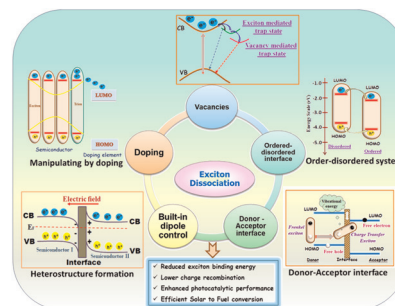
Jingjing Wang, Yue Liu, Fengbo Liu, Shaoyan Gan, Shubham Roy, Ikram Hasan, Baozhu Zhang* and Bing Guo*



10939

Band-structure tunability via the modulation of excitons in semiconductor nanostructures: manifestation in photocatalytic fuel generation

Srabanti Ghosh,* Dipendu Sarkar, Sweta Bastia and Yatendra S. Chaudhary

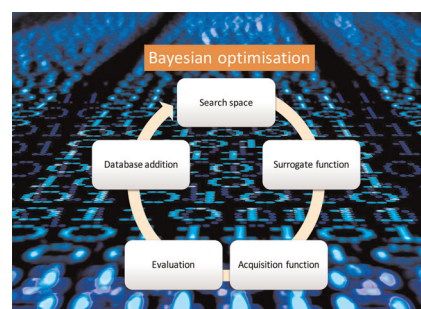


MINIREVIEW

10975

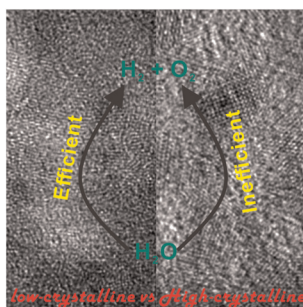
Bayesian optimisation for efficient material discovery: a mini review

Yimeng Jin and Priyank V. Kumar*



COMMUNICATION

10985

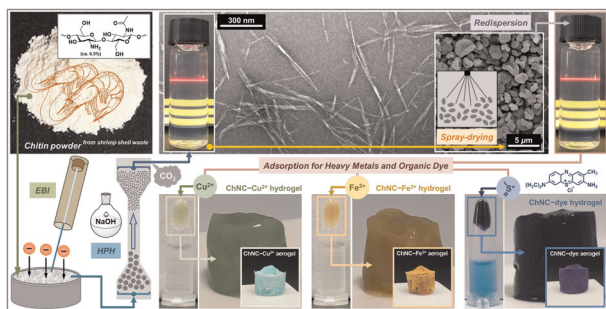


Ammonia-assisted synthesis of low-crystalline FeCo hydroxides for efficient electrochemical overall water splitting

Huijun Ren, Changgen Cheng, Peiqun Yin,* Qing Qin* and Lei Dai*

PAPERS

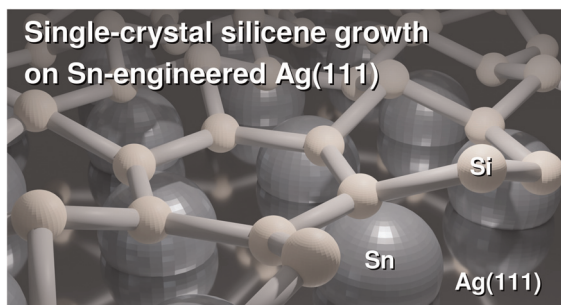
10990



Water-redispersible and high-yield α -chitin nanocrystals isolated using electron-beam irradiation as adsorbents to remove heavy metals and dye

Hyunho Lee, Min Haeng Heo, Haemin Jeong, Se Young Kim, Jeong Suk Yuk, Sae Hume Park* and Jihoon Shin*

11005

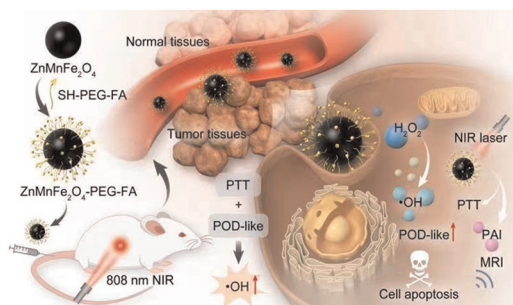


Single-crystal silicene growth on Sn-engineered Ag(111)

Crystal phase engineering of silicene by Sn-modified Ag(111)

Simona Achilli, Daya Sagar Dhungana, Federico Orlando, Carlo Grazianetti, Christian Martella, Alessandro Molle* and Guido Fratesi*

11013



Functionalized $\text{ZnMnFe}_2\text{O}_4$ -PEG-FA nanoenzymes integrating diagnosis and therapy for targeting hepatic carcinoma guided by multi-modality imaging

Jifa Liu, Xinglong Shi, Yangcui Qu and Guannan Wang*

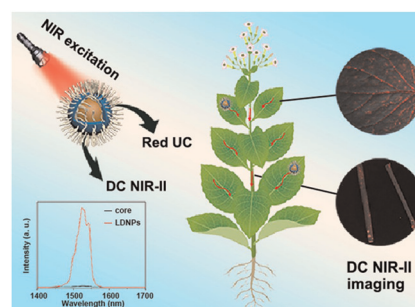


PAPERS

11026

Optimized core–shell lanthanide nanoparticles with ultrabright Ce^{3+} -modulated second near-infrared emission for “lighting” plants

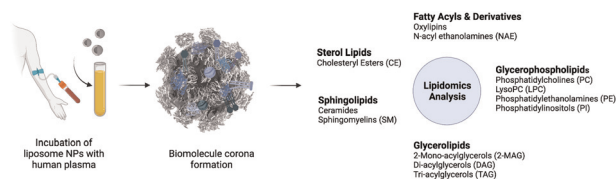
Jikun Wang, Chunsheng Li, Yujie Cui, Qiang Wang, Jin Ye, Jie Yang, Zhongyuan Liu, Su Zhang, Yujie Fu* and Jiating Xu*



11038

The lipidomic profile of the nanoparticle-biomolecule corona reflects the diversity of plasma lipids

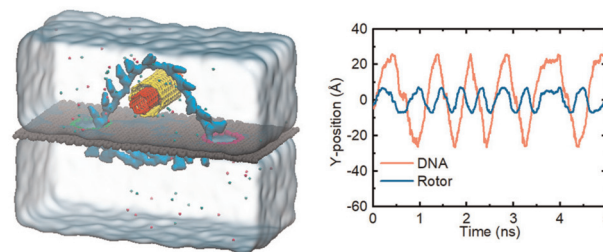
Lana Papafilippou, Anna Nicolaou,* Alexandra C. Kendall, Dolores Camacho-Muñoz and Marilena Hadjidemetriou*



11052

Precise control of CNT-DNA assembled nanomotor using oppositely charged dual nanopores

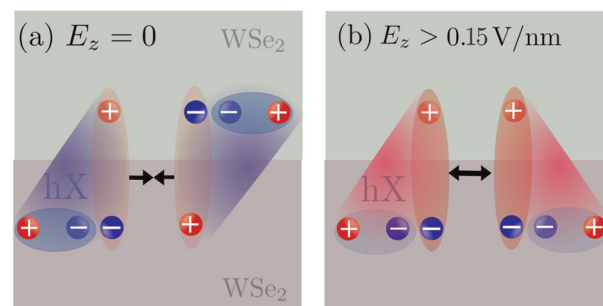
Chaofan Ma, Wei Xu, Wei Liu, Changhui Xu, Wei Si* and Jingjie Sha*



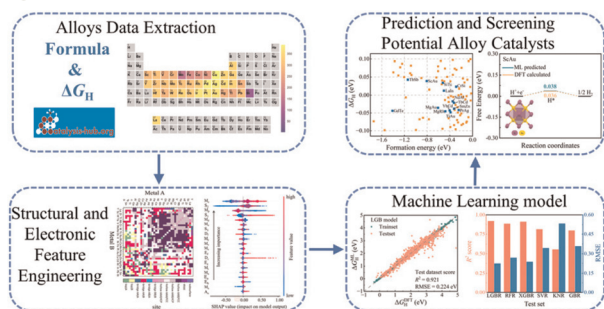
11064

Electrically tunable dipolar interactions between layer-hybridized excitons

Daniel Erkensten,* Samuel Brem, Raúl Perea-Causín, Joakim Hagel, Fedele Tagarelli, Edoardo Lopriore, Andras Kis and Ermin Malic*



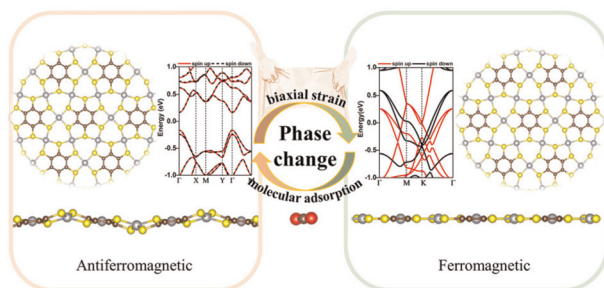
11072



Accurate and efficient machine learning models for predicting hydrogen evolution reaction catalysts based on structural and electronic feature engineering in alloys

Jingzi Zhang, Yuelin Wang, Xuyan Zhou, Chengquan Zhong, Ke Zhang, Jiakai Liu, Kailong Hu* and Xi Lin*

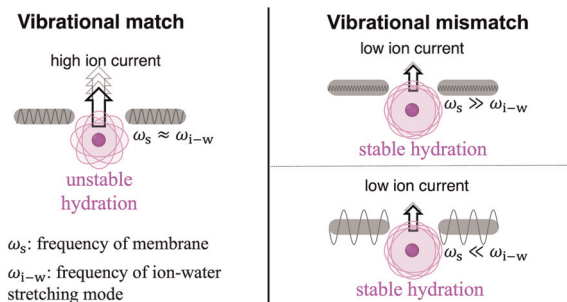
11083



Tunable electronic and magnetic properties of planar and corrugated phases of two-dimensional metal-organic frameworks

Ran Wang, Chaozheng He* and Weixing Chen*

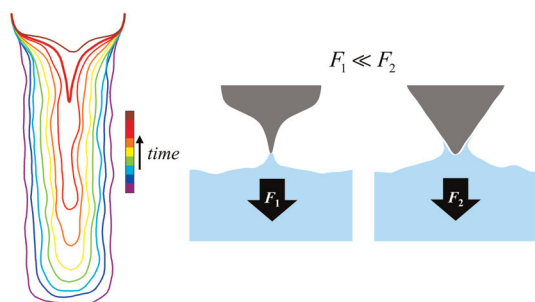
11090



Ion transport in two-dimensional flexible nanoporous membranes

Yechan Noh and Narayana R. Aluru*

11099



Shape optimization of a meniscus-adherent nanotip

Shihao Tian, Xudong Chen and Quanzi Yuan*

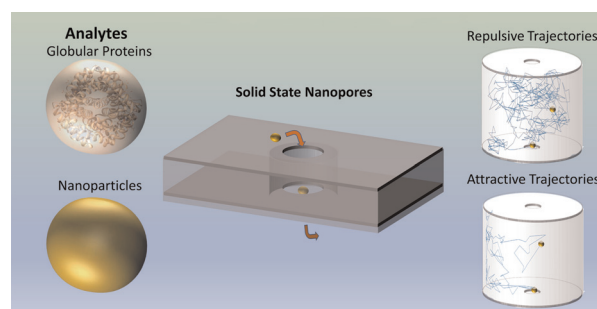


PAPERS

11107

Surface–particle interactions control the escape time of a particle from a nanopore-gated nanocavity system: a coarse grained simulation

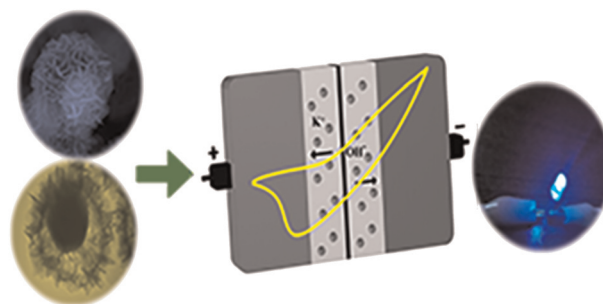
Robert Zando, Mauro Chinappi, Cristiano Giordani, Fabio Cecconi and Zhen Zhang



11115

Self-templated construction of hollow trimetallic MnNiCoP yolk–shell spheres assembled with nanosheets as a satisfactory positive electrode material for hybrid supercapacitors

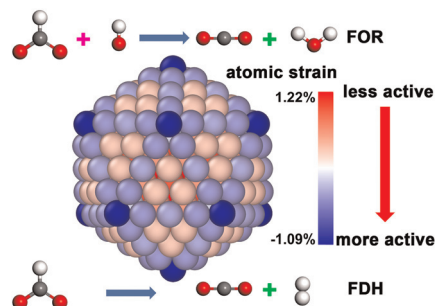
Majid Shirvani and Saied Saeed Hosseiny Davarani*



11131

Atomic strain and catalytic properties of formate oxidation and dehydrogenation in AgPd nanoalloys

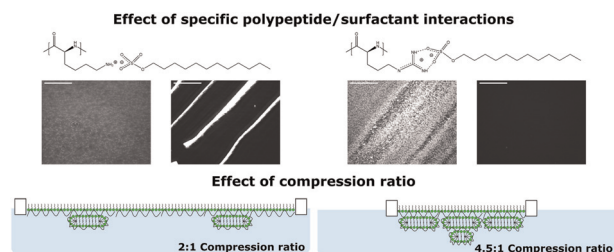
Tao Jin, Longfei Guo, Quan Tang, Junpeng Wang, Bowei Pan, Zhen Li, Chongyang Wang, Shuang Shan and Fuyi Chen*



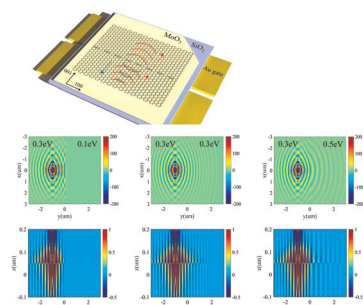
11141

Control of the structure and morphology of polypeptide/surfactant spread films by exploiting specific interactions

Javier Carrascosa-Tejedor,* Laura M. Miñarro, Marina Efstratiou, Imre Varga, Maximilian W. A. Skoda, Philipp Gutfreund, Armando Maestro, M. Jayne Lawrence* and Richard A. Campbell*



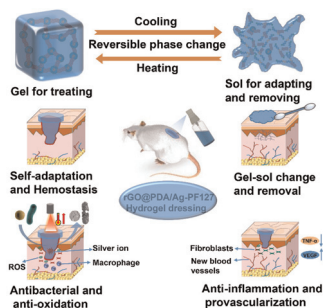
11155



High-efficiency *in situ* amplitude and phase control of infrared light using topological polaritons

Guoyu Luo, Xinyu Lv, Weijie Kong, Changtao Wang, Mingbo Pu, Yanqin Wang, Xiaoliang Ma, Zhiqiang Li* and Xiangang Luo*

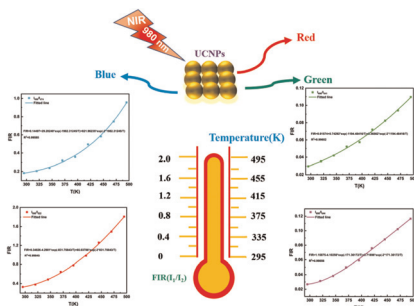
11163



A cooling-driven self-adaptive and removable hydrogel coupled with combined chemophothermal sterilization for promoting infected wound healing

Jun Cao, Tao Zhang, Wei Zhu, Hou-Bin Li and Ai-Guo Shen*

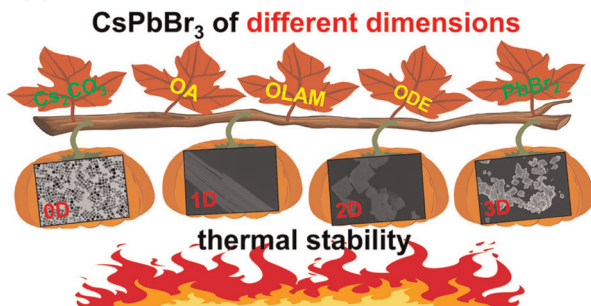
11179



High-sensitivity NaYF₄:Yb³⁺/Ho³⁺/Tm³⁺ phosphors for optical temperature sensing based on thermally coupled and non-thermally coupled energy levels

Zhenlong Cheng, Mingzhou Meng, Jiaoyu Wang, Zhuoyue Li, Jiao He, Hao Liang, Xin Qiao, Yuanli Liu and Jun Ou*

11190

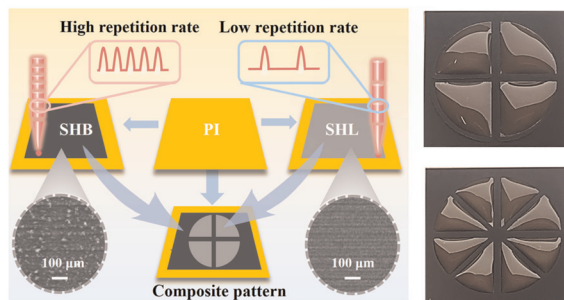


Studies on the optical stability of CsPbBr₃ with different dimensions (0D, 1D, 2D, 3D) under thermal environments

Jindou Shi, Minqiang Wang,* Zheyuan Da, Chen Zhang, Junnan Wang, Yusong Ding, Youlong Xu* and Nikolai V. Gaponenko



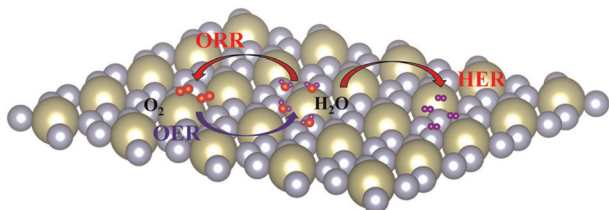
11247



Femtosecond laser-scribed superhydrophilic/superhydrophobic self-splitting patterns for one droplet multi-detection

Qiaqiao Huang, Kai Yin,* Lingxiao Wang, Qinwen Deng and Christopher J. Arnusch

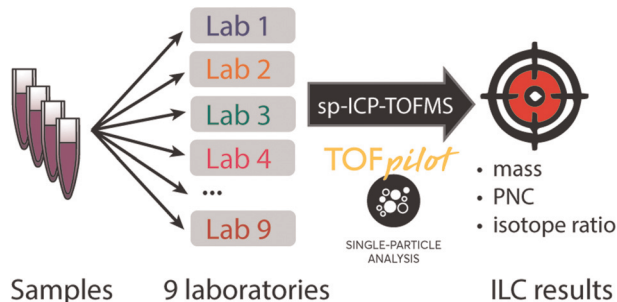
11255



Two-dimensional MN₄ materials as effective multi-functional electrocatalysts for the hydrogen-evolution, oxygen-evolution, and oxygen-reduction reactions

Xian Zhang, Zhifen Luo, Jiayi Fan, Tengfei Cao, Junqin Shi and Xiaoli Fan*

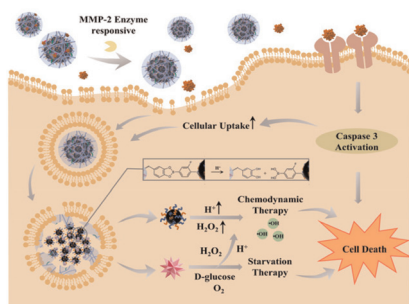
11268



Results of an interlaboratory comparison for characterization of Pt nanoparticles using single-particle ICP-TOFMS

L. Hendriks,* R. Brünjes, S. Taskula, J. Kocic, B. Hattendorf, G. Bland, G. Lowry, E. Bolea-Fernandez, F. Vanhaecke, J. Wang, M. Baalousha, M. von der Au, B. Meermann, T. R. Holbrook, S. Wagner, S. Harycki, A. Gundlach-Graham and F. von der Kammer*

11280



A smart magnetic nanosystem for sequential extracellular and intracellular release of proteins for cancer therapy

Yaxuan Zhao, Kai Feng, Guojun Lei, Jingjing Shen, Yang Liu, Yiling Ruan and Xiaolian Sun*



11290

Giant coercivity enhancement in a room-temperature van der Waals magnet through substitutional metal-doping

Hyo-Bin Ahn, Soon-Gil Jung, Hyungjong Lim, Kwangsu Kim, Sanghoon Kim, Tae-Eon Park, Tuson Park* and Changgu Lee*

