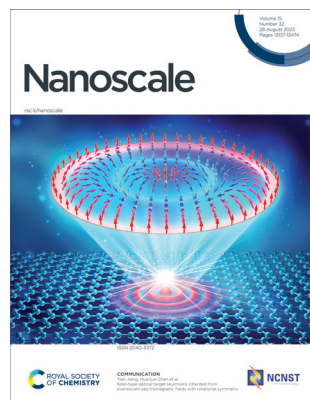


IN THIS ISSUE

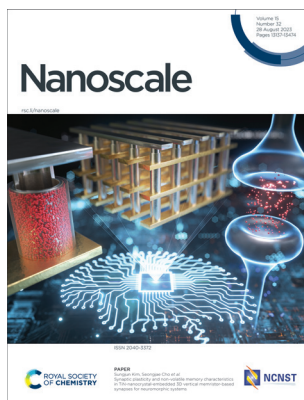
ISSN 2040-3372 CODEN NANOHL 15(32) 13137–13474 (2023)



Cover

See Tian Jiang,
Huanjun Chen *et al.*,
pp. 13224–13232.

Image reproduced by
permission of Huanjun Chen
from *Nanoscale*, 2023, **15**,
13224.



Inside cover

See Sungjun Kim,
Seongjae Cho *et al.*,
pp. 13239–13251.

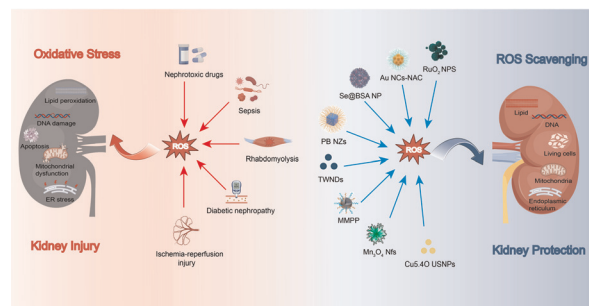
Image reproduced by
permission of Sungjun Kim
from *Nanoscale*, 2023, **15**,
13239.

REVIEWS

13148

Antioxidant nanozymes in kidney injury: mechanism and application

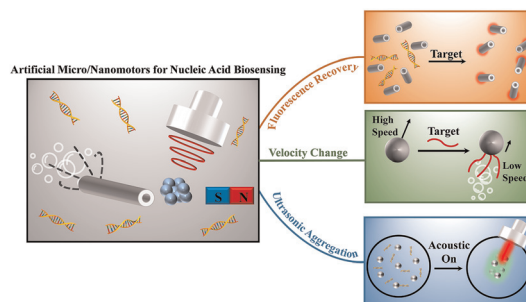
Jian Wu, Haojie Shang, An Zhang, Yu He,
Yonghua Tong, Qiu Huang, Xiao Liu, Zhiqiang Chen*
and Kun Tang*



13172

Advancements in artificial micro/nanomotors for nucleic acid biosensing: a review of recent progress

Conghui Liu, Jingyu Chen, Jiahui Liang, Tailin Xu* and
Xueji Zhang



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, 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 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 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
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, 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 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
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

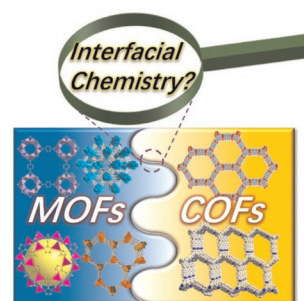


REVIEWS

13187

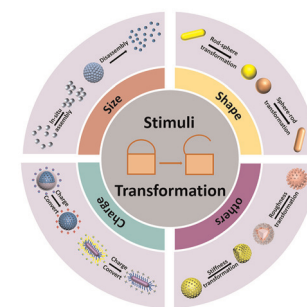
Interfacial chemistries in metal–organic framework (MOF)/covalent–organic framework (COF) hybrids

Lin Ye, Wanglai Cen, Yinghao Chu and Dengrong Sun*



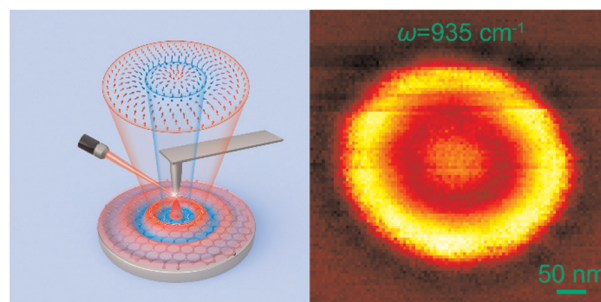
MINIREVIEW

13202

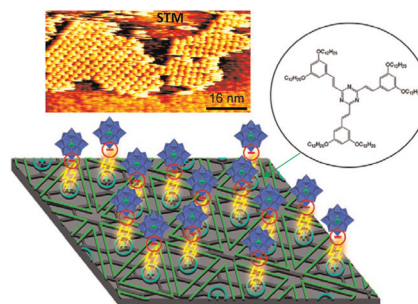
Nanoparticles with transformable physicochemical properties for overcoming biological barriersQianqian Lu, Hongyue Yu, Tiancong Zhao,*
Guanjia Zhu* and Xiaomin Li*

COMMUNICATIONS

13224

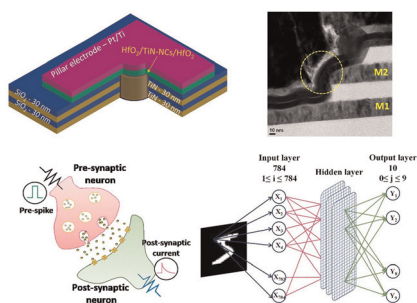
Néel-type optical target skyrmions inherited from evanescent electromagnetic fields with rotational symmetryBo Tian, Jingyao Jiang, Zebo Zheng, Ximiao Wang,
Shaojing Liu, Wuchao Huang, Tian Jiang,*
Huanjun Chen* and Shaozhi Deng

13233

Ready-to-be-addressed oxo-clusters: individualized, periodically organized and separated from the substrateJuba Salhi, Jan Patrick Calupitan, Michele Mattera,
David Montero, Antoine Miche, Régina Maruchenko,
Anna Proust, Guillaume Izzet, David Kreher,
Imad Arfaoui and Florence Volatron*

PAPERS

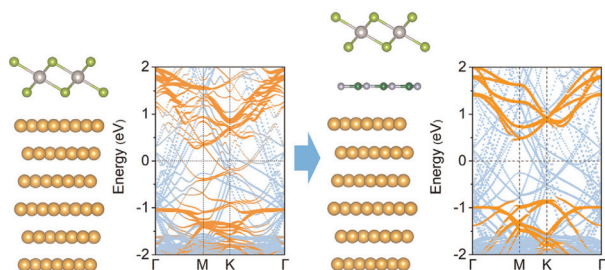
13239



Synaptic plasticity and non-volatile memory characteristics in TiN-nanocrystal-embedded 3D vertical memristor-based synapses for neuromorphic systems

Seyeong Yang, Taegyun Kim, Sunghun Kim, Daewon Chung, Tae-Hyeon Kim, Jung Kyu Lee, Sungjoon Kim, Muhammad Ismail, Chandreswar Mahata, Sungjun Kim* and Seongjae Cho*

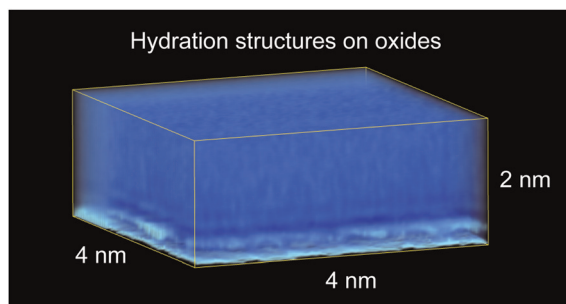
13252



Mechanistic understanding of the interfacial properties of metal–PtSe₂ contacts

Liujian Qi, Mengqi Che, Mingxiu Liu, Bin Wang, Nan Zhang, Yuting Zou, Xiaojuan Sun, Zhiming Shi, Dabing Li and Shaojuan Li*

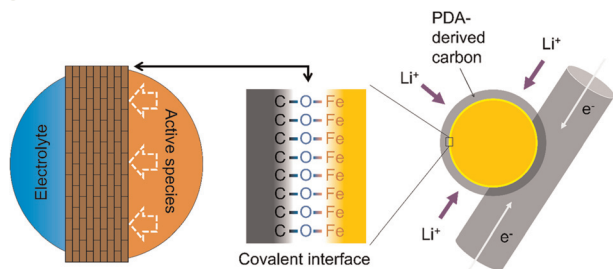
13262



Three-dimensional ordering of water molecules reflecting hydroxyl groups on sapphire (001) and α -quartz (100) surfaces

Sho Nagai, Shingo Urata, Kent Suga, Takeshi Fukuma, Yasuo Hayashi and Keisuke Miyazawa*

13272



Covalent netting restrains dissolution enabling stable high-loading and high-rate iron difluoride cathodes

Wenqiang Xu, Yingjie Ma, Denghui Wang, Siyuan Zhang, Mathar Hamza, Linjie Zhi*, Lidong Li* and Xianglong Li*

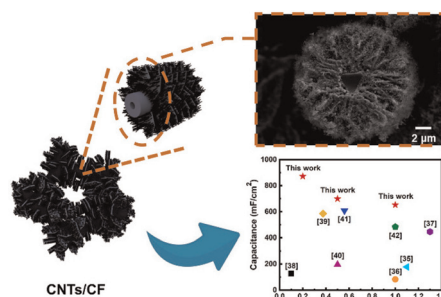


PAPERS

13280

A novel catalyst derived from Co-ZIFs to grow N-doped carbon nanotubes for all-solid-state supercapacitors with high performance

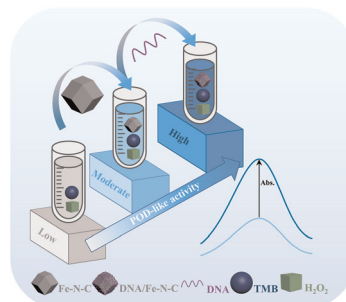
Yunlong Qi, Tian Lv,* Zilin Chen, Yu Duan, Xiao Li, Weiyang Tang, Quanhu Sun, Dongmei Zhai and Tao Chen*



13289

DNA-modulated single-atom nanozymes with enhanced enzyme-like activity for ultrasensitive detection of dopamine

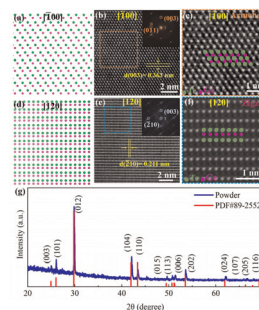
Zhihan Wu, Wendong Liu, Haijun Lu, Hongyan Zhang, Zhe Hao, Fanghua Zhang, Ruizhong Zhang,* Xiyan Li* and Libing Zhang*



13297

Anisotropy and thermal properties in GeTe semiconductor by Raman analysis

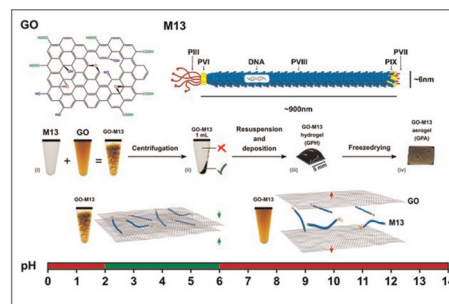
Shuai Yang, Fengrui Sui, Yucheng Liu, Ruijuan Qi,* Xiaoyu Feng, Shangwei Dong, Pingxiong Yang and Fangyu Yue*



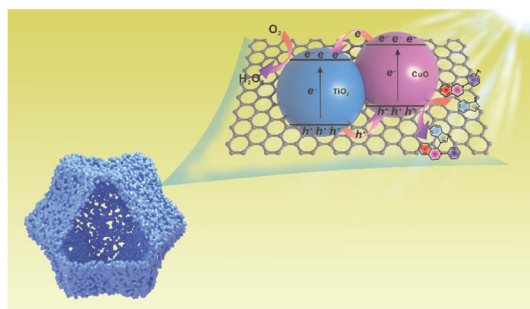
13304

Optimisation of GraPhage13 macro-dispersibility via understanding the pH-dependent ionisation during self-assembly: towards the manufacture of graphene-based nanodevices

Kate Stokes, Yiwei Sun, Paolo Passaretti, Henry White and Pola Goldberg Oppenheimer*



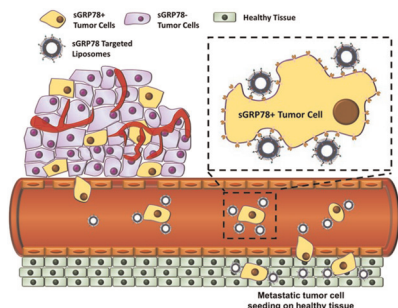
13313



Engineering cuboctahedral N-doped C-coated p-CuO/n-TiO₂ heterojunctions toward high-performance photocatalytic cross-dehydrogenative coupling

Shuo Zhou, Qiuyan Shen, Feng-Lei Yang,*
Wenwen Zhan, Xiaojun Wang and Xiguang Han*

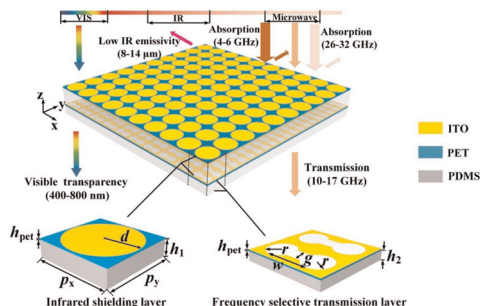
13322



A nanotherapeutic approach to selectively eliminate metastatic breast cancer cells by targeting cell surface GRP78

Jaeho Shin, Baksun Kim, Tyson W. Lager, Franklin Mejia,
Ian Guldner, Clay Conner, Siyuan Zhang,
Athanasia D. Panopoulos* and Basar Bilgicer*

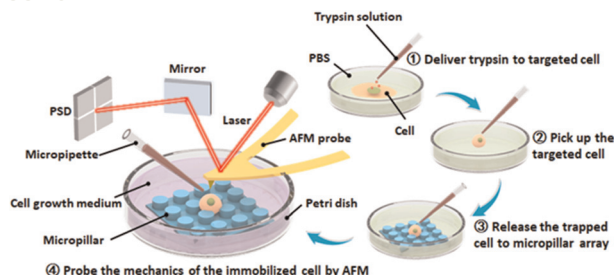
13335



Optically transparent and flexible-assembled metasurface raserorber for infrared-microwave camouflage based on a hybrid anapole state

Yi Luo, Lirong Huang,* Jifei Ding, Bing Sun and
Wei Hong

13346



Micropipette-assisted atomic force microscopy for single-cell 3D manipulations and nanomechanical measurements

Yaqi Feng and Mi Li*

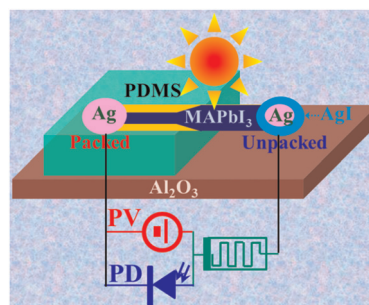


PAPERS

13359

Controllably modulated asymmetrical photoresponse with a nonvolatile memory effect in a single $\text{CH}_3\text{NH}_3\text{PbI}_3$ micro/nanowire for photorectifiers and photomemory

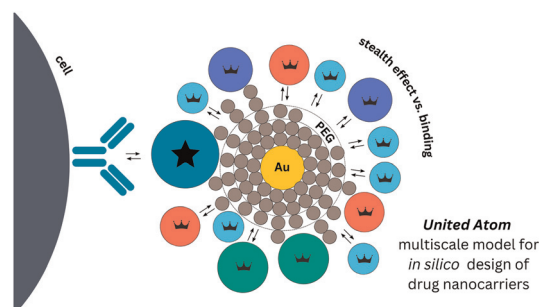
Zhen Hong, Hongying Quan, Changying Ke, Zhiyong Ouyang and Baochang Cheng*



13371

In silico prediction of protein binding affinities onto core-shell PEGylated noble metal nanoparticles for rational design of drug nanocarriers

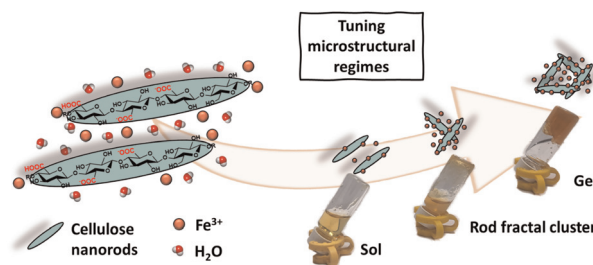
Julia Subbotina,* Ian Rouse and Vladimir Lobaskin



13384

A study across scales to unveil microstructural regimes in the multivalent metal driven self-assembly of cellulose nanocrystals

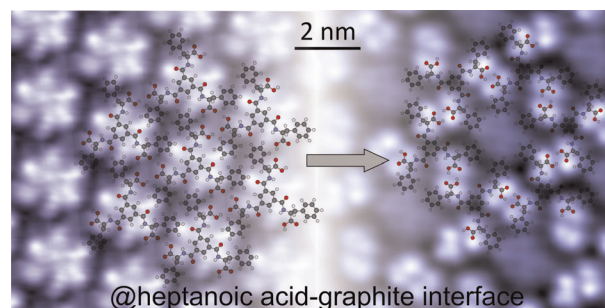
Valeria Gabrielli, Alberta Ferrarini* and Marco Frasconi*



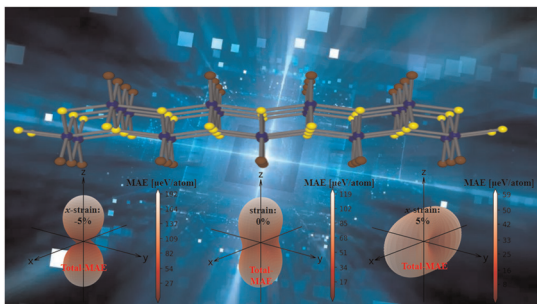
13393

Kinetic *versus* thermodynamic polymorph stabilization of a tri-carboxylic acid derivative at the solid-liquid interface

Richa Arjariya, Gagandeep Kaur, Shantanu Sen, Sandeep Verma, Markus Lackinger and Thiruvancheril G. Gopakumar*



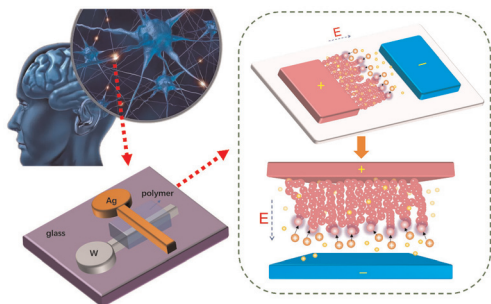
13402



Origin and regulation of triaxial magnetic anisotropy in the ferromagnetic semiconductor CrSBr monolayer

Bing Wang, Yaxuan Wu, Yihang Bai, Puyuan Shi, Guangbiao Zhang,* Yungeng Zhang* and Chang Liu*

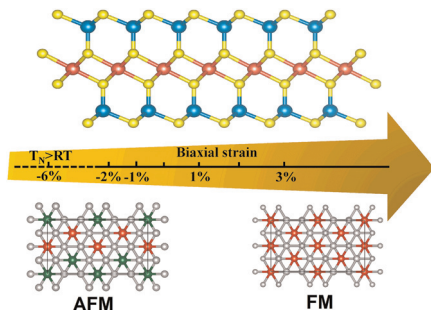
13411



A high linearity and multilevel polymer-based conductive-bridging memristor for artificial synapses

Jianhong Zhou, Zheng Wang, Yujun Fu, Zhichao Xie, Wei Xiao, Zhenli Wen, Qi Wang,* Qiming Liu,* Junyan Zhang and Deyan He

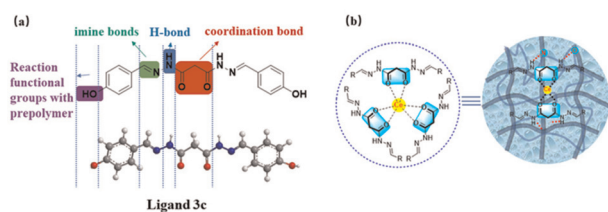
13420



Strain-dependent magnetic ordering switching in 2D AFM ternary V-based chalcogenide monolayers

Kaijuan Pang, Xiaodong Xu,* Yadong Wei, Tao Ying, Bo Gao, Weiqi Li* and Yongyuan Jiang*

13428



Mechanical property-enhanced thermally conductive self-healing composites: preparation using designed self-healing matrix phase and hyBNNSs

Zhe Wang, Xiao-Bin Gong, Jing-Chuan Xu, Jing-Wei Wang, Ya-Nan Li, Xin Ge, Rui-Guang Xing* and Gao-Fei Pan*

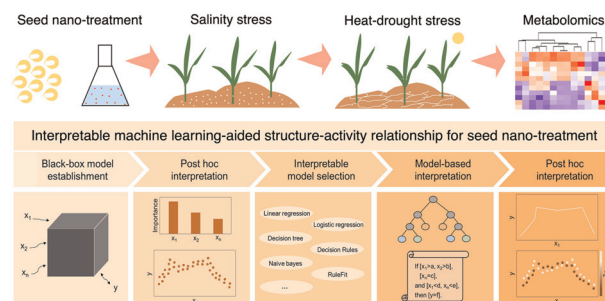


PAPERS

13437

Interpretable machine learning-accelerated seed treatment using nanomaterials for environmental stress alleviation

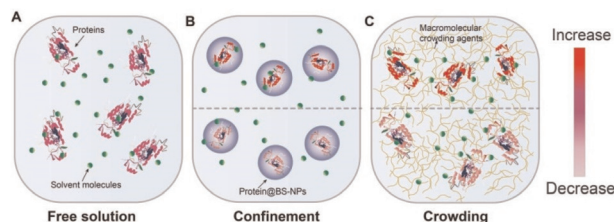
Hengjie Yu, Dan Luo, Sam Fong Yau Li, Maozhen Qu, Da Liu, Yingchao He and Fang Cheng*



13450

Evaluation of exogenous therapeutic protein activity under confinement and crowding effects

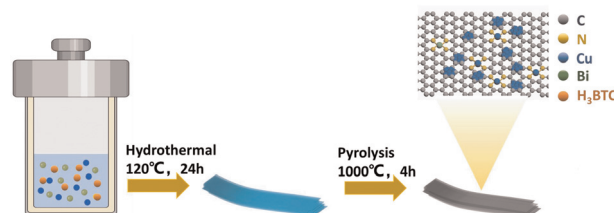
Jie Dai, Zhiyi Peng, Shuwei Shen, Binbin Huang, Lili Ren, Jia Liu,* Chia-Hung Chen* and Guoguang Chen*



13459

Cu-based catalysts with the co-existence of single atoms and nanoparticles for basic electrocatalytic oxygen reduction reaction

Huimin Liu, Qiong Jin, Lingzhe Meng, Hongfei Gu, Xiao Liang, Yu Fan, Zhi Li, Fang Zhang, Hongpan Rong* and Jiatao Zhang*



13466

Early-stage oral cancer diagnosis by artificial intelligence-based SERS using Ag NWs@ZIF core-shell nanochains

Xin Xie, Wenrou Yu, Zhaoxian Chen, Li Wang, Junjun Yang,* Shihong Liu, Linze Li, Yanxi Li and Yingzhou Huang*

