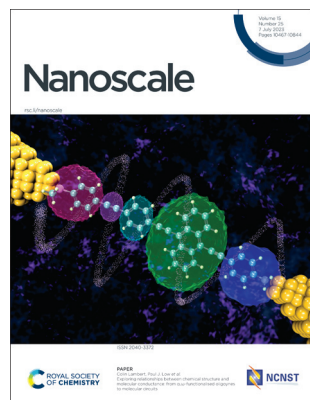


IN THIS ISSUE

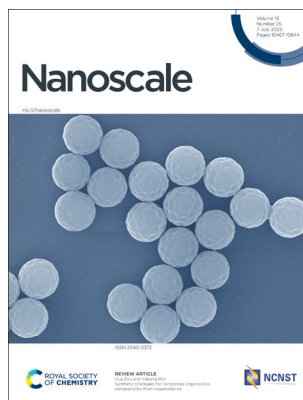
ISSN 2040-3372 CODEN NANOHL 15(25) 10467–10844 (2023)



Cover

See Colin Lambert,
Paul J. Low *et al.*,
pp. 10573–10583.

Image reproduced by
permission of
Elena Gorenskaia from
Nanoscale, 2023, **15**, 10573.



Inside cover

See Hua Zou and
Yuhang Ren,
pp. 10484–10497.

Image reproduced by
permission of Hua Zou from
Nanoscale, 2023, **15**, 10484.

EDITORIAL

10480

Introduction to nanomaterials for printed electronics

Cinzia Casiraghi,* Oana D. Jurchescu,*
Shlomo Magdassi* and Wenming Su*

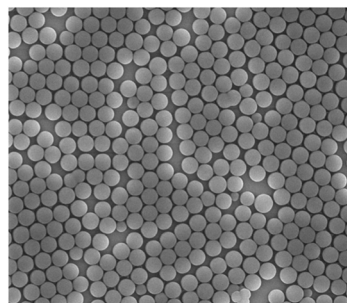


REVIEWS

10484

Synthetic strategies for nonporous organosilica nanoparticles from organosilanes

Hua Zou* and Yuhang Ren



Editorial Staff

Executive Editor

Michaela Mühlberg

Managing Editor

Heather Montgomery

Editorial Production Manager

Jonathon Watson

Senior Publishing Editor

Daniella Ferluccio

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

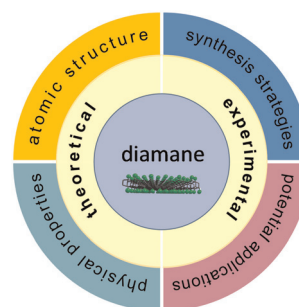


REVIEWS

10498

Advancements in theoretical and experimental investigations on diamane materials

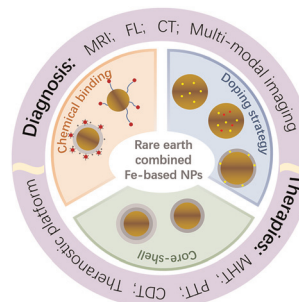
Bowen Liu, Emilia Emmanuel, Tao Liang* and Bin Wang*



10513

The development of rare-earth combined Fe-based magnetic nanocomposites for use in biological theranostics

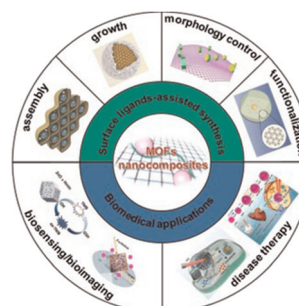
Hao Peng, Guiping Ren, Norbert Hampp, Aiguo Wu and Fang Yang*



10529

Surface ligand-assisted synthesis and biomedical applications of metal–organic framework nanocomposites

Lihua Wang, Zhiheng Li, Yingqian Wang, Mengyue Gao, Ting He, Yifang Zhan* and Zhihao Li*

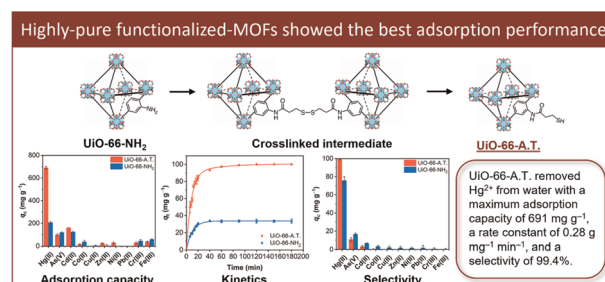


COMMUNICATIONS

10558

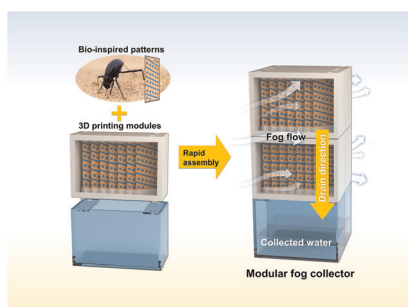
Towards the fastest kinetics and highest uptake of post-functionalized UiO-66 for Hg²⁺ removal from water

Iris Tsz Yan Lam, Yufei Yuan, Ki-Taek Bang, Seon-Jin Choi, Dong-Myeong Shin, Dong Lu and Yoonseob Kim*



COMMUNICATIONS

10567

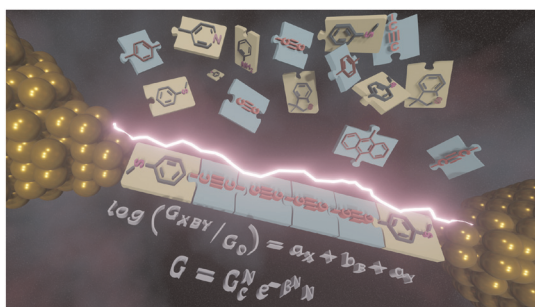


Manufacture of a modular fog harvesting system combining 3D printing and wettability-contrasting patterns

Jie Guo, Zhiguang Guo* and Weimin Liu*

PAPERS

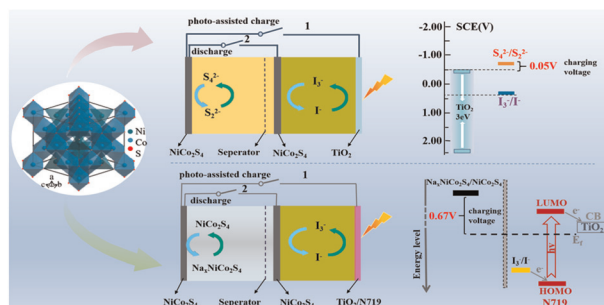
10573



Exploring relationships between chemical structure and molecular conductance: from α,ω -functionalised oligoynes to molecular circuits

Elena Gorenskaia, Jarred Potter, Marcus Korb, Colin Lambert* and Paul J. Low*

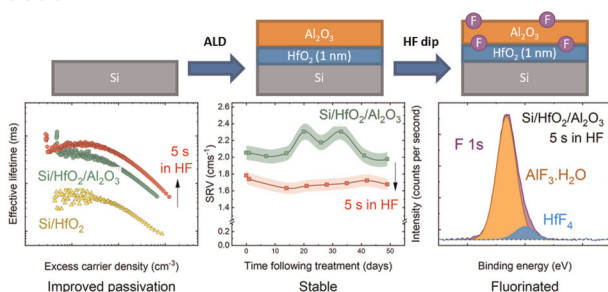
10584



Dual-duty NiCo_2S_4 nanosheet-based solar rechargeable batteries toward multi-scene solar energy conversion and storage

Xiaohong Ma, Jie Fu, Linning Gao, Junzheng Zhang, Sheng Tao, Wenqing Guo, Xuefei Liu, Beibei Yang and Jun Lu*

10593



Stable chemical enhancement of passivating nanolayer structures grown by atomic layer deposition on silicon

Sophie L. Pain,* Edris Khorani, Tim Niewelt, Ailish Wratten, Marc Walker, Nicholas E. Grant and John D. Murphy*

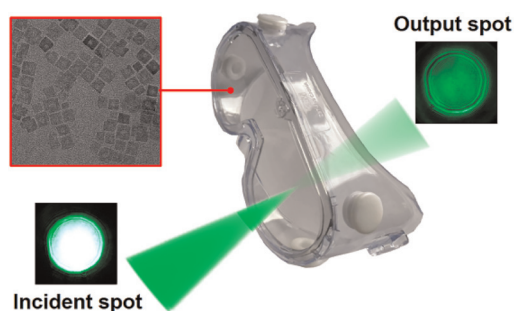


PAPERS

10606

Flexible optical limiters based on Cu_3VSe_4 nanocrystals

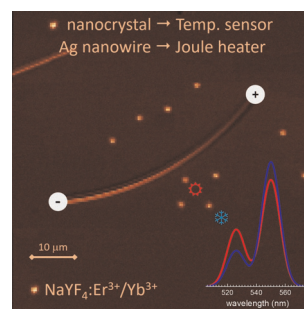
Xin-Ping Zhai, Bo Ma, Ming-Jun Xiao, Wen Shang, Zhi-Cong Zeng, Qiang Wang* and Hao-Li Zhang*



10614

Single up-conversion nanocrystal as a local temperature probe of electrically heated silver nanowire

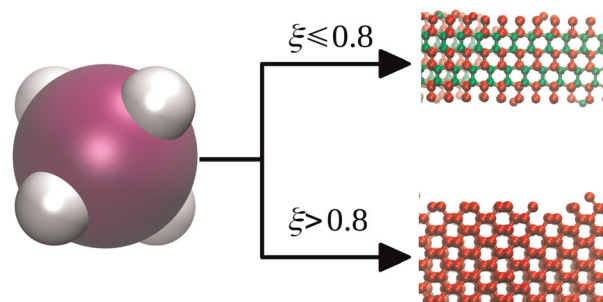
K. Wiwatowski, K. Sulowska, R. Houssaini, A. Pilch-Wróbel, A. Bednarkiewicz, A. Hartschuh, S. Maćkowski and D. Piątkowski*



10623

Pursuing colloidal diamonds

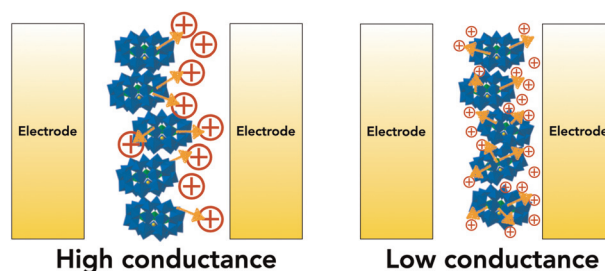
Łukasz Baran,* Dariusz Tarasewicz, Daniel M. Kamiński and Wojciech Rzyśko



10634

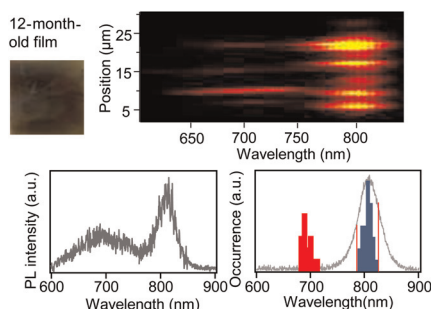
Experimental observation of the role of counteranions in modulating the electrical conductance of Preyssler-type polyoxometalate nanodevices

Cécile Huez, Séverine Renaudineau, Florence Volatron, Anna Proust* and Dominique Vuillaume*



PAPERS

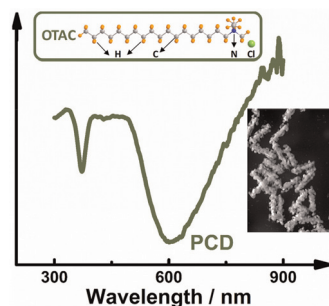
10642



Air-stable mixed cation lead halide perovskite films and microscopic study of their degradation process

Anubha Agarwal, Shun Omagari and Martin Vacha*

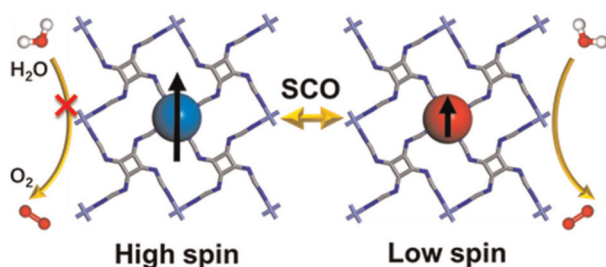
10651



Modulation of plasmonic chiral shell growth on gold nanorods *via* nonchiral surfactants

Xinshuang Gao, Qiang Zheng, Hanbo Li, Chenqi Zhang, Rui Cai, Yinglu Ji, Zhijian Hu and Xiaochun Wu*

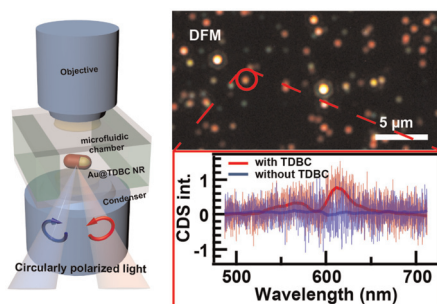
10661



Proposal of spin crossover as a reversible switch of catalytic activity for the oxygen evolution reaction in two dimensional metal-organic frameworks

Min Ren, Xiangyu Zhu, Qiquan Luo,* Xingxing Li* and Jinglong Yang

10667



Trace detection of chiral J-aggregated molecules adsorbed on single Au nanorods

Xingyue Lin, Yuhan Zhou, Xinyang Pan, Qin Zhang, Ningneng Hu, Hao Li, Le Wang, Qi Xue, Wei Zhang and Weihai Ni*

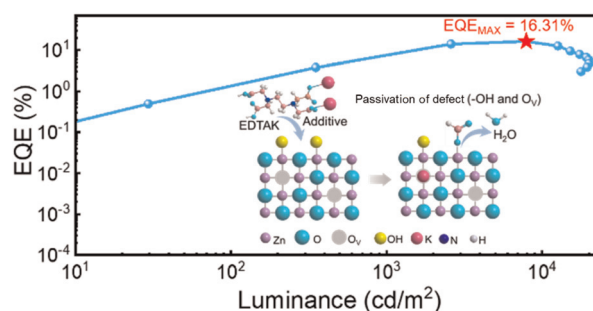


PAPERS

10677

Defect passivation and electron band energy regulation of a ZnO electron transport layer through synergetic bifunctional surface engineering for efficient quantum dot light-emitting diodes

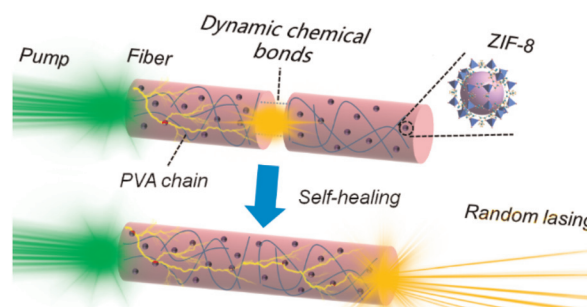
Fensha Cai, Yufei Tu, Dadi Tian, Yan Fang, Bo Hou, Muhammad Ishaq, Xiaohong Jiang, Meng Li, Shujie Wang* and Zuliang Du*



10685

Metal–organic framework-based self-healing hydrogel fiber random lasers

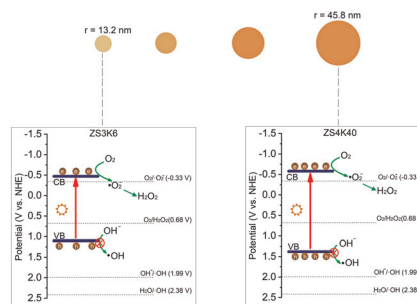
Dexiang Zhu, Zhouyuanhang Wang, Jun Xie, Guangyin Qu, Qi Yu, Yan Kuai, Benli Yu, Jianzhong Zheng, Zhijia Hu* and Siqi Li*



10693

Size-controlled growth of ZnSe nanocrystals for high-performance photocatalytic H₂O₂ production in pure water

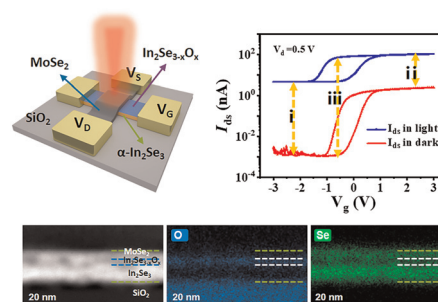
Peng Zhang,* Jiankang Wang, Jinyu Hu, Zhibo Tong, Yajing Wang, Songli Liu,* Shimin Ding and Youqing Yu



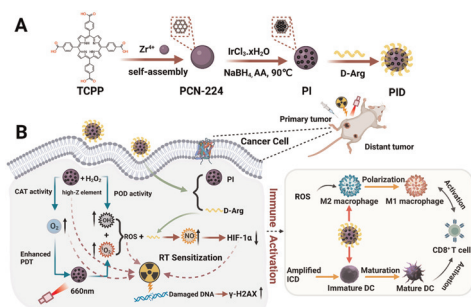
10705

An all-two-dimensional Fe-FET retinomorphic sensor based on the novel gate dielectric In₂Se_{3-x}O_x

Xuhong Li, Xiaoqing Chen,* Wenjie Deng, Songyu Li, Boxing An, Feihong Chu, Yi Wu, Famin Liu* and Yongzhe Zhang*



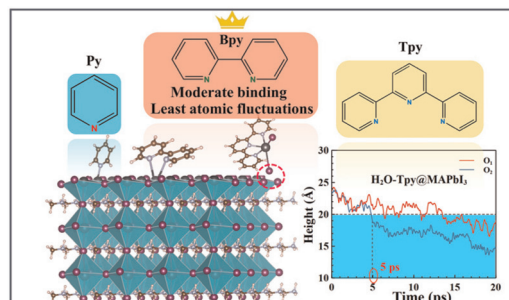
10715



Reprogramming of the tumor microenvironment using a PCN-224@IrNCs/D-Arg nanoplatfor for the synergistic PDT, NO, and radiosensitization therapy of breast cancer and improving anti-tumor immunity

Yi-Ming Zou, Rong-Tian Li, Lei Yu, Ting Huang, Jian Peng, Wei Meng, Bin Sun, Wen-Hua Zhang, Zhi-Hong Jiang, Jun Chen* and Jin-Xiang Chen*

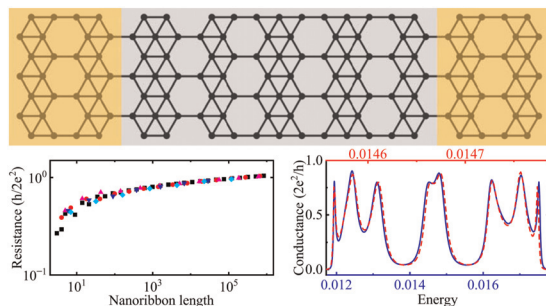
10730



A moderate intensity ligand works best: a theoretical study on passivation effects of pyridine-based molecules for perovskite solar cells

Na Chen, Weiyl Zhang and Quan-Song Li*

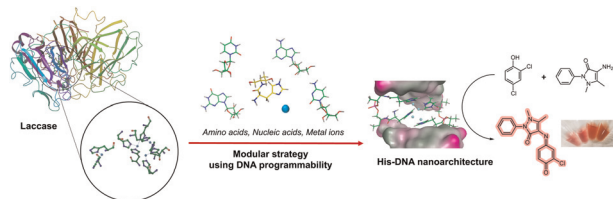
10740



Enhanced electron transport and self-similarity in quasiperiodic borophene nanoribbons with line defects

Pei-Jia Hu, Jin-Ting Ding, Zeng-Ren Liang, Tie-Feng Fang, Ai-Min Guo* and Qing-Feng Sun

10749



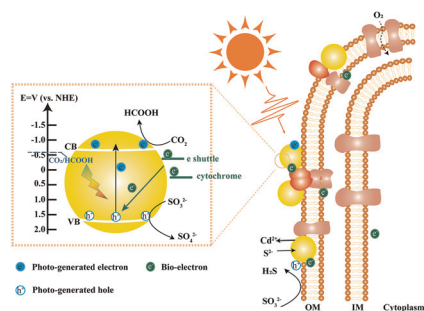
Histidine-DNA nanoarchitecture as laccase mimetic DNazymes

Ji Hye Yum, Tomotaka Kumagai, Daisuke Hori, Hiroshi Sugiyama* and Soyoung Park*



PAPERS

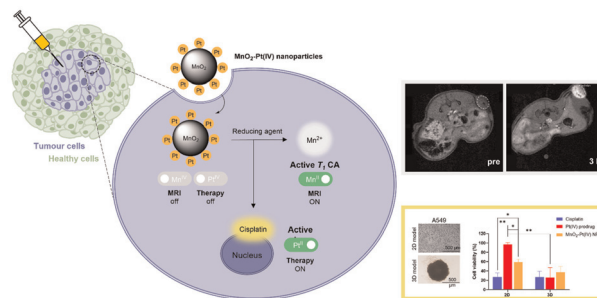
10755

Enhanced photocatalytic CO₂ reduction on bio-mineralized CdS *via* an electron conduit in bacteriaJuan Liu, Xiaoxiao Guo, Liuyang He, Li-Ping Jiang,*
Yang Zhou* and Jun-Jie Zhu*

10763

Redox double-switch cancer theranostics through Pt(IV) functionalised manganese dioxide nanostructures

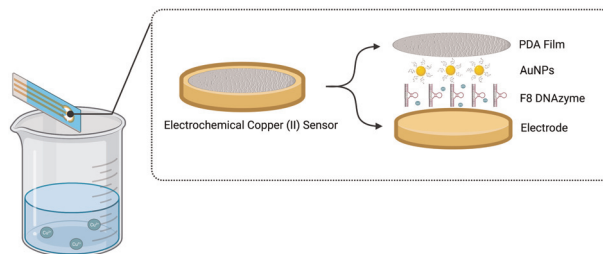
Beatriz Brito, Maria Rosaria Ruggiero, Thomas W. Price, Milene da Costa Silva, Núria Genicio, Annah J. Wilson, Olga Tyurina, Veronika Rosecker, Thomas R. Eykyn, Manuel Bañobre-López, Graeme J. Stasiuk and Juan Gallo*



10776

Activity-enhanced DNAzyme for design of label-free copper(II) biosensor

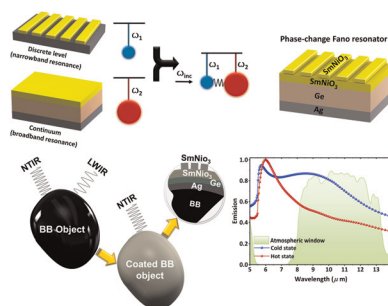
William Etheridge, Frederic Brossard, Sitan Zheng, Svenja Moench, Suraj Pavagada, Róisín M. Owens and Ljiljana Fruk*



10783

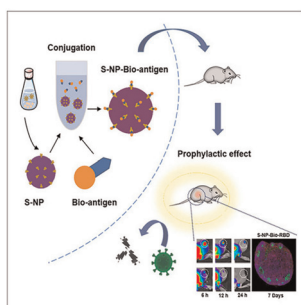
Phase-change Fano resonator for active modulation of thermal emission

Bahram Khalichi,* Amir Ghobadi,* Ataollah Kalantari Osgouei, Zahra Rahimian Omam, Hasan Kocer and Ekmel Ozbay*



PAPERS

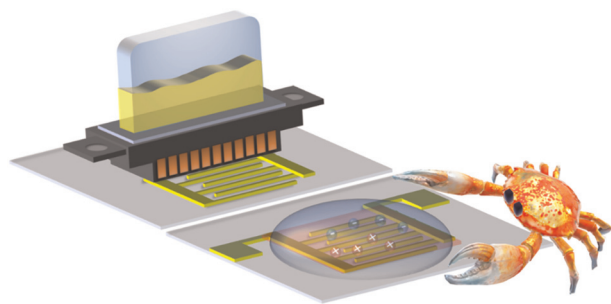
10794



Production of a promising modular proteinaceous self-assembled delivery system for vaccination

Chao Pan, Jingqin Ye, Sen Zhang, Xiang Li, Yixin Shi, Yan Guo, Kangfeng Wang, Peng Sun, Jun Wu,* Hengliang Wang* and Li Zhu*

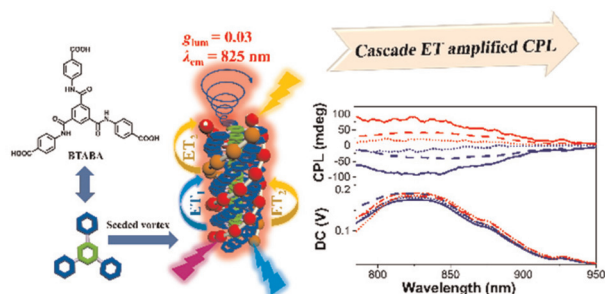
10808



Chitosan-gated organic transistors printed on ethyl cellulose as a versatile platform for edible electronics and bioelectronics

Alina S. Sharova, Francesco Modena, Alessandro Luzio, Filippo Melloni, Pietro Cataldi, Fabrizio Viola, Leonardo Lamanna, Nicolas F. Zorn, Mauro Sassi, Carlotta Ronchi, Jana Zaumseil, Luca Beverina, Maria Rosa Antognazza and Mario Caironi*

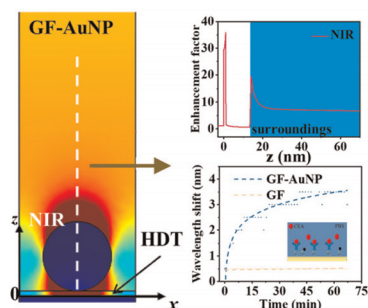
10820



Cascade energy transfer boosted near-infrared circularly polarized luminescence of nanofibers from an exclusively achiral system

Chen Xiao, Chengxi Li, Kang Huang, Pengfei Duan* and Yafei Wang*

10826



Sensitivity investigation of a biosensor with resonant coupling of propagating surface plasmons to localized surface plasmons in the near infrared region

Huimin Wang, Tao Wang,* Simei Zhong, Jinyan Zhang, Ruoqin Yan, Peng Xu, Yu-hui Zhang, Xinzhaoyue, Lu Wang, Yuandong Wang, Xuyang Yuan, Jinwei Zeng and Jian Wang*



10834

Evaluating strain and doping of Janus MoSSe from phonon mode shifts supported by *ab initio* DFT calculations

Jennifer Schmeink, Vladislav Musytschuk, Erik Pollmann, Stephan Sleziona, André Maas, Peter Kratzer and Marika Schleberger*

