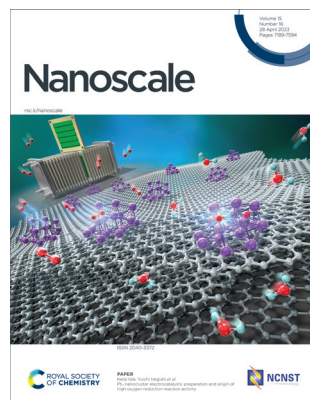


IN THIS ISSUE

ISSN 2040-3372 CODEN NANOHL 15(16) 7189–7594 (2023)



Cover

See Kenji Iida, Yuichi Negishi *et al.*, pp. 7272–7279.

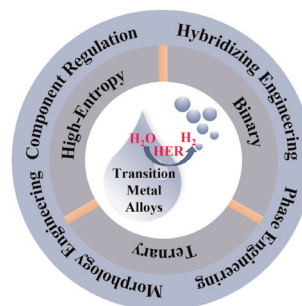
Image reproduced by permission of Yuichi Negishi from *Nanoscale*, 2023, **15**, 7272.

REVIEWS

7202

Progress in electrocatalytic hydrogen evolution of transition metal alloys: synthesis, structure, and mechanism analysis

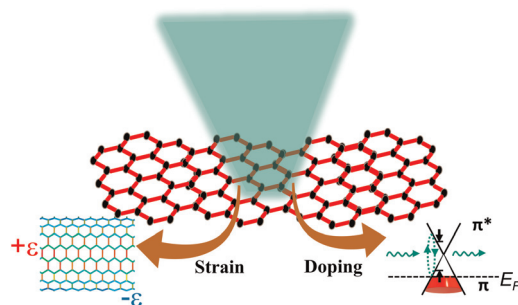
Dunyuan Jin, Fen Qiao,* Huaqiang Chu and Yi Xie



7227

Localised strain and doping of 2D materials

Frank Lee,* Manoj Tripathi,* Roque Sanchez Salas, Sean P. Ogilvie, Aline Amorim Graf, Izabela Jurewicz and Alan B. Dalton*



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

Blake Baker, 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
Dong Qin, Georgia Institute of Technology, USA
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
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
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
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

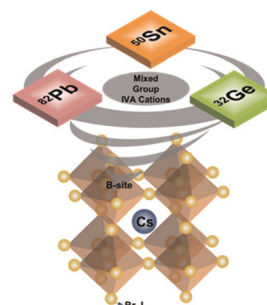


MINIREVIEW

7249

All-inorganic perovskite solar cells featuring mixed group IVA cations

Yufeng Li, Changyu Yang, Weisi Guo, Tianwei Duan,* Zhongmin Zhou* and Yuanyuan Zhou*

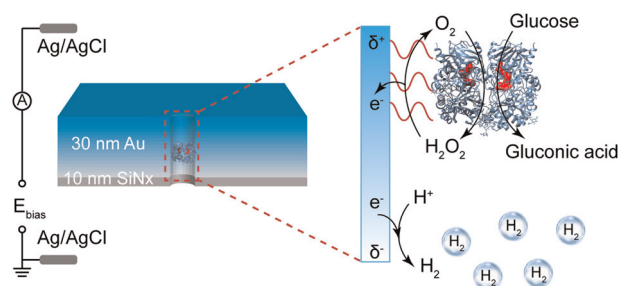


COMMUNICATIONS

7261

Simultaneous observation of the spatial and temporal dynamics of single enzymatic catalysis using a solid-state nanopore

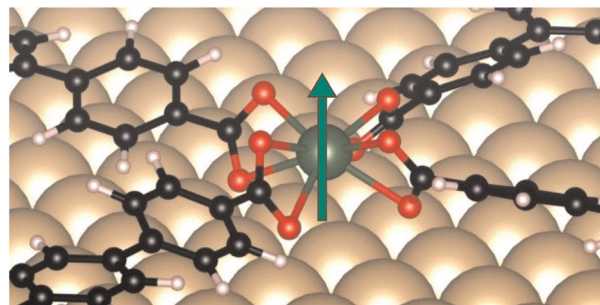
Ru-Jia Yu,* Qiao Li, Shao-Chuang Liu, Hui Ma, Yi-Lun Ying* and Yi-Tao Long



7267

Lanthanide metal–organic network featuring strong perpendicular magnetic anisotropy

Sofia O. Parreiras,* Daniel Moreno, Shanmugasibi K. Mathialagan, Beatriz Muñoz-Cano, Cristina Martín-Fuentes, María Tenorio, Lenka Černa, José I. Urgel, Koen Lauwaet, Manuel Valvidares, Miguel A. Valbuena, José M. Gallego, José I. Martínez, Pierluigi Gargiani, Rodolfo Miranda, Julio Camarero and David Ćija*

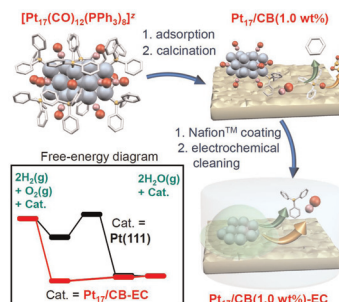


PAPERS

7272

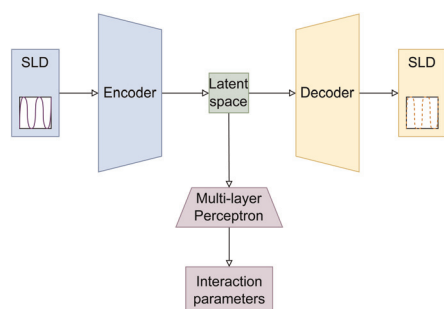
Pt₁₇ nanocluster electrocatalysts: preparation and origin of high oxygen reduction reaction activity

Tokuhisa Kawawaki, Yusuke Mitomi, Naoki Nishi, Ryuki Kurosaki, Kazutaka Oiwa, Tomoya Tanaka, Hinoki Hirase, Sayuri Miyajima, Yoshiki Niihori, D. J. Osborn, Takanori Koitaya, Gregory F. Metha, Toshihiko Yokoyama, Kenji Iida* and Yuichi Negishi*



PAPERS

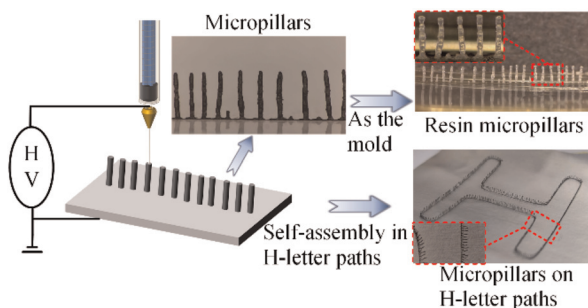
7280



Extraction of interaction parameters from specular neutron reflectivity in thin films of diblock copolymers: an “inverse problem”

Dustin Eby, Mikolaj Jakowski, Valeria Lauter, Mathieu Doucet, Panchapakesan Ganesh,* Miguel Fuentes-Cabrera* and Rajeev Kumar*

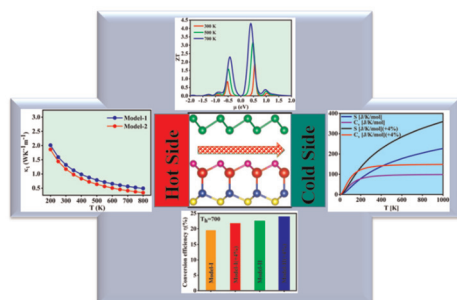
7292



Self-assembled micropillar arrays via near-field electrospinning

Fengjun Chen* and Xiaogang Du

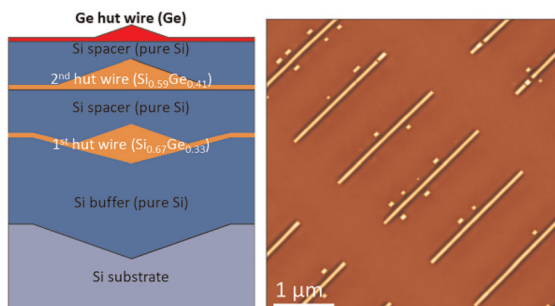
7302



High thermoelectric performance of two-dimensional SiPGeS/As heterostructures

Ismail Shahid, Xu Hu, Iqtidar Ahmad, Anwar Ali, Nasir Shehzad, Sheraz Ahmad and Zhen Zhou*

7311



Strain-induced ordered Ge(Si) hut wires on patterned Si (001) substrates

Ming Ming, Fei Gao, Jian-Huan Wang, Jie-Yin Zhang, Ting Wang, Yuan Yao, Hao Hu and Jian-Jun Zhang*

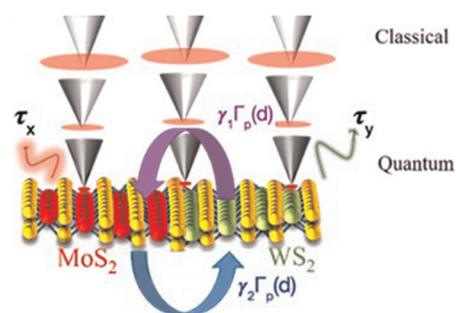


PAPERS

7318

Quantum plasmonic two-dimensional WS_2 – MoS_2 heterojunction

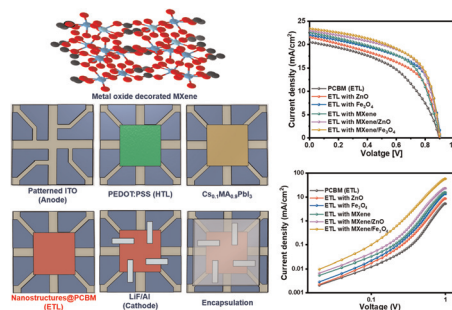
Sharad Ambardar, Zachary H. Withers, Jiru Liu, Xiaoyi Lai, Abdullah Albagami, Alina Zhukova, Pedro Fabris Capelli, Prasana K. Sahoo and Dmitri V. Voronine



7329

Tuning of electron transport layers using MXene/metal–oxide nanocomposites for perovskite solar cells and X-ray detectors

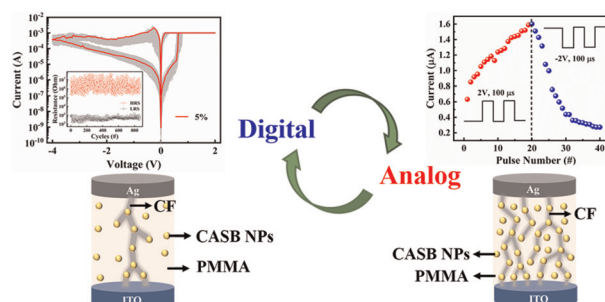
Sajjad Hussain, Hailiang Liu, Dhanasekaran Vikraman, Syed Hassan Abbas Jaffery, Ghazanfar Nazir, Faisal Shahzad, Khalid Mjasam Batoo, Jongwan Jung, Jungwon Kang* and Hyun-Seok Kim*



7344

Achieving adjustable digital-to-analog conversion in memristors with embedded $\text{Cs}_2\text{AgSbBr}_6$ nanoparticles

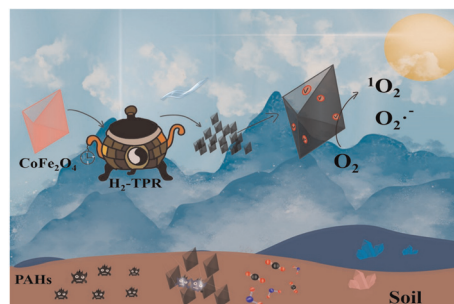
Yuchan Wang,* Nannan Xu, Yiming Yuan, Wenxia Zhang,* Qiang Huang, Xiaosheng Tang and Fei Qi*



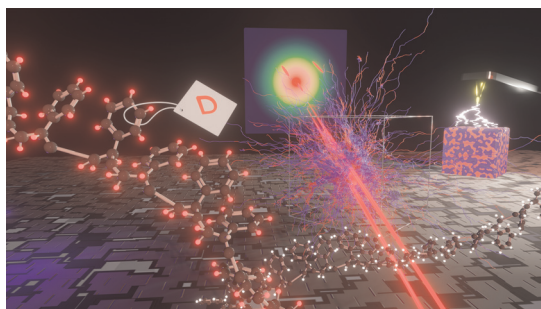
7352

Metal ion endogenous cycles of CoFe_2O_4 induced boosted photocatalytic/PMS degradation toward polycyclic aromatic hydrocarbons

Xiaojuan Bai,* Wei Song, Xuan Ling, Linlong Guo, Derek Hao and Xiao Zhang*



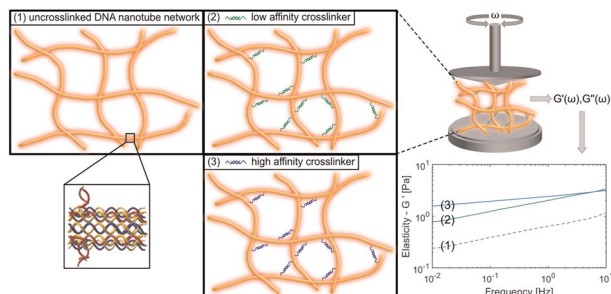
7365



Enabling quantitative analysis of complex polymer blends by infrared nanospectroscopy and isotopic deuteration

Nathaniel Prine, Zhiqiang Cao, Song Zhang, Tianyu Li, Changwoo Do, Kunlun Hong, Camille Cardinal, Travis L. Thornell, Sarah E. Morgan and Xiaodan Gu*

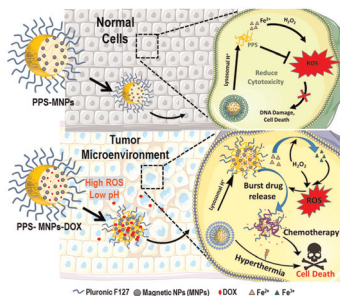
7374



Systematic altering of semiflexible DNA-based polymer networks via tunable crosslinking

Martin Glaser, Paul Mollenkopf, Dusan Prascevic, Catarina Ferraz, Josef A. Käs, Jörg Schnauß and David M Smith*

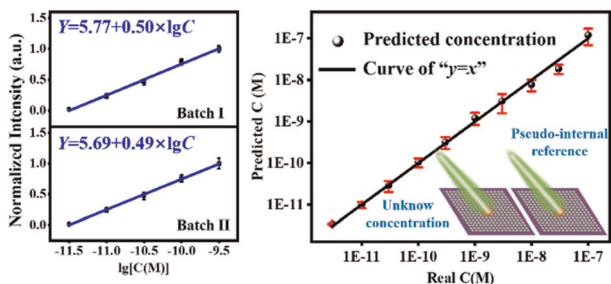
7384



Polypropylene sulphide coating on magnetic nanoparticles as a novel platform for excellent biocompatible, stimuli-responsive smart magnetic nanocarriers for cancer therapeutics

Meenakshi Chauhan, Suparna Mercy Basu, Mohd Qasim and Jyotsnendu Giri*

7403



A robust SERS calibration using a pseudo-internal intensity reference

Meng Zhang, Jingran Yang, Longkun Yang* and Zhipeng Li*

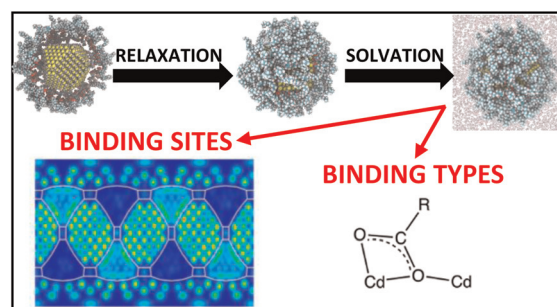


PAPERS

7410

Ligand dynamics on the surface of CdSe nanocrystals

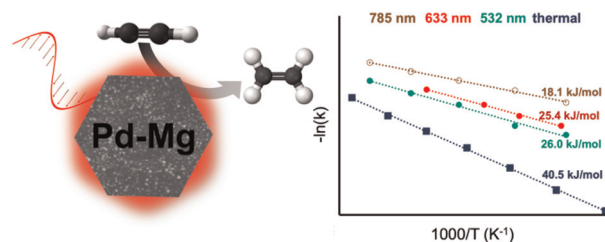
Salvatore Cosseddu, Roberta Pascasio, Carlo Giansante, Liberato Manna and Ivan Infante*



7420

Plasmonic magnesium nanoparticles decorated with palladium catalyze thermal and light-driven hydrogenation of acetylene

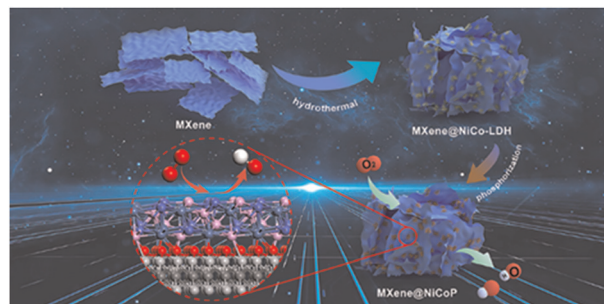
Vladimir Lomonosov, Thomas M. R. Wayman, Elizabeth R. Hopper, Yurii P. Ivanov, Giorgio Divitini and Emilie Ringe*



7430

Electron transfer and surface activity of NiCoP-wrapped MXene: cathodic catalysts for the oxygen reduction reaction

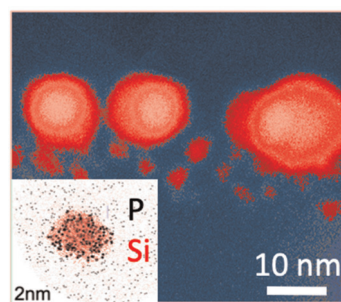
Hao Xie, Demin Jiang, Huina Chen, Xiaoshuang Ma, Xiaojin Liu, Qi Qi and Yuqiao Wang*



7438

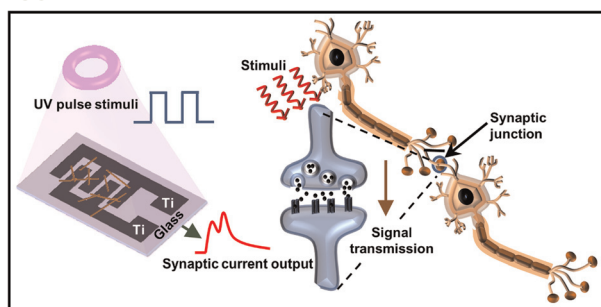
Hyperdoped Si nanocrystals embedded in silica for infrared plasmonics

Meiling Zhang, Jean-Marie Poumirol, Nicolas Chery, Hervé Rinnert, Alaa E. Giba, Rémi Demoulin, Etienne Talbot, Fuccio Cristiano, Teresa Hungria, Vincent Paillard, Fabrice Gourbilleau and Caroline Bonafos*



PAPERS

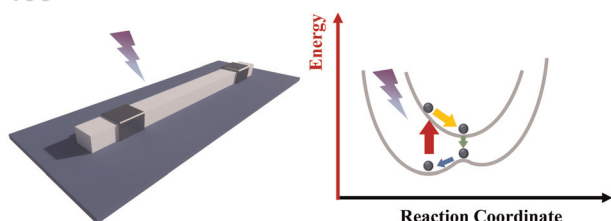
7450



Emulating Ebbinghaus forgetting behavior in a neuromorphic device based on 1D supramolecular nanofibres

Tejaswini S. Rao, Suman Kundu, Bharath Bannur, Subi J. George and Giridhar U. Kulkarni*

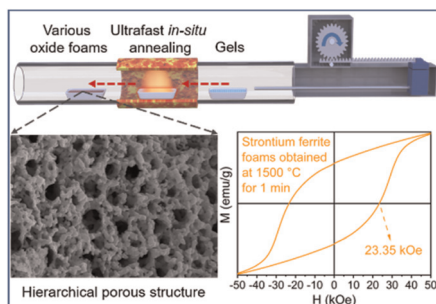
7460



A high responsivity, high detectivity, and high response speed MSM UVB photodetector based on SnO₂ microwires

Rongpeng Fu, Xue Jiang, Yuefei Wang, Danyang Xia, Bingsheng Li,* Jiangang Ma, Haiyang Xu, Aidong Shen and Yichun Liu

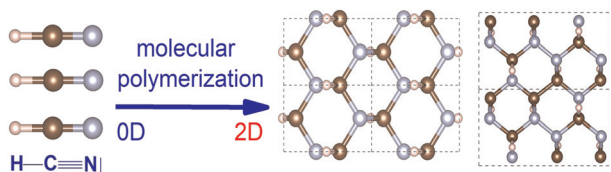
7466



In situ annealing achieves an ultrafast synthesis of high coercive strontium ferrite foams and beyond

Guanghui Han, Menggang Li, Lin He, Ao Xu, Xiaolong Chen, Weiwei Yang,* Yequn Liu* and Yongsheng Yu*

7472



CRYSTAL STRUCTURE PREDICTION

First-principles structure prediction of two-dimensional HCN polymorphs obtained *via* formal molecular polymerization

Heng Zhang, Junjie Wang,* Frédéric Guégan and Gilles Frapper*

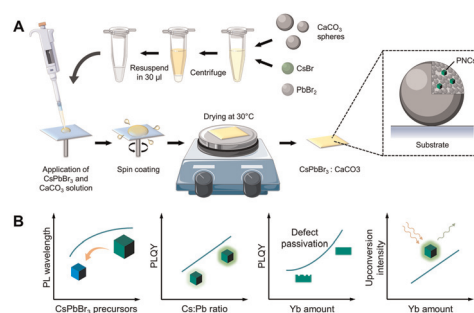


PAPERS

7482

Ligand-free template-assisted synthesis of stable perovskite nanocrystals with near-unity photoluminescence quantum yield within the pores of vaterite spheres

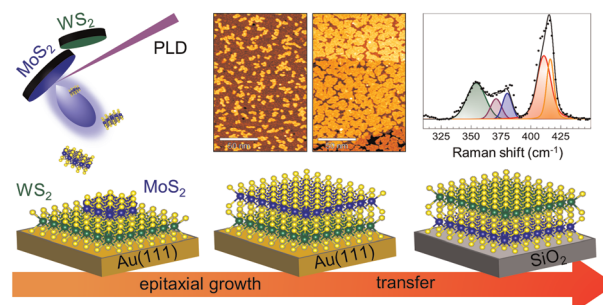
Oleksii O. Peltek, Pavel M. Talianov, Anna Krylova, Artem S. Polushkin, Elizaveta I. Anastasova, Daria D. Mikushina, Dmitri Gets, Lev E. Zelenkov, Soslan Khubezhov, Anatoly Pushkarev, Mikhail V. Zyuzin* and Sergey V. Makarov*



7493

Interface coupling in Au-supported MoS₂–WS₂ heterobilayers grown by pulsed laser deposition

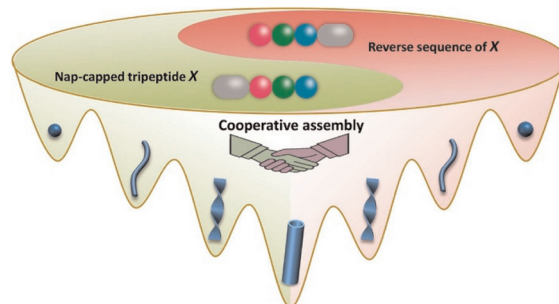
Paolo D'Agosta,* Francesco Tumino,* Valeria Russo, Andrea Li Bassi and Carlo S. Casari



7502

Achieving higher hierarchical structures by cooperative assembly of tripeptides with reverse sequences

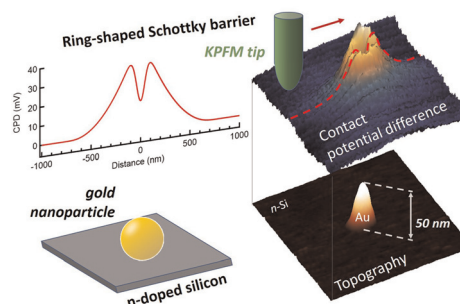
Zhongyan Wang, Yuna Shang, Hongjing Luo, Cuihong Yang, Zhimou Yang,* Chunhua Ren* and Jianfeng Liu*



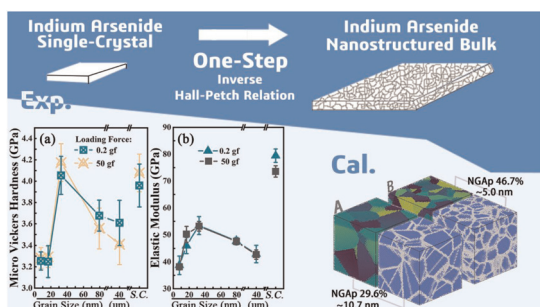
7510

KPFM visualisation of the Schottky barrier at the interface between gold nanoparticles and silicon

Luis Lechaptois, Yoann Prado and Olivier Pluchery*



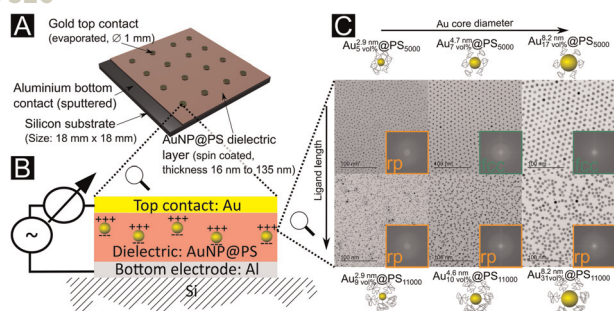
7517



Rediscovering the intrinsic mechanical properties of bulk nanocrystalline indium arsenide

Shuaiqi Li, Jiawei Zhang, Shixue Guan, Ruiang Guo and Duanwei He*

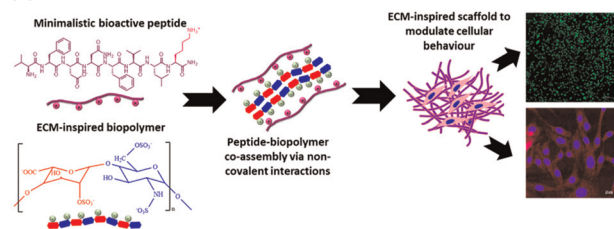
7526



Surface polarization, field homogeneity, and dielectric breakdown in ordered and disordered nanodielectrics based on gold-polystyrene superlattices

Roman Buchheit, Bart-Jan Niebuur, Lola González-García* and Tobias Kraus*

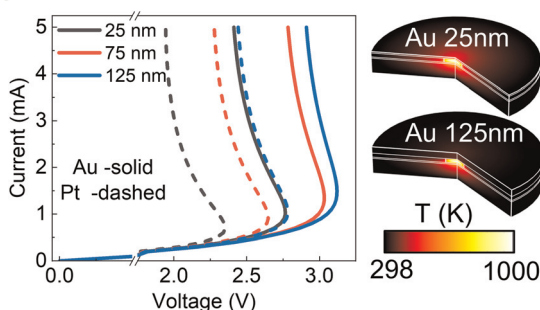
7537



Designing ECM-inspired supramolecular scaffolds by utilizing the interactions between a minimalistic neuroactive peptide and heparin

Pooja Sharma and Sangita Roy*

7559



Thermal transport in metal-NbO_x-metal cross-point devices and its effect on threshold switching characteristics

Shimul Kanti Nath,* Sanjoy Kumar Nandi, Sujan Kumar Das, Yan Liang and Robert G. Elliman

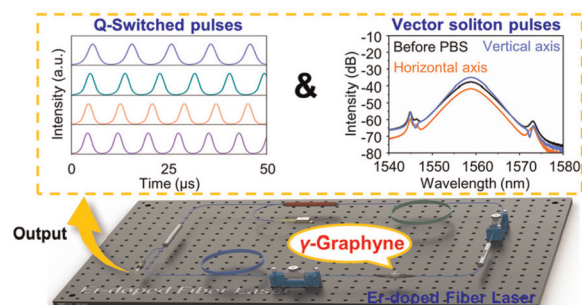


PAPERS

7566

Q-switched and vector soliton pulses from an Er-doped fiber laser with high stability based on a γ -graphyne saturable absorber

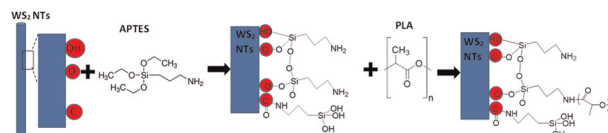
Qingbo Wang, Zhuo Li, Pan Wang,* Qiaoqiao Xu, Zhiwei Zhang, Zhi Wang, Yi Huang and Yan-ge Liu



7577

Silane functionalization of WS₂ nanotubes for interaction with poly(lactic acid)

Eimear Magee, Fengzai Tang, Marc Walker, Alla Zak, Reshef Tenne and Tony McNally*



CORRECTION

7591

Correction: Recent advances in self-healing polyurethane based on dynamic covalent bonds combined with other self-healing methods

Ze-Wei An, Rui Xue, Kang Ye, Hui Zhao,* Yang Liu, Peng Li, Zhen-Ming Chen, Chong-Xing Huang and Guo-Hua Hu

