

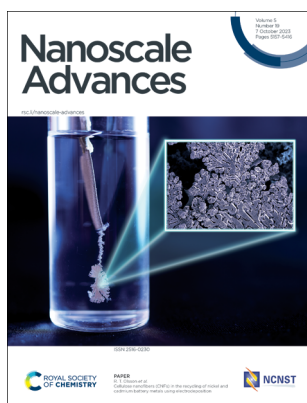
Nanoscale Advances

An open access journal publishing across the breadth of nanoscience and nanotechnology
rsc.li/nanoscale-advances

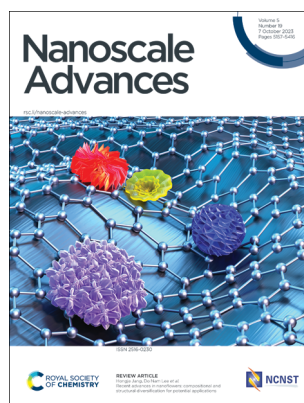
The Royal Society of Chemistry is the world's leading chemistry community. Through our high impact journals and publications we connect the world with the chemical sciences and invest the profits back into the chemistry community.

IN THIS ISSUE

ISSN 2516-0230 CODEN NAADAI 5(19) 5157–5416 (2023)



Cover
See R. T. Olsson *et al.*, pp. 5263–5275. Image reproduced by permission of Richard T. Olsson from *Nanoscale Adv.*, 2023, 5, 5263.



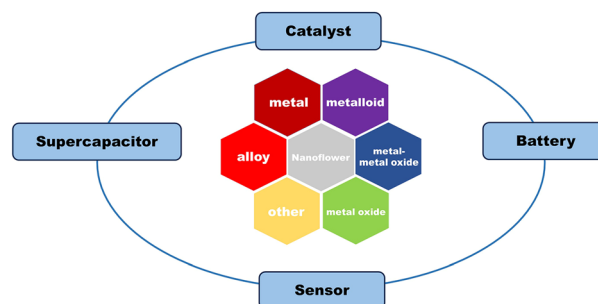
Inside cover
See Hongje Jang, Do Nam Lee *et al.*, pp. 5165–5213. Image reproduced by permission of Do Nam Lee from *Nanoscale Adv.*, 2023, 5, 5165.

REVIEWS

5165

Recent advances in nanoflowers: compositional and structural diversification for potential applications

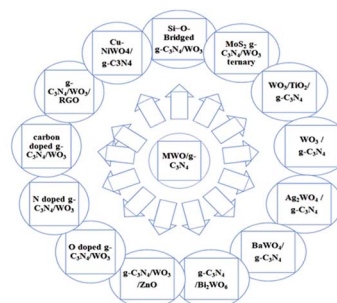
Su Jung Lee, Hongje Jang* and Do Nam Lee*



5214

Recent advancements in the fabrication and photocatalytic applications of graphitic carbon nitride-tungsten oxide nanocomposites

Muhammad Ikram Nabeel, Dilshad Hussain,*
Naseer Ahmad, Muhammad Najam-ul-Haq
and Syed Ghulam Musharraf*



Editorial Staff**Executive Editor**

Jeremy Allen

Deputy Editor

Hannah Kerr

Editorial Assistant

Rosie Hague

Editorial Production Manager

Christopher Goodall

Assistant Editors

Zita Zachariah, Serra Arslanlan Sengelen and Zifei Lu

Publisher

Neil Hammond

For queries about submitted papers, please contact Christopher Goodall, Editorial Production Manager in the first instance. E-mail: nanoscaleadvances@rsc.org

For pre-submission queries please contact Jeremy Allen, Executive Editor. E-mail: nanoscaleadvances-rsc@rsc.org

Nanoscale Advances (electronic: ISSN 2516-0230) is published 24 times a year by the Royal Society of Chemistry, Thomas Graham House, Science Park, Milton Road, Cambridge, UK CB4 0WE.

Nanoscale Advances is a Gold Open Access journal and all articles are free to read. Please email orders@rsc.org to register your interest or contact Royal Society of Chemistry Order Department, Royal Society of Chemistry, Thomas Graham House, Science Park, Milton Road, Cambridge, CB4 0WE, UK Tel +44 (0)1223 432398; E-mail: orders@rsc.org

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 Advances

rsc.li/nanoscale-advances

Nanoscale Advances 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**Honorary Editor-in-chief**

Chunli Bai, National Centre for Nanoscience and Nanotechnology, China

Editors-in-chief

Dirk Guld, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

Yue Zhang, University of Science and Technology Beijing, China

Associate EditorsCinzia Casiraghi, University of Manchester, UK
Gianurelio (Giovanni) Cuniberti, TU 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, Korea

Christian Klinke, 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, JNCASR, India
Jinlan Wang, Southeast University, China

Manzhou Zhu, Anhui University, China

Jin Zou, University of Queensland, Australia

Advisory Board

Suryasarathi Bose, Indian Institute of Science Bangalore, India

Stephanie Brock, Wayne State University, USA

Raffaella Buonsanti, EPFL, Switzerland

Chunying Chen, National Centre for

Nanoscience and Technology of China, China

Jingyi Chen, University of Arkansas, USA

Xiaodong Chen, Nanyang Technological

University, Singapore

Wenlong Cheng, Monash University, Australia

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

Katharina Landfester, Max Planck Institute for

Polymer Research, Germany

Dattatray Late, CSIR - National Chemical

Laboratory, India

Pooi See Lee, Nanyang Technological

University, Singapore

Changming Li, Southwest University, China

Jie Liu, Duke University, USA

Laura Na Liu, Max Planck Institute for

Intelligent Systems, Germany

Liberato Manna, Istituto Italiano di

Tecnologia, Italy

Anna Fontcuberta i Morral, EPFL, Switzerland

Catherine Murphy, University of Illinois at

Urbana-Champaign, USA

Kostya Ostrikov, Queensland University of

Technology, Australia

So-Jung Park, Ewha Womens University, Korea

Lakshmi Polavarapu, University of Vigo, Spain

Thalappil Pradeep, Indian Institute of

Technology Madras, India

Narayan Pradhan, Indian Association for the

Cultivation of Science, India

Dong Qin, Georgia Tech University, USA

Michael Sailor, University of California, San

Diego, USA

Hyeon Suk Shin, Ulsan National Institute of

Science and Technology, South Korea

Zhigang Shuai, Tsinghua University, China

Sara Skrabalak, Indiana University, USA

Francesco Stellacci, EPFL, Switzerland

Hong-Bo Sun, Jilin 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 Nanotec, 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, Chinese Academy of Sciences,

China

Jinhua Ye, National Institute for Materials

Science, Japan

Xiao Cheng Zeng, University of Nebraska-

Lincoln, USA

Gang Zhang, Institute of High Performance

Computing, Singapore

Hua Zhang, City University of Hong Kong,

China

Miqin Zhang, University of Washington, USA

Information for Authors

Full details on how to submit material for publication in Nanoscale Advances 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-advances

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.

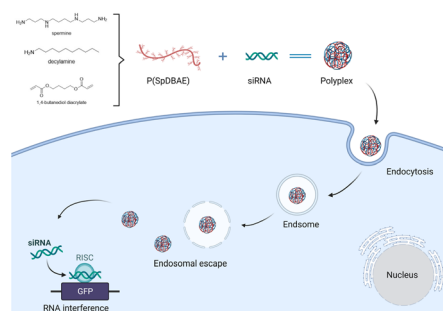
Registered charity number: 207890



5256

Synthesis and application of spermine-based amphiphilic poly(β -amino ester)s for siRNA delivery

Yao Jin, Friederike Adams, Anny Nguyen, Sebastian Sturm, Simone Carnerio, Knut Müller-Caspary and Olivia M. Merkel*



PAPERS

5263

Cellulose nanofibers (CNFs) in the recycling of nickel and cadmium battery metals using electrodeposition

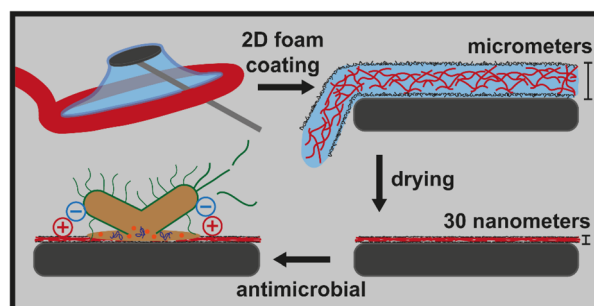
B. W. Hoogendoorn, O. Karlsson, X. Xiao, A. Pandey, S. E. Mattsson, V. Ström, R. L. Andersson, Y. Li and R. T. Olsson*



5276

2D foam film coating of antimicrobial lysozyme amyloid fibrils onto cellulose nanopapers

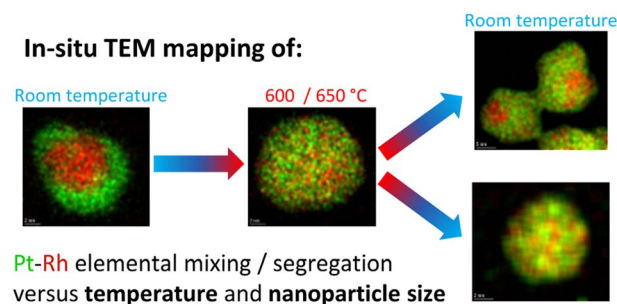
Nico Kummer, Luc Huguenin-Elie, Adrian Zeller, Yashoda Chandorkar, Jean Schoeller, Flavia Zuber, Qun Ren, Ashutosh Sinha, Kevin De France, Peter Fischer, Silvia Campioni* and Gustav Nyström*



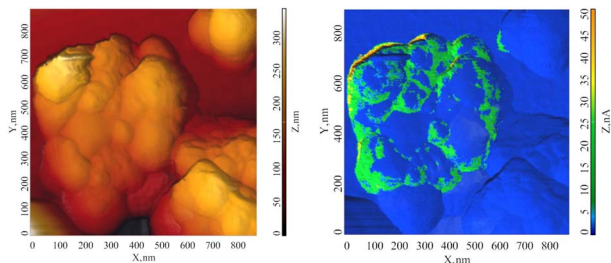
5286

Variable temperature *in situ* TEM mapping of the thermodynamically stable element distribution in bimetallic Pt–Rh nanoparticles

Martin Jensen,* Wallace Kierulf-Vieira, Patricia J. Kooyman and Anja O. Sjästad*



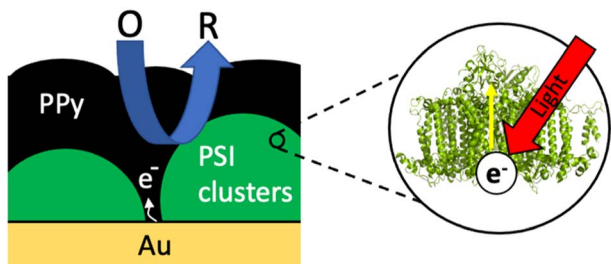
5295



A nanoscale study of the structure and electrical response of *Sepia eumelanin*

Dieudonné Niyonkuru, Anthony Camus, Manuel Reali, Zhaojing Gao, Daniel M. Shadrack, Oleg Butyaev, Marko Surtchev and Clara Santato*

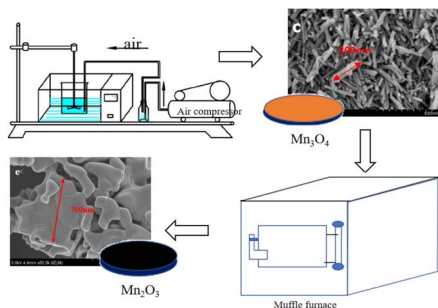
5301



Photoactive and conductive biohybrid films by polymerization of pyrrole through voids in photosystem I multilayer films

Joshua M. Passantino, Blake A. Christiansen, Marc A. Nabhan, Zane J. Parkerson, Tyler D. Oddo, David E. Cliffel and G. Kane Jennings*

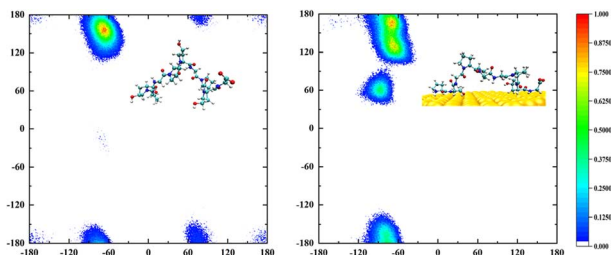
5309



The effects of calcination on the electrochemical properties of manganese oxides

Xinyu Dong, Haifeng Wang, Jiawei Wang,* Yue He, Pan Yang, Song Wang, Xiaoliang Chen, Chunyuan Yang and Fanghai Lu

5322



Characterizing polyproline II conformational change of collagen superhelix unit on adsorption on gold surface

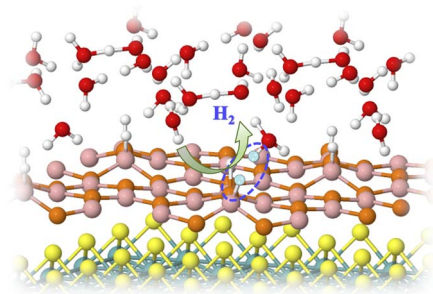
Yuntao Li, Jinrong Yang* and Xiao He*



5332

Electrocatalytic study of the hydrogen evolution reaction on MoS₂/BP and MoSSe/BP in acidic media

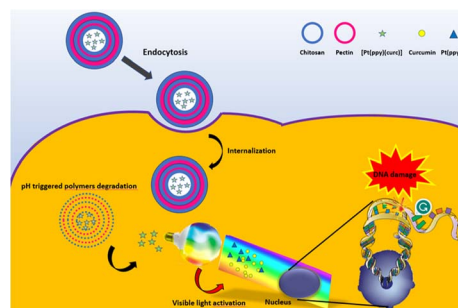
Arunima Singh,* Manjari Jain, Preeti Bhumla and Saswata Bhattacharya*



5340

Synthesis of a light-responsive platinum curcumin complex, chemical and biological investigations and delivery to tumor cells by means of polymeric nanoparticles

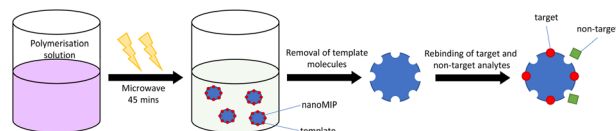
Viviana Vergaro,* Maria Michela Dell'Anna, Hamid R. Shahsavari, Francesca Baldassarre, Danilo Migoni, Piero Mastrorilli, Francesco Paolo Fanizzi and Giuseppe Ciccarella*



5352

A rapid synthesis of molecularly imprinted polymer nanoparticles for the extraction of performance enhancing drugs (PIEDs)

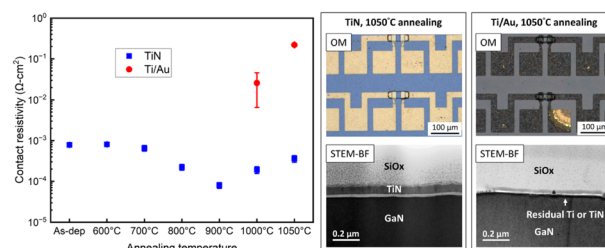
Mark V. Sullivan,* Connor Fletcher, Rachel Armitage, Chester Blackburn and Nicholas W. Turner*



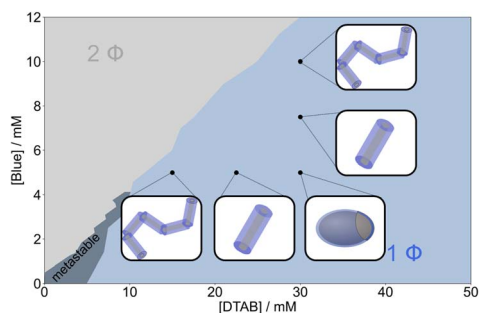
5361

A high thermal stability ohmic contact for GaN-based devices

Chia-Yi Wu, Tien-Sheng Chao and Yi-Chia Chou*



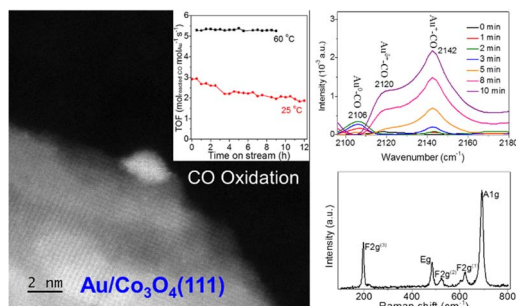
5367



SANS contrast matching for the unambiguous localization of anionic dye in cationic surfactant micelles

Wenke Müller,* Ralf Schweins, Bernd Nöcker, Hans Egold, Yvonne Hannappel and Klaus Huber

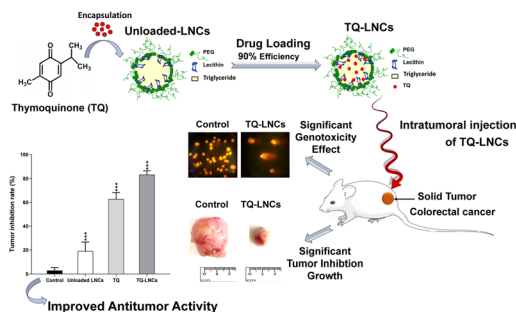
5385



Robust 2 nm-sized gold nanoclusters on Co₃O₄ for CO oxidation

Quanquan Shi,* Zhiwen Li, Changhai Cao, Gao Li* and Sami Barkaoui*

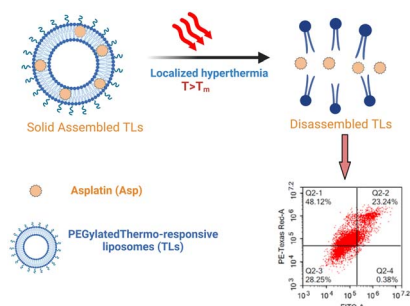
5390



Thymoquinone-loaded lipid nanocapsules with promising anticancer activity for colorectal cancer

Mouna Selmi, Abir Salek, Mahassen Barboura, Leila Njim, Amine Trabelsi, Aida Lahmar, Nolwenn Lautram, Emilie Roger, Tarek Baati* and Leila chekir Ghedira

5399



Box–Behnken design of thermo-responsive nano-liposomes loaded with a platinum(IV) anticancer complex: evaluation of cytotoxicity and apoptotic pathways in triple negative breast cancer cells

Nada K. Sedky, Maria Braoudaki, Noha Khalil Mahdy, Kenzy Amin, Iten M. Fawzy, Eleni K. Efthimiadou, Rana A. Youness and Sherif Ashraf Fahmy*

