

IN THIS ISSUE

ISSN 1144–0546 CODEN NJCHES 47(13) 6003–6458 (2023)



Cover

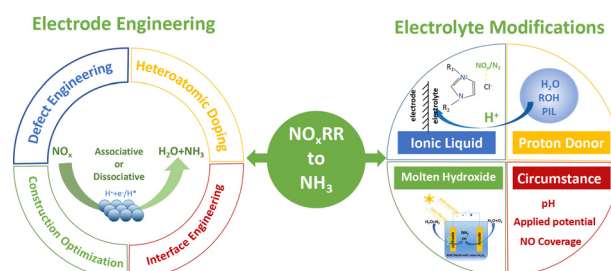
See Bin Li, Guangjin Zhang et al., pp. 6058–6065.
Image reproduced by permission of Guangjin Zhang from *New J. Chem.*, 2023, 47, 6058.

PERSPECTIVE

6018

The state-of-the-art in the electroreduction of NO_x for the production of ammonia in aqueous and nonaqueous media at ambient conditions: a review

Yuxian Fan, Xiang Xue, Lingyue Zhu, Yuwei Qin, Dandan Yuan, Di Gu and Baohui Wang*

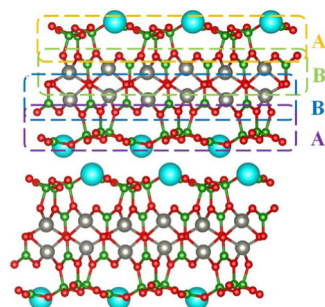


COMMUNICATIONS

6041

Discovery of $\text{SrZn}_2\text{B}_6\text{O}_{12}$ with an unprecedented quadruple-layered configuration

Xiangyu Long, Yan Lv and Xueyan Wu*



Editorial Staff

Executive Editor

Sally Howells

Deputy Editor

Mike Andrews

Development Editors

Michelle Canning, Emily Cuffin-Munday

Assistant Editor

Eva Balentova

Editorial Production Manager

Susannah Davies

Publishing Editors

Debora Giovannelli, Helen Lunn, Samuel Oldknow, Kate Tustain

Editorial Assistant

Daphne Houston

Publishing Assistant

Huw Hedges

Publisher

Jeanne Andres

For queries about submitted articles please contact Susannah Davies, Editorial Production Manager in the first instance. E-mail njc@rsc.org
For pre-submission queries please contact Sally Howells (RSC), Executive Editor. E-mail njc-rsc@rsc.org

New Journal of Chemistry (electronic: ISSN 1369-9261) is published 48 times a year by the Centre National de la Recherche Scientifique (CNRS), 3 rue Michel-Ange, 75794 Paris cedex 16, France, and the Royal Society of Chemistry (RSC), 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: £2306; US\$3880. 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

NJC

New Journal of Chemistry

A journal for new directions in chemistry

rsc.li/njc

NJC solicits innovative and cutting-edge reports of high quality and broad appeal that have a strong chemical component. Cross-disciplinary papers are welcome.

NJC contains reports of original research (Communications, Papers) as well as reviews (Focuses, Perspectives).

Editorial Board

Editor-in-chief

Jean-François Gérard, INSA Lyon, University of Lyon, France

Associate Editors

Annie Castonguay, INRS (University of Quebec), Canada

Alexander J. Andre Cobb, Kings College London, UK

Vera R. L. Constantino, University of São Paulo, Brazil

Debbie Crans, Colorado State University, USA

Qiang Cui, Boston University, USA

Catharine Esterhuysen, University of Stellenbosch, South Africa

David Farrusseng, IRCELYON, France

Yannick Guari, Université Montpellier, France

Suman L. Jain, CSIR Indian Institute of Petroleum, India

Peter Junk, James Cook University, Australia

Hee-Je Kim, Pusan National University, Korea

Dai-Wen Pang, Wuhan University, China

Karine Philippot, LCC, France

Luca Prodi, University of Bologna, Italy

Maarten Roeflaers, Katholieke Universiteit Leuven, Belgium

Edina Rosta, University College London, UK

Akhila K. Sahoo, University of Hyderabad, India

Jianji Wang, Henan Normal University, China

Gregory Welch, University of Calgary, Canada

Kazunari Yoshizawa, Kyushu University, Japan

Jinghua Yu, University of Jinan, China

Consulting Editor

Odile Eisenstein, Université Montpellier, France

Advisory Board

George Gokel, University of Missouri- St. Louis, USA

Hendrik Heinz, University of Colorado Boulder, USA

Mir Wais Hosseini, Université de Strasbourg, France

Takashi Kato, University of Tokyo, Japan

Henryk Kozłowski, University of Wrocław, Poland

Jean-Pierre Majoral, University of Toulouse,

France

Sijbren Otto, University of Groningen, The Netherlands

David Reinholdt, University of Twente, The Netherlands

Alan Rowan, Radboud University Nijmegen, The Netherlands

Jean-Pierre Sauvage, Université de Strasbourg, France

Jonathan W. Steed, Durham University, UK

Lin Xu, East China Normal University, China

Yi-Jun Xu, Fuzhou University, China

Vivian Yam, University of Hong Kong, PR China

Davit Zargarian, Université de Montréal, Canada

Founding Editor

Lionel Salem

Information for Authors

Full details on how to submit material for publication in New Journal of Chemistry 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/njc

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 with permission from the Centre National de la Recherche Scientifique (CNRS) and the Royal Society of Chemistry.

This journal is © The Royal Society of Chemistry and the Centre National de la Recherche Scientifique 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

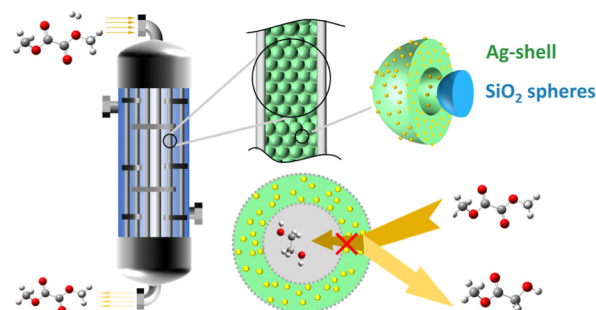


COMMUNICATIONS

6045

Engineering an egg-shell structure for the Ag/SiO₂ pellet catalyst for selective hydrogenation of dimethyl oxalate to methyl glycolate

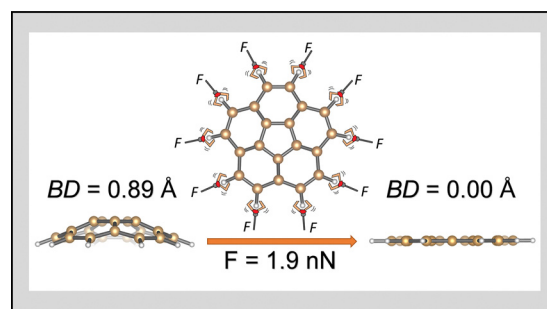
Xiaofeng Xu, Xin Hu, Zuwei Luo, Yueqiang Cao,*
Yi-An Zhu, Wei Li, Jinghong Zhou* and Xinggui Zhou



6050

Bowl-shaped carbon skeletons under tensile stress: quantum mechanochemistry of corannulene

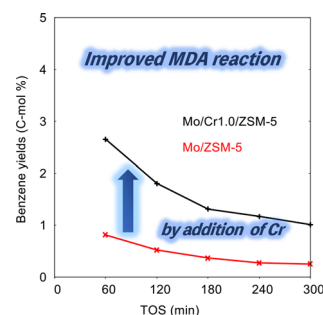
Zi-Yang Qiu, Xiang Zhao* and Jing-Shuang Dang*



6054

Improved methane dehydroaromatization reaction over Mo and Cr co-doped ZSM-5 catalyst

Koji Miyake,* Tomoka Sumi, Shinya Kokuryo,
Haruna Kitamura, Jose A. Hernandez Gaitan,
Yoshiaki Uchida and Norikazu Nishiyama

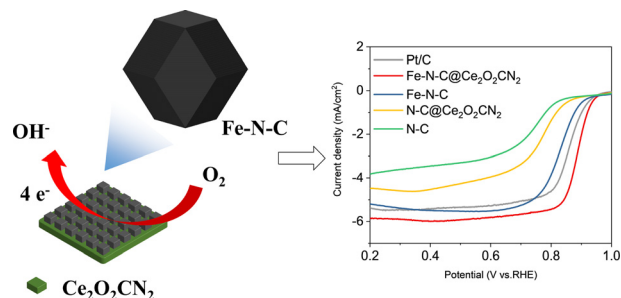


PAPERS

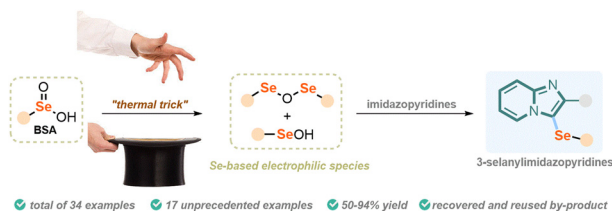
6058

Coupling of cerium oxide cyanamide with Fe–N–C for enhanced oxygen reduction reaction

Xu Zhang, Jingxian Zhang, Shi Zeng, Haifan Wang,
Yiling Bai, Huaming Hou, Ke Zhang, Bin Li* and
Guangjin Zhang*



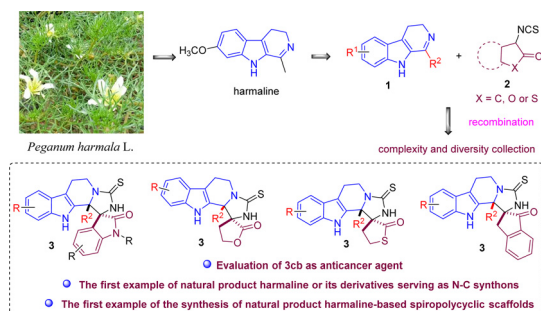
6066



Arylseleninic acid derivative decomposition towards Se(II)-based electrophiles: an elegant approach to construct 3-selenyl-imidazopyridines

João M. Anghinoni, Sabrina S. Ferreira, Ricardo F. Schumacher, Bernardo A. Iglesias, Gelson Perin, Filipe Penteado* and Eder J. Lenardão*

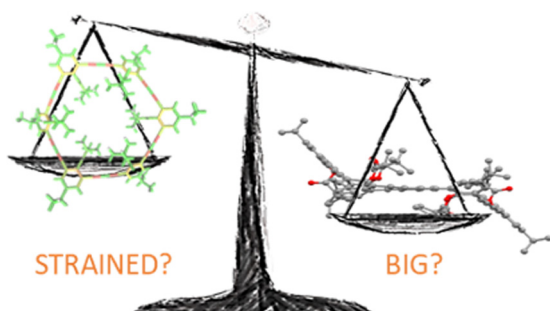
6073



Design, synthesis and evaluation of multi-pharmacophore-containing spiropolycyclic harmaline-based hybrids as anticancer agents

Shuang Chen, Ze-Hua Yu, Wei-Na Wang, Zi-Yue Chen, Bo-Wen Pan, Lin Chen,* Ying Zhou, Xiong-Wei Liu and Xiong-Li Liu*

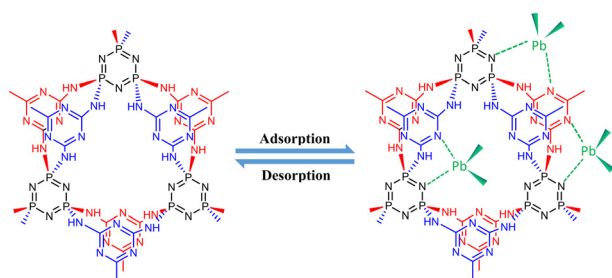
6086



Better big or strained? Deformations of shape persistent arylene butadiynylene macrocycles

Marcin S. Matecki, Przemysław Dopieralski, Nurbey Gulia, Bartłomiej Pigulski, Tadeusz Lis and Sławomir Szafert*

6095



Nitrogen-rich covalent phosphazene-based framework for efficient removal of lead(II) ions

Lin-ling Peng, Wei-Fang Zhou, Wei-Feng Xu, Yu Liu, Cong-Shan Zhou, Jun Xie* and Ke-Wen Tang

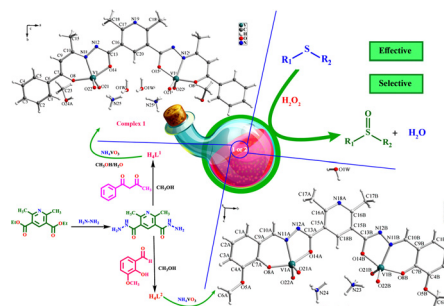


PAPERS

6102

Dinuclear oxidovanadium complexes with dihydrazone ligands derived from diethyl 2,6-dimethylpyridine-3,5-dicarboxylate obtained from Hantzsch reaction; crystal structure and catalytic activity

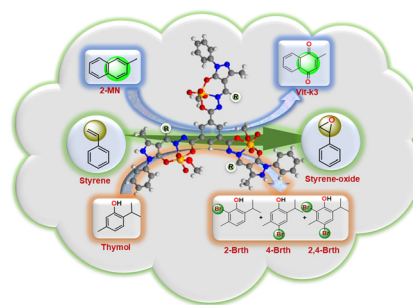
Fatemeh Soltani, Rahman Bikas,* Neda Heydari and Anna Kozakiewicz-Piekarz



6114

Trinuclear dioxidomolybdenum(vi) complexes derived from benzene-1,3,5-tricarbohydrazone and study of the catalytic activity

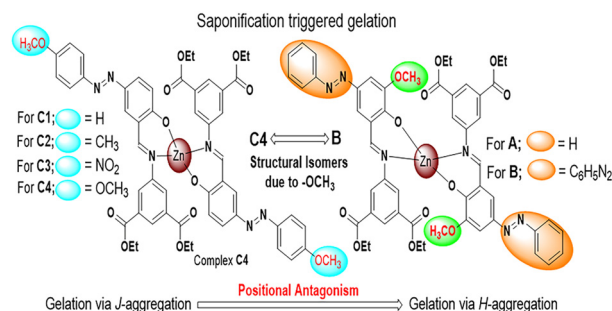
Mannar R. Maurya,* Devesh Singh, Fernando Avecilla, Akhilesh Sharma and Puneet Gupta



6135

Acquiring preferred mode of aggregation through positional antagonism for saponification triggered gelation

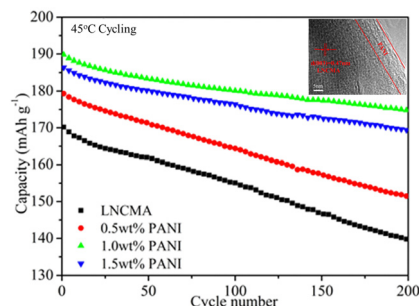
Prem Chand and Ashish Kumar*



6144

Conductive polymer polyaniline covering promotes the electrochemical properties of a nickel-rich quaternary cathode $\text{LiNi}_{0.88}\text{Co}_{0.06}\text{Mn}_{0.03}\text{Al}_{0.03}\text{O}_2$

Xiaodie Li, Junchao Qian, Zhengying Wu, Chengbao Liu, Xiaodong Guan, Yang Zhou, Zhigang Chen and Feng Chen*

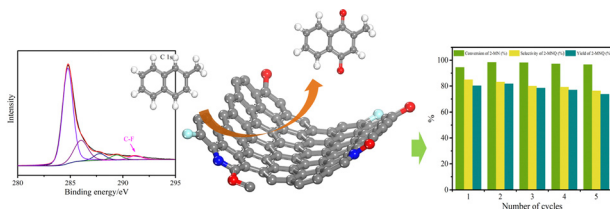


PAPERS

6155

Nitrogen and fluorine co-doped mesoporous carbon as an efficient metal-free catalyst for selective oxidation of 2-methylnaphthalene

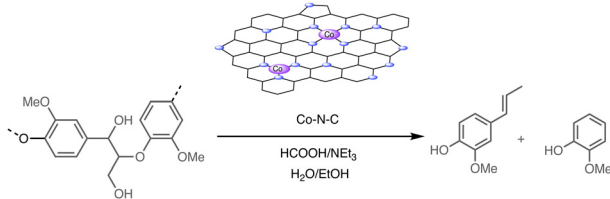
Yi Yu, Qingxin Zhang, Jiarui Li, Li Xu* and Guoji Liu*



6164

Cobalt catalysts (Co–N–C) for C–O bond cleavage in lignin-derived aryl ethers and lignin

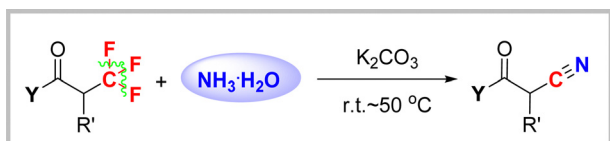
Daniel Bautista-García, David Macías-José, Paola Aguillón-Rodríguez, Obed Pérez-Reyes and Carmen Ortiz-Cervantes*



6171

Metal-free synthesis of ketonitriles via C–F bond cleavage

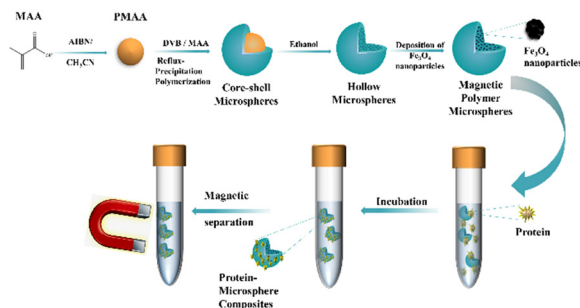
Ge Gao and Zhiping Li*



6176

Fabrication of magnetic Fe₃O₄@P(DVB-co-MAA) microspheres using hollow microspheres as templates for protein separation

Fengjie Bu, Qianrui Xu, Wenjie Jiang, Yingying Wei, Zhifei Wang and Yong Jiang*

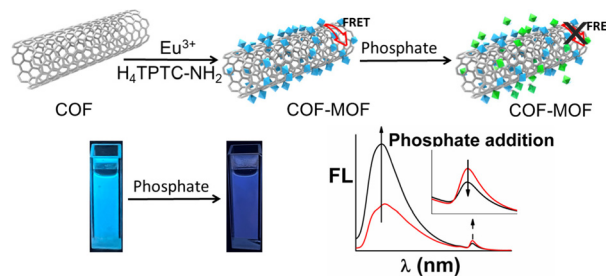


PAPERS

6186

Rational design of COF–MOF composites for ratiometric fluorescence detection of phosphate

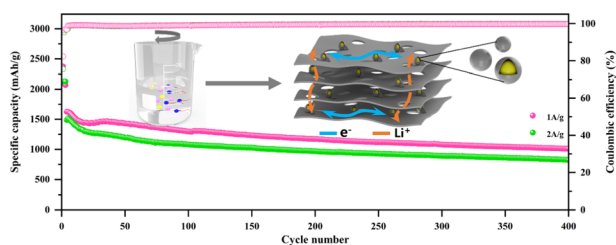
Yun-Jie Yu, Wei Li, Shi-Bin Ren, Xian-Jing Zhou and De-Man Han*



6191

A self-sacrificing strategy to fabricate a fluorine-modified integrated silicon/carbon anode for high-performance lithium-ion batteries

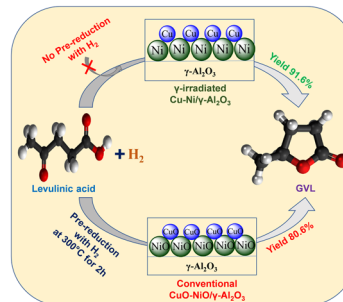
Jiangzhi Xiong, Peng Xiao,* Jian Luo, Yangjie Li, Peng Zhou, Liang Pang, Xilei Xie and Yang Li



6201

Utilization of γ -radiation in the synthesis of bimetallic Cu–Ni catalysts for selective vapour phase hydrogenation of levulinic acid to γ -valerolactone

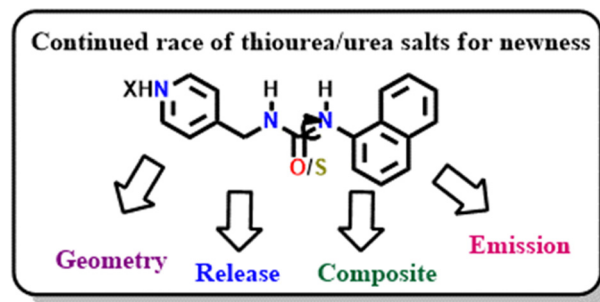
Gadamani Suresh Babu, Sanju Francis, Dasari Padmakar, Paka Rajitha, Challapalli Subrahmanyam and Nakka Lingaiah*



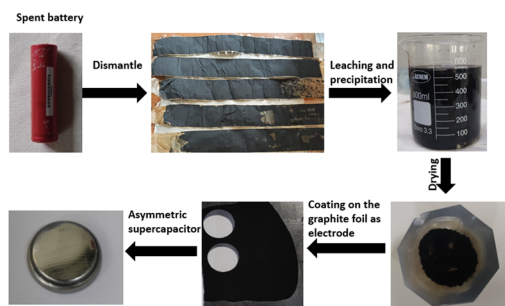
6211

Assemblies of salts of urea and thiourea derivatives and release of hosts from composites with calcium oxide

Rinki Brahma and Jubaraj Bikash Baruah*



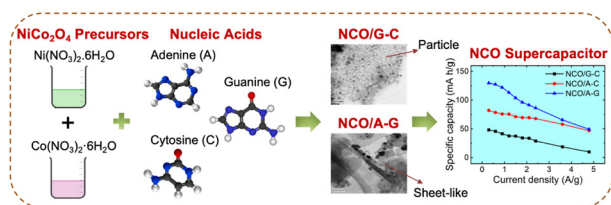
6224



Recovery of cobalt as CoS from spent Li-ion batteries and investigation of its use as an electrode material for supercapacitors

Sezgin Yasa, Burak Birol and Metin Gencten*

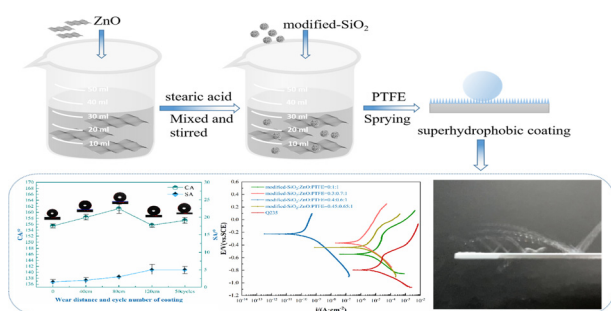
6235



Exploring the electrochemical characteristics of the nucleobase-template assisted NiCo_2O_4 electrode for supercapacitors

Karthik Krishnan,* Amuthan Dekshinamoorthy, Saranyan Vijayaraghavan and Selvakumar Karuthapandi*

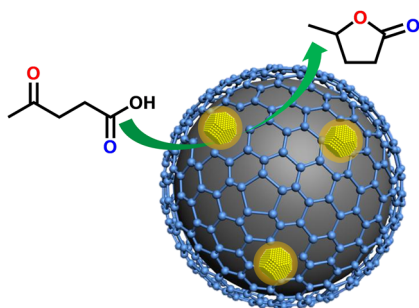
6246



Study of nano-ZnO improvement of the mechanical properties and corrosion resistance of modified-SiO₂/PTFE superhydrophobic nanocomposite coatings by one-step spraying

Jiansan Li, Ziping Liu* and Zhenyu Wang

6258



Modulating the surface structure of nanodiamonds to enhance the electronic metal–support interaction of efficient ruthenium catalysts for levulinic acid hydrogenation

Guojun Lan,* Zhenqing Li, Xiaojia Han, Liping Zhang, Yiyang Qiu, Xiucheng Sun, Zaizhe Cheng and Ying Li*

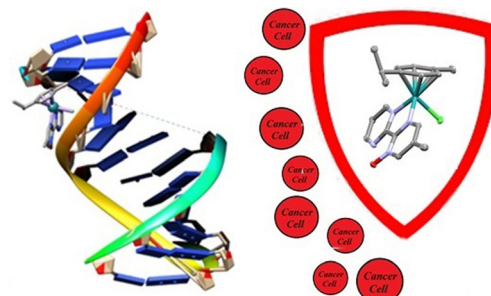


PAPERS

6266

Synthesis of a half-sandwich complex of ruthenium(II) with a nonsymmetric bis-nitrogen donor ligand: biological investigations

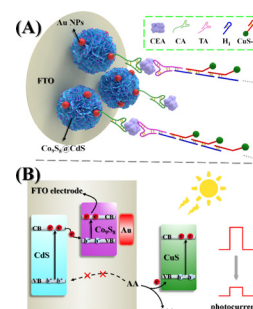
Sana Yarahmadi, Elham Jokar, Zahra Shamsi, Dalia Nahieh, Mehrnoosh Moosavi, Masood Fereidoon nezahad* and Hamid R. Shahsavari*



6275

Co₉S₈ nanoparticle-functionalized CdS nanoflowers for signal-off photoelectrochemical bioanalysis of carcinoembryonic antigens with hybridization chain reaction

Kangyao Zhang,* Kejun Wang, Jianhui Zhang, Meirong Tan, Mingdi Xu,* Wenqiang Lai and Dianping Tang



6282

Construction of strongly-coupled CeO₂/MnO₂ heterogeneous catalysts for highly-efficient removal of formaldehyde

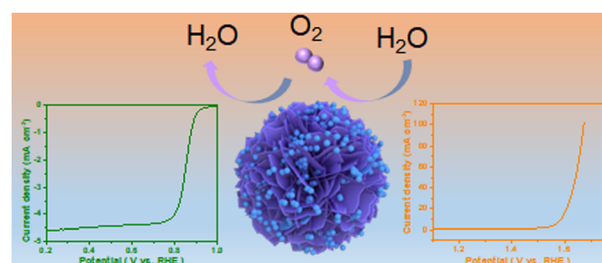
Shuaishuai Zhang, Lingling Zhang, Li Liu, Xiang Chu, Xiao Wang,* Shuyan Song* and Hongjie Zhang*



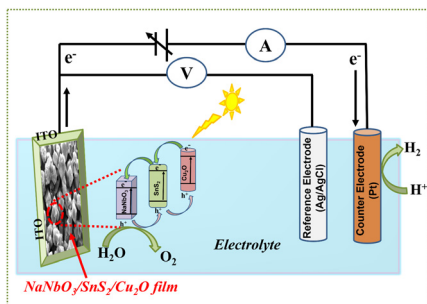
6287

Dopamine-coated layered Co_{0.85}Se as an efficient bifunctional oxygen electrocatalyst

Jin Li, Yu Zhang, Wenjie Wei, Gaochao Fan, Zumin Wang,* Lingbo Zong* and Lei Wang



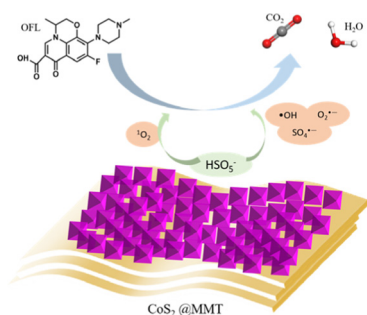
6294



Enhancing the activity and stability of Cu₂O nanorods via coupling with a NaNbO₃/SnS₂ heterostructure for photoelectrochemical water-splitting

Shalini Tiwari, Priyanka Yadav and Ashok K. Ganguli*

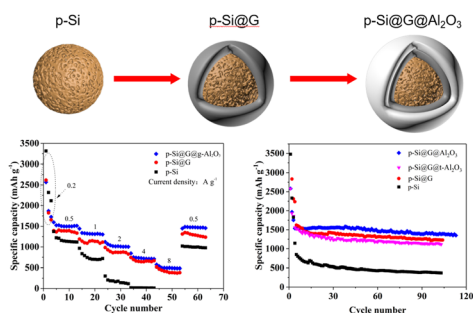
6305



Adsorption-enhanced rapid catalytic degradation of ofloxacin by a CoS₂@montmorillonite catalyst via peroxymonosulfate activation

Peiping Hong, Lian Wu, Yifang Zhao, Yue Yu, Shuxi Gao, Bing Liao* and Hao Pang*

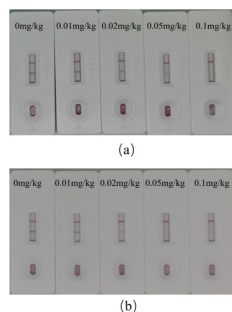
6313



Construction of a core-double-shell structured Si@graphene@Al₂O₃ composite for a high-performance lithium-ion battery anode

Fei Zhou, Zhitong Shang, Xiaoyu Zhao, Qiang Yu, YiChen Mu, Haoran Xu, Xiaojun Tang, Siyuan Huang and Xiaocheng Li*

6323



Development of immunochromatographic strips for the rapid detection of diquat in apples and strawberries

Jian Zhou, Aihong Wu, Liguang Xu, Hua Kuang, Liqiang Liu, Chuanlai Xu and Xinxin Xu*

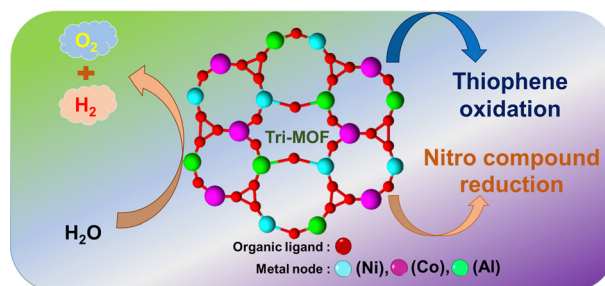


PAPERS

6330

One pot synthesis and characterization of binary and ternary metal organic frameworks (MOFs) as tri-modal catalysts for thiophene electrooxidation, water splitting and 4-nitrophenol reduction

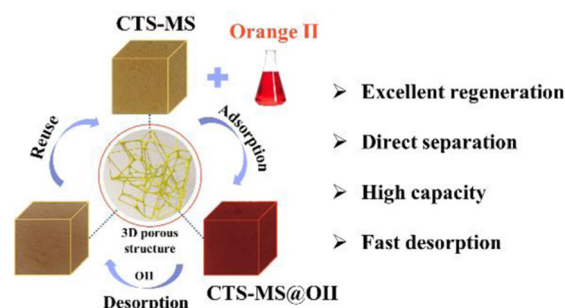
Mahendran Manivannan, Venkatachalam Rajagopal, Lalithambigai Krishnamoorthy, Selvam Dhanasurya, Vembu Suryanarayanan,* Murugavel Kathiresan, Thasan Raju and Lathe A. Jones



6342

Excellent regeneration, easy separation and high capacity of 3D chitosan–melamine sponge composites for anionic dye removal

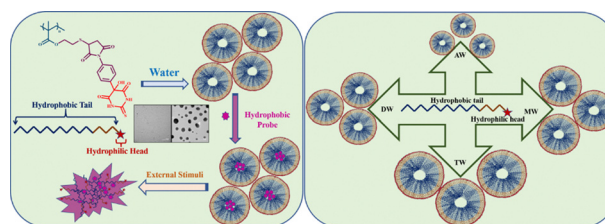
Yang Zeng, Xin Liu,* Yimo Zhang, Yan Qin, Xiangtao Tang, Wenqing Zhang and Lingfan Zhang*



6353

Efficient route to synthesizing a biocompatible delivery system undergoing morphological changes upon solvent variation

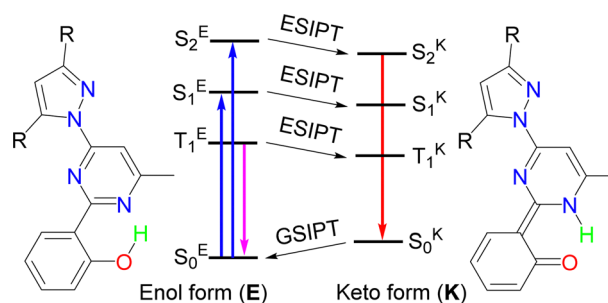
Piyali Mandal,* Madhumita Mukherjee and Raja Shunmugam*



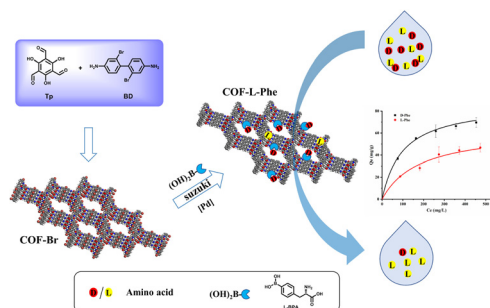
6361

Dual emission of ESIPT-capable 2-(2-hydroxyphenyl)-4-(1H-pyrazol-1-yl)pyrimidines: interplay of fluorescence and phosphorescence

Nikita A. Shekhovtsov,* Elena B. Nikolaenkova, Alexey A. Ryadun, Sofia N. Vorobyeva, Viktor P. Krivopalov and Mark B. Bushuev*



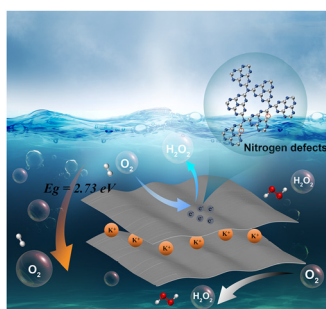
6378



Chiral covalent organic frameworks synthesized via a Suzuki–Miyaura-coupling reaction: enantioselective recognition of D/L-amino acids

Dongdong Tan, Tianmiao Wang, Jing Hu, Donglian Deng, Tingting Li and Ruijun Li*

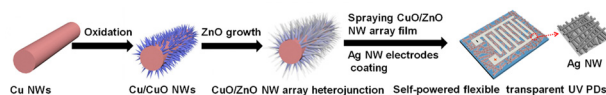
6385



K-intercalated polymeric carbon nitride with nitrogen defects for efficient photocatalytic H_2O_2 production

Qinyuan Wang, Lulu Bai, Qiang Wu* and Weifeng Yao*

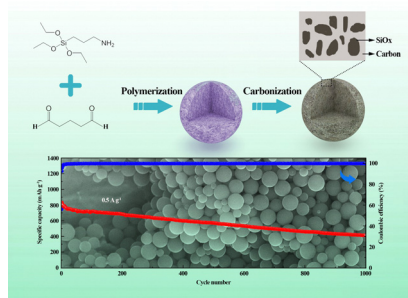
6397



Fast-response self-powered flexible transparent ultraviolet photodetectors based on a CuO/ZnO nanowire array heterojunction

Yi Li, Xiaojing Wei, Qiuyue Yang, Jie Zhang, Wencai Wang, Linlin Dong, Bokai Gao, Chen Li, Xiaolin Sun and Yanwen Ma*

6405



Designing a simple polymerisation route for homogeneous SiO_x/C spheres as a lithium-ion battery anode

Xiaoming Zhou, Yang Liu,* Liming Chen and Guohui Yuan*

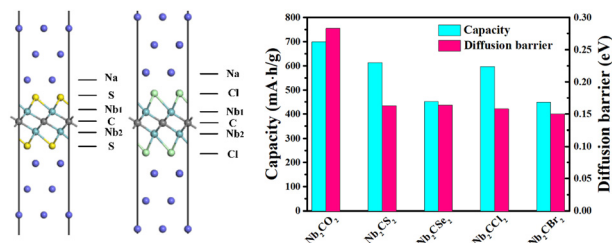


PAPERS

6412

S- and Cl-functionalized Nb₂C MXenes as novel anode materials for sodium-ion batteries: a first-principles study

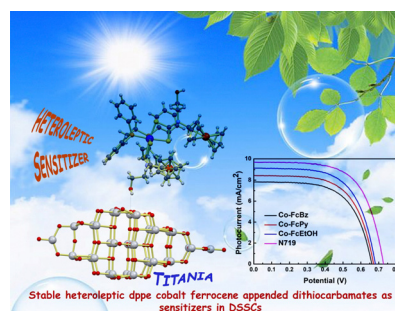
Tongxin Yan, Meixia Xiao,* Haiyang Song,* Ying Lv, Zhao Li and Beibei Xiao



6420

New heteroleptic 1,2-bis(diphenylphosphino)ethane appended cobalt(III) ferrocene dithiocarbamates as sensitizers in dye-sensitized solar cells (DSSCs)

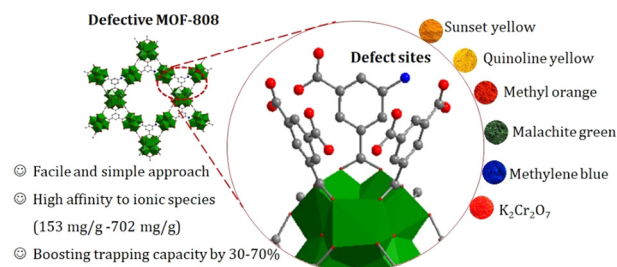
Devayani Srivastava, Amita Singh, Gabriele Kociok-Köhn, Suresh W. Gosavi, Ratna Chauhan,* Muthupandian Ashokkumar, Abhinav Kumar* and Mohd. Muddassir



6433

Defect-engineered metal–organic frameworks (MOF-808) towards the improved adsorptive removal of organic dyes and chromium (vi) species from water

Khoa D. Nguyen, Nhi T. Vo, Khanh T. M. Le, Khanh V. Ho, Nam T. S. Phan, Phuoc H. Ho* and Ha V. Le*



6448

A novel electrochemical sensor based on an Fe–N–C/AuNP nanohybrid for rapid and sensitive gallic acid detection

Wanqing Zhang,* Xijiao Li, Xinxin Hu, Chunxiang Li, Shanqin Liu, Jingjing Ma, Jichao Wang,* Renlong Li, Qing Wang, Xiaoman Ding and Zhiyuan Wang*

