

Dalton Transactions

An international journal of inorganic chemistry incorporating Acta Chemica Scandinavica
rsc.li/dalton

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 1477-9226 CODEN DTARAF 52(27) 9173–9512 (2023)



Cover

See Dominique Matt et al.,
pp. 9202–9207.

Image reproduced by
permission of
Dominique Matt from
Dalton Trans., 2023, **52**,
9202.



Inside cover

See Zhenxia Chen,
Mingli Deng et al.,
pp. 9208–9214.

Image reproduced by
permission of Zhenxia Chen
from *Dalton Trans.*, 2023, **52**,
9208.

EDITORIAL

9186

Spotlight collection on photoinduced redox chemistry

Paul I. P. Elliott,* Katja Heinze and Thomas S. Teets

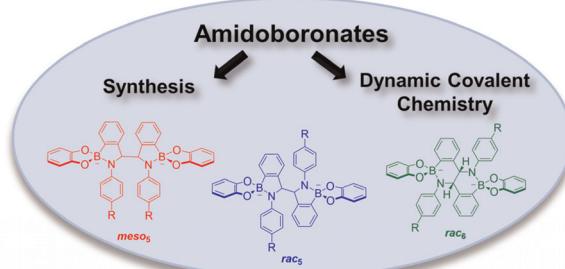


PERSPECTIVE

9189

Amidoboronates: bringing together the synthesis of BN-heterocycles via a reductive coupling and dynamic covalent chemistry

Anna J. McConnell



Dalton Transactions

An international journal for high quality, original research in inorganic and organometallic chemistry incorporating *Acta Chemica Scandinavica*

rsc.li/dalton

Editorial Staff

Executive Editor

Sally Howells-Wyllie

Deputy Editor

Mike Andrews

Development Editors

Michelle Canning, Emily Cuffin-Munday

Editorial Production Manager

Susannah Davies

Publishing Editors

Debra 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 dalton@rsc.org

For pre-submission queries please contact

Sally Howells-Wyllie, Editor.
Email dalton-rsc@rsc.org

Dalton Transactions (electronic: ISSN 1477-9234) 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: £4441; US\$7972. 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/iph

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

Editorial Board

Chair

Russell Morris, University of St Andrews, UK

Associate Editors

Paola Ceroni, University of Bologna, Italy
Vadapalli Chandrasekhar, Indian Institute of Technology Kanpur, India
Maarit Karpinnen, Aalto University, Finland
Mi Hee Lim, Korea Advanced Institute of

Science and Technology, South Korea

Neal Mankad, University of Illinois at Chicago, USA
Warren Piers, University of Calgary, Canada
Wolfgang Tremel, Johannes Gutenberg-Universität, Germany
Takashi Uemura, University of Tokyo, Japan
Li-Min Zheng, Nanjing University, China

Members

Jaqueline Kiplinger, Los Alamos National Laboratory, USA
Sascha Ott, Uppsala University, Sweden

Advisory Board

Simon Aldridge, University of Oxford, UK	William Evans, University of California, Irvine, USA	Seiji Ogo, Kyushu University, Japan
Santiago Alvarez, University of Barcelona, Spain	Harry B. Gray, California Institute of Technology, USA	Chris Orvig, University of British Columbia, Canada
John Arnold, University of California, Berkeley, USA	Zijian Guo, Nanjing University, China	Gerard Parkin, Columbia University, USA
Mu-Hyun Baik, KAIST, Korea	Michael Hayward, University of Oxford, UK	Eric Rivard, University of Alberta, Canada
Jitendra Bera, IIT Kanpur, India	Todd W. Hudnall, Texas State University, USA	Douglas Stephan, University of Toronto, Canada
Ezster Borbas, Uppsala University, Sweden	Ilich Ibarra, National Autonomous University of Mexico, Mexico	Matthias Tamm, Technische Universität Braunschweig, Germany
Holger Braunschweig, Universität Würzburg, Germany	Cameron Jones, Monash University, Australia	Jinkui Tang, Changchun Institute of Applied Chemistry, China
Xian-He Bu, Nankai University, China	Masako Kato, Hokkaido University, Japan	Thomas Teets, University of Houston, USA
Raffaella Buonsanti, École Polytechnique Fédérale de Lausanne, Switzerland	Takahiko Kojima, University of Tsukuba, Japan	Christine Thomas, The Ohio State University, USA
Claire Carmalt, University College London, UK	Jian-Ping Lang, Suzhou University, China	Ajay Venugopal, Indian Institute of Science Education and Research Thiruvananthapuram, India
Eric Clot, Université de Montpellier 2, France	Jennifer Love, University of British Columbia, Canada	Claudio N. Verani, Wayne State University, USA
Catherine Constable-Housecroft, University of Basel, Switzerland	Stuart Macgregor, Heriot Watt University, UK	Wai-Yeung Wong, Hong Kong Baptist University, China
Amitava Das, Indian Institute of Science and Education Research Kolkata, India	Celia Machado Ronconi, Federal Fluminense University, Brazil	Zhiguo Xia, South China University of Technology, China
Jillian Dempsey, University of North Carolina, USA	Laurent Maron, Université de Toulouse, France	Zuowei Xie, Chinese University of Hong Kong, China
Anjana Devi, Ruhr-University Bochum, Germany	Ellen Matson, Rochester University, USA	Lin Xu, East China Normal University, China
Rasika Dias, University of Texas at Arlington, USA	Marinella Mazzanti, Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland	
Jairton Dupont, University of Nottingham, UK	Nils Metzler-Nolte, Ruhr-Universität Bochum, Germany	
	Barbara Milani, Università di Trieste, Italy	
	Georgii Nikonov, Brock University, Canada	

Information for Authors

Full details on how to submit material for publication in Dalton Transactions 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/dalton

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

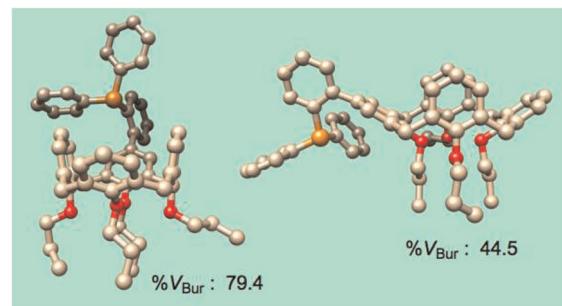


PAPERS

9202

Structural and conformational analysis of a biaryl phosphine integrating a calix[4]arene cavity. Can the phosphorus atom behave as an introverted donor?

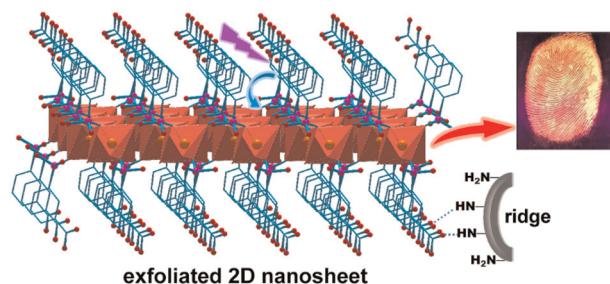
Christophe Gourlaouen, Fethi Elaieb, Eric Brenner, Dominique Matt,* Jack Harrowfield and Louis Ricard



9208

Nanosheets of two-dimensional photoluminescent lanthanide phosphonocarboxylate frameworks decorated with free carboxylic groups for latent fingerprint imaging

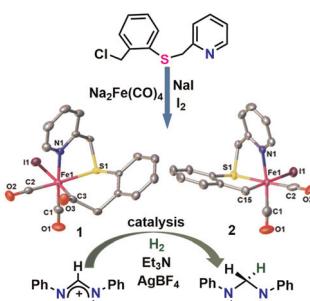
Dan Luo, Hongjie He, Huiru Jing, Yun Ling, Yu Jia, Yongtai Yang, Xiaofeng Liu, Zhenxia Chen* and Mingli Deng*



9215

Structural and functional biomimetics of [Fe]-hydrogenase featuring a mono-, di- or tetrasubstituted pyridine ligand with a *fac*-C, N, and S ligation

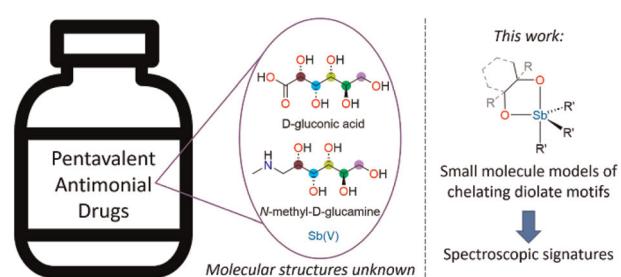
Li-Cheng Song,* Zhen-Qing Zhang and Bei-Bei Liu



9229

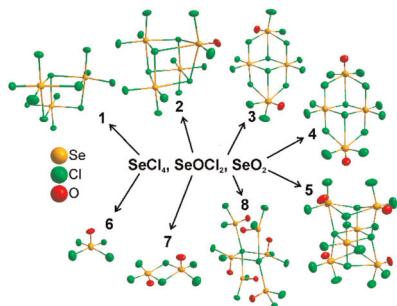
Models of the putative antimony(V)–diolate motifs in antileishmanial pentavalent antimonial drugs

Brent Lindquist-Kleissler and Timothy C. Johnstone*



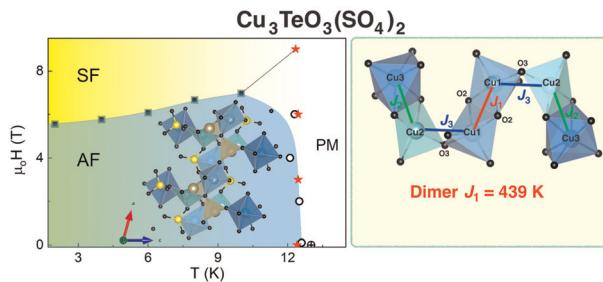
PAPERS

9238


Oxychloridoselenites(IV) with cubane-derived anions and stepwise chlorine-to-oxygen exchange

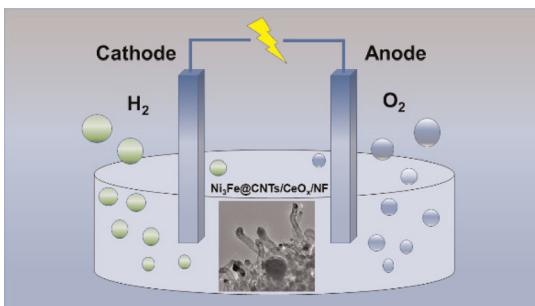
Maxime A. Bonnin and Claus Feldmann*

9247


Anhydrous copper tellurite disulfate $\text{Cu}_3\text{TeO}_3(\text{SO}_4)_2$ featuring the coexistence of spin singlets and a long-range antiferromagnetic order

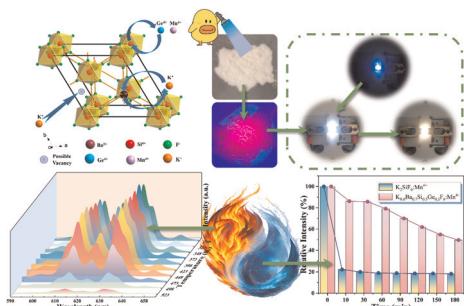
Alisher F. Murtazoev, Peter S. Berdonosov, Konstantin A. Lyssenko, Valery A. Dolgikh, Zlata V. Pchelkina, Konstantin V. Zakharov, Michael Y. Geidorf, Tatyana M. Vasilchikova, Olga S. Volkova and Alexander N. Vasiliev*

9254


A low-content CeO_x dually promoted $\text{Ni}_3\text{Fe}@\text{CNT}$ electrocatalyst for overall water splitting

Mingqi Sun, Shuai Zhang, Yaru Li, Chen Yang, Ying Guo,* Lan Yang and Sailong Xu*

9261


Crystal field optimization and fluorescence enhancement of a Mn^{4+} -doped fluoride red phosphor with excellent stability induced by double-site metal ion replacement for warm WLED

Junze Tong, Feng Hong,* Long Li, Edwin Yue Bun Pun and Hai Lin*

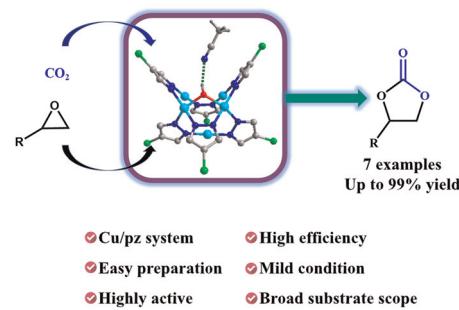


PAPERS

9275

An efficient mixed-valence copper pyrazolate catalyst for the conversion of carbon dioxide and epoxides into cyclic carbonates

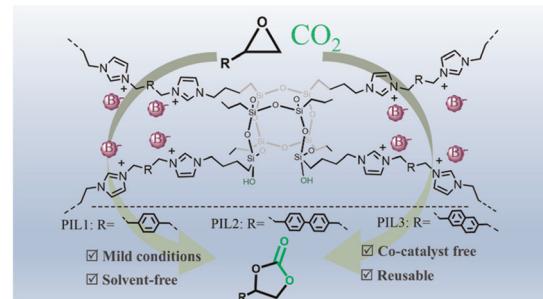
Jian-Ge Wang, Yang Liu, Chun-Mei Liu, Jing-Huo Chen* and Guang Yang*



9282

POSS-based polyionic liquids for efficient CO₂ cycloaddition reactions under solvent- and cocatalyst-free conditions at ambient pressure

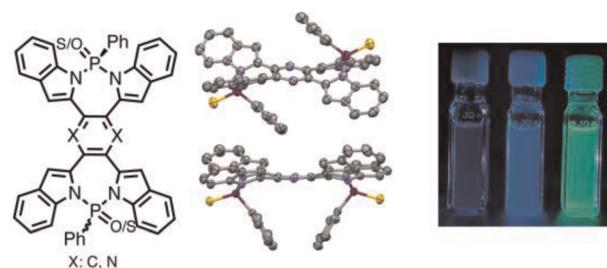
Longqiang Xiao, Yiming Lai, Qianyu Song, Jingyu Cai,* Rui Zhao* and Linxi Hou*



9294

Synthesis, post-functionalization, and photoluminescence of contorted diazaphosphepine-based polycyclic aromatic heterocycles

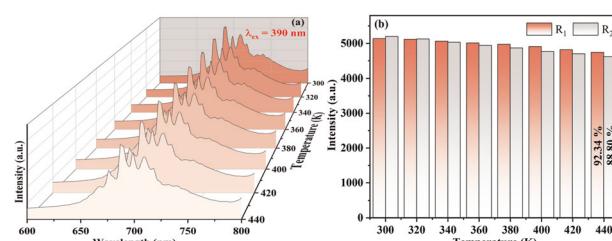
Can Li, Kai Yang, Xinyu Li, Shuya Wen, Na Yu and Yi Ren*



9301

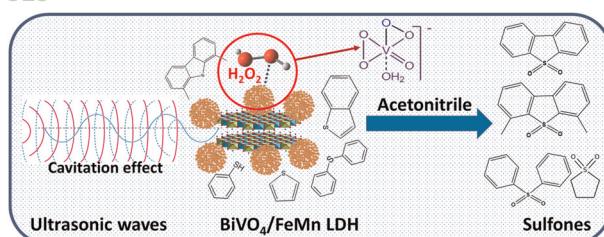
A far-red-emitting ZnAl_{1.95}Cr_{0.05}O₄ phosphor for plant growth LED applications

I. Elhamdi,* F. Mselmi, S. Kammoun, E. Dhahri, A. J. Carvalho, P. Tavares and B. F. O. Costa



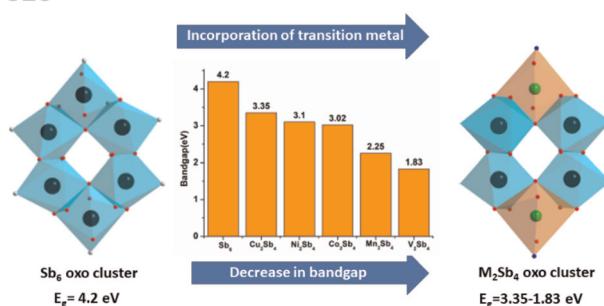
PAPERS

9315

**Sonocatalytic oxidative desulfurization of diesel oil using a novel $\text{BiVO}_4/\text{FeMn}$ LDH nanocomposite**

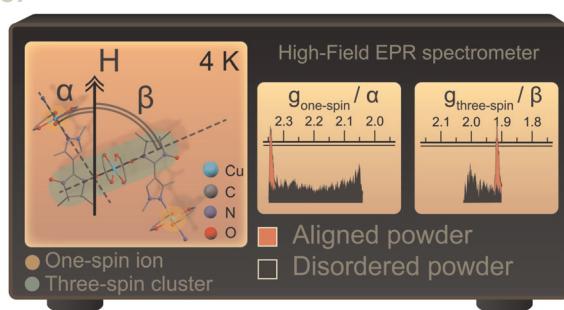
Asmaa A. Abdelrahman, Doaa I. Osman, Abdelrahman M. Rabie* and Heba M. Salem*

9328

**Tunable bandgaps in self-assembled transition metal-incorporated heterometallic M_2Sb_4 ($\text{M} = \text{V, Mn, Co, Ni, and Cu}$) oxo clusters**

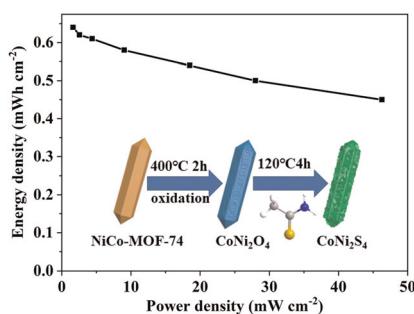
Tokala Navaneetha, Uppara Ugandhar, Calvin Samuel, Thierry Guizouarn, Fabrice Pointillart, Rajamani Raghunathan* and Viswanathan Baskar*

9337

**High-field EPR of copper(II)-nitroxide compound exhibiting three-step phase transition: structural insights from the field-induced sample orientation**

Sergey V. Tumanov,* Alexey N. Ponomaryov, Kseniya Yu. Maryunina, Artem S. Bogomyakov, Victor I. Ovcharenko, Sergei A. Zvyagin, Matvey V. Fedin and Sergey L. Veber*

9346

**Controlled preparation of CoNi_2S_4 nanorods derived from MOF-74 nanoarrays involving an exchange reaction for high energy density supercapacitors**

Qihang Chen, Wennan Zhao,* Zihao Huang, Guochang Li, Kai Tao and Lei Han*

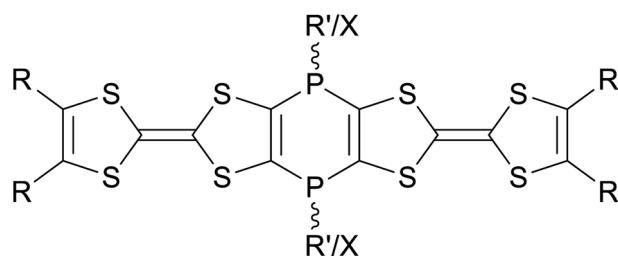


PAPERS

9356

Access to and reactions of P-functional 1,4-dihydro-1,4-diphosphinines fused to two TTF units

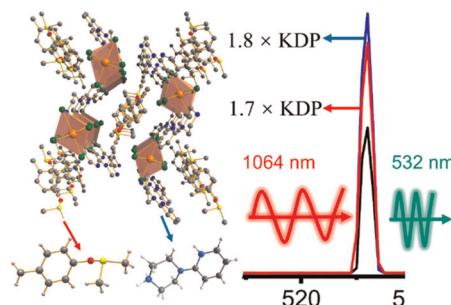
Shahriar Kermanshahian, Tim Kalisch, Zsolt Kelemen, Gregor Schnakenburg, László Nyulászi,* René T. Boeré* and Rainer Streubel*



9368

Second harmonic generation from symmetry breaking stimulated by mixed organic cations in zero-dimensional hybrid metal halides

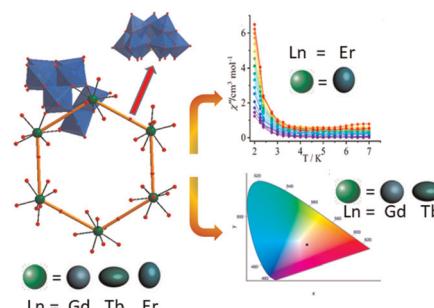
Jindong Cao, Kunjie Liu, Mingzhen Quan, An Hou, Xingxing Jiang,* Zheshuai Lin,* Jing Zhao* and Quanlin Liu



9377

[α -AsW₉O₃₃]⁹⁻ bridged hexagonal clusters of Ln(III) showing field induced SMM behavior: experimental and theoretical insight

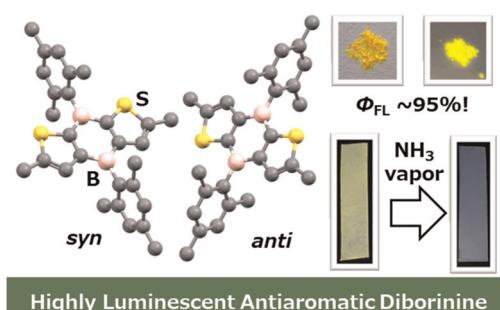
Sandhya Kapurwan, Pradip Kumar Sahu, Mukul Raizada, Ranjan Kharel and Sanjit Konar*



9389

Highly luminescent antiaromatic diborinines with fused thiophene rings

Yohei Adachi,* Takumi Hasegawa and Joji Ohshita*

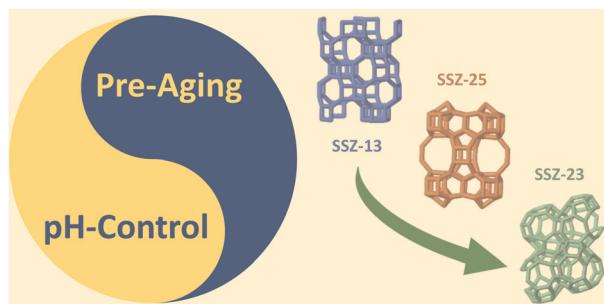


Highly Luminescent Antiaromatic Diborinine



PAPERS

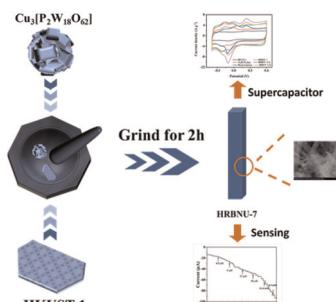
9398



Facile synthesis of aluminosilicate zeolites with STT, CHA and MWW topology structures

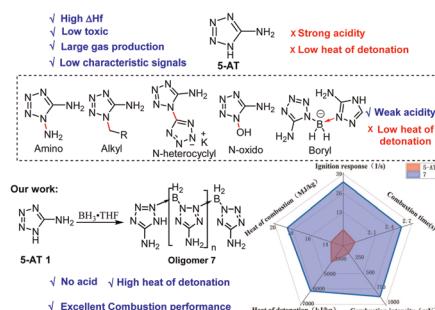
Yuliang Guo, Peilun Li, Zhengchang Wei, Guangjun Wu* and Landong Li*

9406

A host–guest compound formed by $\text{Cu}_3[\text{P}_2\text{W}_{18}\text{O}_{62}]$ and HKUST-1 with capacitance and H_2O_2 sensing properties

Caihong Shi, Shan Di, Hongquan Jiang,* Chunxiao Wang, Chunmei Wang, Kai Yu,* Jinghua Lv and Baibin Zhou*

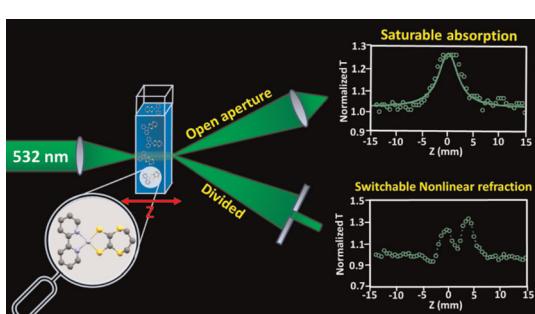
9414



Performance enhancement strategy for tetrazoles based on nitrogen–boron bonds

Kunkai Wang, Kaidi Yang, Heng Li, Junlin Zhang, Minjie Wu, Xiangzhi Li, Qi Xue, Bozhou Wang* and Fuqiang Bi*

9423



A new class of third-order nonlinear optical materials: laser pulse-duration dependant saturable absorption and nonlinear refraction in platinum(II) diimine-dithiolate complexes

Anna Pintus,* Cristian Pilloni, Gabriele Pippa, Enrico Podda, M. Carla Aragoni, Vito Lippolis, Panagiotis Aloukos, Dionysios Potamianos, Nikolaos Chazapis, Stelios Couris,* George C. Anyfantis, Alexandra M. Z. Slawin, J. Derek Woollins and Massimiliano Arca*

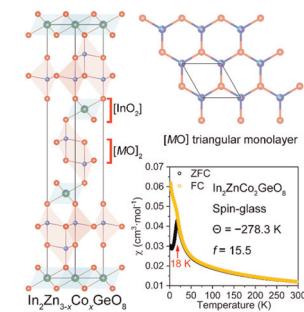


PAPERS

9433

Rational design, crystal structure, and frustrated magnetism of the Ge-containing YbFe_2O_4 -type layered oxides $\text{In}_2\text{Zn}_{3-x}\text{Co}_x\text{GeO}_8$ ($0 \leq x \leq 3$)

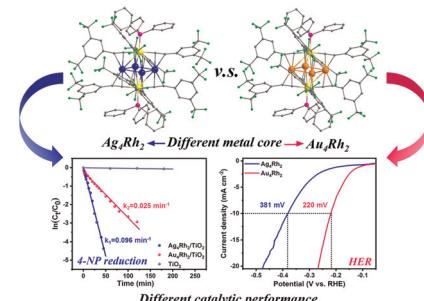
Yuhan Wu, Pengfei Jiang* and Tao Yang*



9441

Structure, optical properties, and catalytic applications of alkynyl-protected M_4Rh_2 ($\text{M} = \text{Ag}/\text{Au}$) nanoclusters with atomic precision: a comparative study

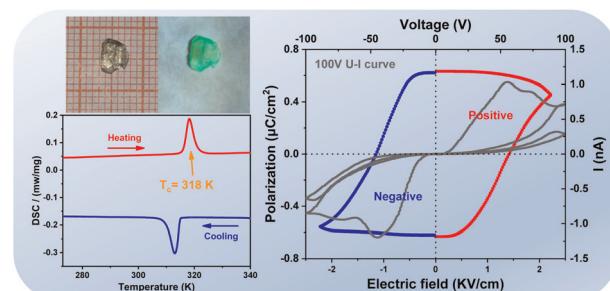
Leyi Chen, Fang Sun, Quanli Shen, Lei Wang, Yonggang Liu, Hao Fan, Qing Tang and Zhenghua Tang*



9448

A room temperature ferroelectric material with photoluminescence: $(1,3\text{-dicyclohexylimidazole})_2\text{MnCl}_4$

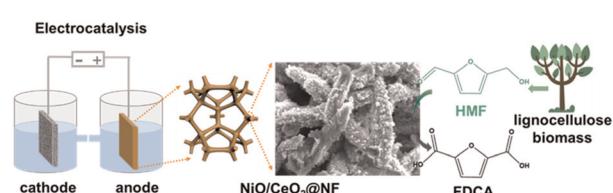
Peng Chen, Shulin Jiao, Zheng Tang, Xiaofan Sun, Dong Li, Zhu Yang, Yanzhou Lu, Wentao Zhang, Hong-Ling Cai* and X. S. Wu



9456

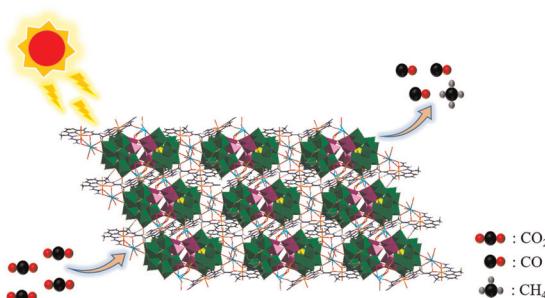
Interface engineering of the $\text{NiO}/\text{CeO}_2@\text{NF}$ heterostructure to boost the electro-oxidation of 5-hydroxymethylfurfural

Xiu He, ZhenZhen Mo,* Huiling Liu* and Cheng Wang



PAPERS

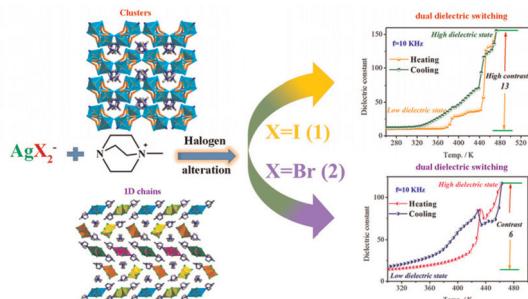
9465



Two bimetal-doped (Fe/Co, Mn) polyoxometalate-based hybrid compounds for visible-light-driven CO_2 reduction

Jiu-Lin Zhou, Xin-Ying Xiang, Ling-Tong Xu, Ji-Lei Wang, Si-Man Li, Ya-Ting Yu, Hua Mei* and Yan Xu*

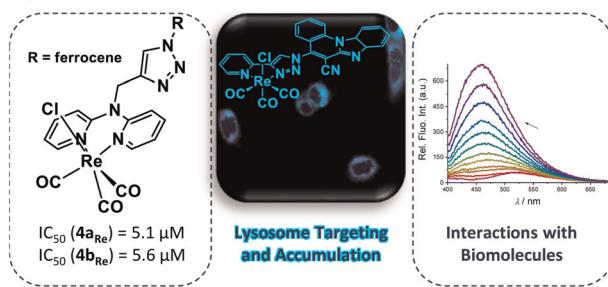
9472



Organic–inorganic haloargentate hybrids of $[\text{Me-dabco}]\text{Ag}_2\text{X}_3$ ($\text{X} = \text{I}$ or Br) with halide ions manipulating the crystal structure, phase transition, and dielectric behavior

Xue-Wei Pan, Qing-Qing Li, Lu Zhai,* Jin Zhang, Wen-Long Liu and Xiao-Ming Ren*

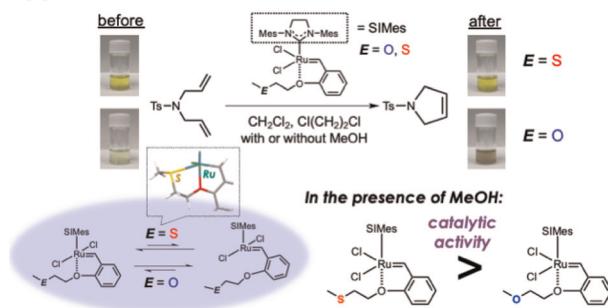
9482



Synthesis, characterisation and biological evaluation of monometallic Re(I) and heterobimetallic Re(I)/Fe(II) complexes with a 1,2,3-triazolyl pyridine chelating moiety

Silvio Jakopec, Lisa Gourdon-Grünwaldt, Ivona Čipor, Andrijana Mešić Macan, Berislav Perić, Ivo Piantanida, Kevin Cariou, Gilles Gasser,* Srećko I. Kirin* and Silvana Raić-Malić*

9499



Reactivity regulation for olefin metathesis-catalyzing ruthenium complexes with sulfur atoms at the terminal of 2-alkoxybenzylidene ligands

Tsubasa Kinugawa and Takashi Matsuo*



RETRACTION

9509

Retraction: Bis-salophen palladium complex immobilized on $\text{Fe}_3\text{O}_4@\text{SiO}_2$ nanoparticles as a highly active and durable phosphine-free catalyst for Heck and copper-free Sonogashira coupling reactions

Ali Reza Sardarian,* Milad Kazemnejadi and Mohsen Esmaeilpour

