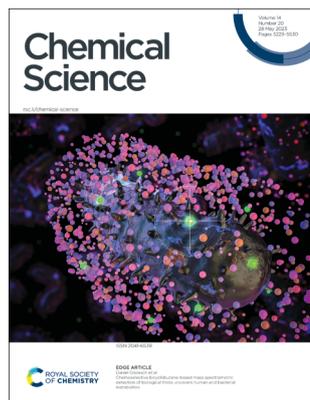


## IN THIS ISSUE

ISSN 2041-6539 CODEN CSHCBM 14(20) 5229–5530 (2023)



**Cover**  
See Daniel Globisch *et al.*, pp. 5291–5301. Image reproduced by permission of Daniel Globisch from *Chem. Sci.*, 2023, 14, 5291.



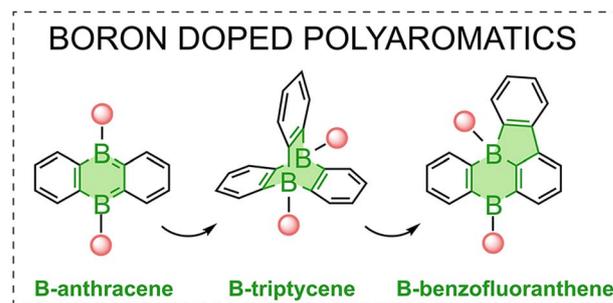
**Inside cover**  
See Yosuke Tani *et al.*, pp. 5302–5308. Image reproduced by permission of Mao Komura from *Chem. Sci.*, 2023, 14, 5302.

## COMMENTARY

5241

### A focus on anionic boron anthracenes and triptycenes as entry point toward B-doped polyaromatic materials and Lewis acids

Guillaume Berionni\*

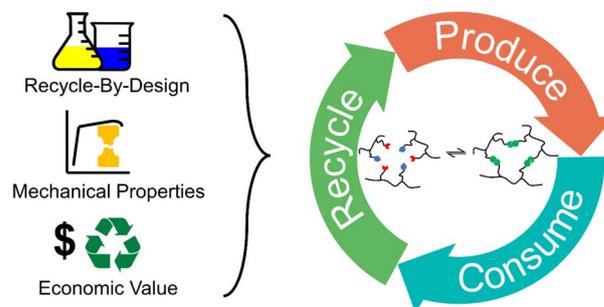


## REVIEWS

5243

### Circularity in polymers: addressing performance and sustainability challenges using dynamic covalent chemistries

Tianwei Yan, Alex H. Balzer, Katie M. Herbert,\* Thomas H. Epps, III\* and LaShanda T. J. Korley\*



## Editorial Staff

### Executive Editor

May Copsy

### Deputy Editor

Samantha Apps

### Senior Editor

James Moore

### Scientific Editors

Ellis Crawford, Jingtao Huang, Esther Johnston, Sophie Orchard, Richard Thompson and Amy Welch

### Editorial Assistant

Karina Webster

### Publishing Assistant

David Bishop

For queries about submitted articles please contact James Moore, Senior Editor, in the first instance. E-mail [chemicalscience@rsc.org](mailto:chemicalscience@rsc.org)

For pre-submission queries please contact May Copsy, Executive Editor. E-mail [chemicalscience-rsc@rsc.org](mailto:chemicalscience-rsc@rsc.org)

Chemical Science (electronic: ISSN 2041-6539) is published 48 times a year by the Royal Society of Chemistry, Thomas Graham House, Science Park, Milton Road, Cambridge, CB4 0WF, UK.

Chemical Science is a Gold Open Access journal and all articles from 2015 onwards are free to read.

Please email [orders@rsc.org](mailto: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 0WF, UK

Tel +44 (0)1223 432398; E-mail [orders@rsc.org](mailto: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](mailto:advertising@rsc.org)

For marketing opportunities relating to this journal, contact [marketing@rsc.org](mailto:marketing@rsc.org)

# Chemical Science

[rsc.li/chemical-science](http://rsc.li/chemical-science)

## Editorial Board

### Editor-in-Chief

Andrew Cooper, University of Liverpool

### Associate Editors

Vincent Artero, CEA-Grenoble  
Luis M. Campos, Columbia University  
Michelle Chang, University of California, Berkeley  
Lin X. Chen, Northwestern University  
Graeme Day, University of Southampton  
Serena DeBeer, Max Planck Institute for Chemical Energy Conversion

Mircea Dincă, MIT

Vy Dong, University of California, Irvine  
François Gabbai, Texas A&M University  
Subi George, JNCASR  
Jinlong Gong, Tianjin University  
Stephen Goldup, University of Birmingham  
Zaiping Guo, University of Adelaide  
Christopher A. Hunter, University of Cambridge  
Malika Jefferies-EL, Boston University  
Ning Jiao, Peking University  
Tanja Junkers, Monash University

Hemamala Karunadasa, Stanford University  
Maja Köhn, University of Freiburg  
Yi-Tao Long, Nanjing University  
Gabriel Merino, CINVESTAV Merida  
James K. McCusker, Michigan State University  
Thomas Meade, Northwestern University  
Paolo Melchiorre, University of Bologna  
Carsten Schultz, Oregon Health & Science University  
Dmitri Talapin, The University of Chicago  
Toshiharu Teranishi, Kyoto University  
Andrei Yudin, University of Toronto

## Advisory Board

Dave Adams, University of Glasgow  
Ayyappanpillai Ajayaghosh, NIIST  
Ulf-Peter Apfel, Ruhr-University Bochum  
Polly Arnold, University of California, Berkeley  
Xinhe Bao, Dalian Institute of Chemical Physics  
Zhenan Bao, Stanford University  
Gonçalo Bernardes, University of Cambridge  
Frank Biedermann, Karlsruhe Institute of Technology  
Donna Blackmond, Scripps Research Institute  
Jeffrey Bode, ETH Zurich  
Jennifer S. Brodbelt, University of Texas at Austin, USA  
Christopher Chang, University of California, Berkeley  
Chi-Ming Che, University of Hong Kong  
Jun Chen, Nankai University  
R. Graham Cooks, Purdue University  
Christophe Copéret, ETH Zurich  
Eugenio Coronado, University of Valencia  
Leroy Cronin, University of Glasgow  
James Crowley, University of Otago  
Christopher C. Cummins, Massachusetts Institute of Technology  
Ben Davis, University of Oxford  
Jillann Dempsey, University of North Carolina at Chapel Hill  
Kazunari Domen, University of Tokyo  
James Durrant, Imperial College London  
Xinlang Feng, TU Dresden  
Ben Feringa, University of Groningen  
Makoto Fujita, University of Tokyo  
Phillip Gale, University of Technology Sydney  
Song Gao, Peking University  
Jeremiah Gassensmith, University of Texas at Dallas  
Elizabeth Gibson, Newcastle University  
Ryan Gilmour, WWU Münster  
Hubert Girault, EPFL  
Frank Glorius, WWU Münster  
Leticia González, University of Vienna  
Duncan Graham, University of Strathclyde

Vicki Grassian, University of California, San Diego  
Alexis Grimaud, Boston College  
Christian Hackenberger, FMP Berlin  
Buxing Han, Chinese Academy of Sciences  
Christy Haynes, University of Minnesota  
Patrick Holland, Yale University  
Kim Jelfs, Imperial College London  
Yousung Jung, KAIST  
Stephanie Kath-Schorr, University of Cologne  
Takashi Kato, University of Tokyo  
Christopher Kelly, Janssen Research & Development  
Jérôme Lacour, University of Geneva  
Ai-Lan Lee, Heriot-Watt University  
Daniele Leonori, RWTH Aachen University  
Chao-Jun Li, McGill University  
Yi Li, Jilin University  
R. Graham Cooks, KAIST  
Wenbin Lin, University of Chicago  
Kopin Liu, Academia Sinica  
Watson Loh, UNICAMP  
Bettina Lotsch, Max Planck Institute  
Xiong Wen (David) Lou, Nanyang Technological University  
Kazuhiko Maeda, Tokyo Institute of Technology  
Satoshi Maeda, Hokkaido University  
Swadhin Mandal, IISER Kolkata  
Ellen Matson, University of Rochester  
Scott Miller, Yale University  
Daniel Minciola, University of Pennsylvania  
Wonwoo Nam, Ewha Womans University  
Jonathan Nitschke, University of Cambridge  
Allie Obermeyer, Columbia University  
Martin Oestreich, Technical University of Berlin  
Takashi Ooi, Nagoya University  
Rachel O'Reilly, University of Birmingham  
Oleg Ozerov, Texas A&M University  
Xiulian Pan, Dalian Institute of Chemical Physics  
Nicolas Plummer, Technical University of

Munich  
Rasmita Raval, University of Liverpool  
Erwin Reisner, University of Cambridge  
Andrea Rentmeister, WWU Münster  
Jeffrey Rinehart, University of California, San Diego  
Stuart Rowan, University of Chicago  
Richmond Sarpong, University of California, Berkeley  
Danielle Schultz, Merck  
Dwight Seferos, University of Toronto  
Oliver Seitz, Humboldt University of Berlin  
Roberta Sessoli, University of Florence  
Kay Severin, Federal Polytechnic School of Lausanne  
Mikiko Sodeoka, RIKEN  
Galo Soler-Illia, Universidad Nacional de San Martín  
David Spring, University of Cambridge  
Brian Stoltz, California Institute of Technology  
Brent Sumriner, University of Florida  
Raghavan B. Sunoj, IIT Bombay  
Yogesh Surendranath, MIT  
Mizuki Tada, Nagoya University  
Ben Zhong Tang, The Hong Kong University of Science and Technology  
Zhiyong Tang, National Center for Nanoscience and Nanotechnology  
Christine Thomas, Ohio State University  
He Tian, East China University of Science & Technology  
Zhong-Qun Tian, Xiamen University  
F. Dean Toste, University of California, Berkeley  
Takashi Uemura, University of Tokyo  
Jan van Hest, Radboud University  
Latha Venkataraman, Columbia University  
Chu Wang, Peking University  
Julia Weinstein, University of Sheffield  
Tom Welton, Imperial College London  
Charlotte Williams, University of Oxford  
Vivian Yam, University of Hong Kong  
Qi-Lin Zhou, Nankai University  
Jenny Zhang, University of Cambridge

## Information for Authors

Full details on how to submit material for publication in Chemical Science 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/chemical-science](http://rsc.li/chemical-science)

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.

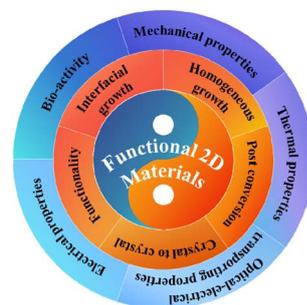
Registered charity number: 207890



5266

## Design, synthesis, and application of some two-dimensional materials

Luwei Zhang, Ning Wang\* and Yuliang Li\*

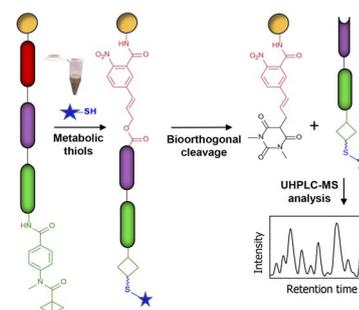


## EDGE ARTICLES

5291

## Chemoselective bicyclobutane-based mass spectrometric detection of biological thiols uncovers human and bacterial metabolites

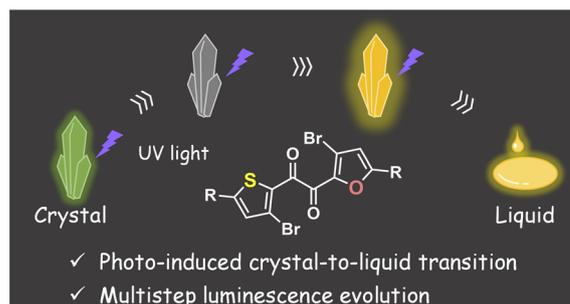
Amanpreet Kaur, Weifeng Lin, Vladyslav Dovhalyuk, Léna Driutti, Maria Letizia Di Martino, Miroslav Vujanovic, J.-Matthias Löhr, Mikael E. Sellin and Daniel Globisch\*



5302

## Photoinduced crystal melting with luminescence evolution based on conformational isomerisation

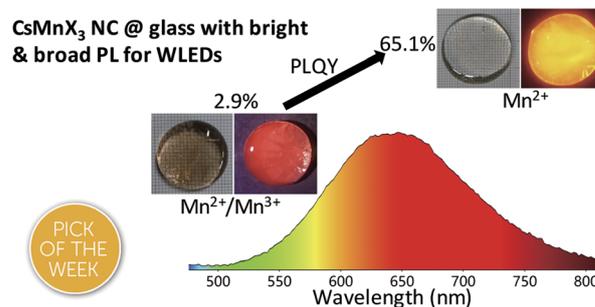
Mao Komura, Hikaru Sotome, Hiroshi Miyasaka, Takuji Ogawa and Yosuke Tani\*



5309

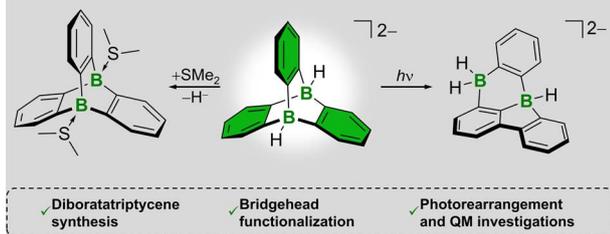
## Solid-state synthesis of cesium manganese halide nanocrystals in glass with bright and broad red emission for white LEDs

Guangyong Xu, Chuying Wang, Yacong Li, Wen Meng, Guigen Luo, Min Peng, Bin Xu and Zhengtao Deng\*



5316

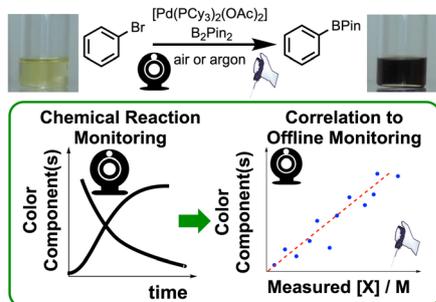
## 9,10-Diboratatriptycene



## Synthesis, bridgehead functionalization, and photoisomerization of 9,10-diboratatriptycene dianions

Sven E. Prey, Jannik Gilmer, Samira V. Teichmann, Luis Čaić, Mischa Wenisch, Michael Bolte, Alexander Virovets, Hans-Wolfram Lerner, Felipe Fantuzzi and Matthias Wagner\*

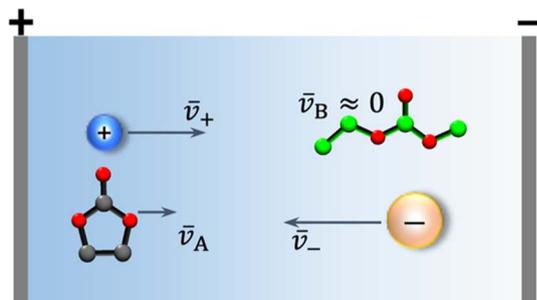
5323



## Computer vision for non-contact monitoring of catalyst degradation and product formation kinetics

Chunhui Yan, Megan Cowie, Calum Howcutt, Katherine M. P. Wheelhouse, Neil S. Hodnett, Martin Kollie, Martin Gildea, Martin H. Goodfellow and Marc Reid\*

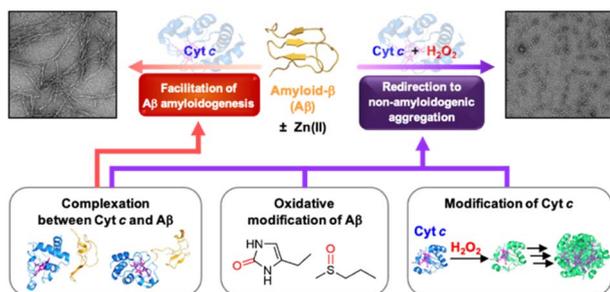
5332



## Quantifying selective solvent transport under an electric field in mixed-solvent electrolytes

Chao Fang, David M. Halat, Aashutosh Mistry, Jeffrey A. Reimer, Nitash P. Balsara and Rui Wang\*

5340



## Unveiling the impact of oxidation-driven endogenous protein interactions on the dynamics of amyloid-β aggregation and toxicity

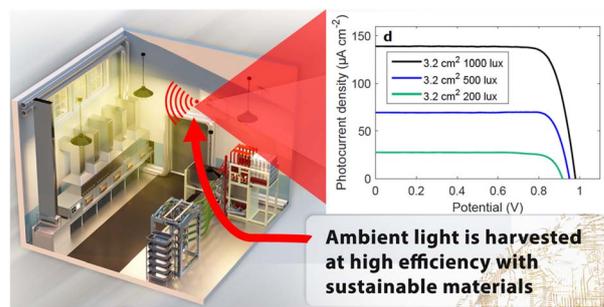
Zhi Du, Eunju Nam, Yuxi Lin, Mannkyu Hong, Tamás Molnár, Ikufumi Kondo, Koichiro Ishimori, Mu-Hyun Baik, Young-Ho Lee\* and Mi Hee Lim\*



5350

## Emerging indoor photovoltaics for self-powered and self-aware IoT towards sustainable energy management

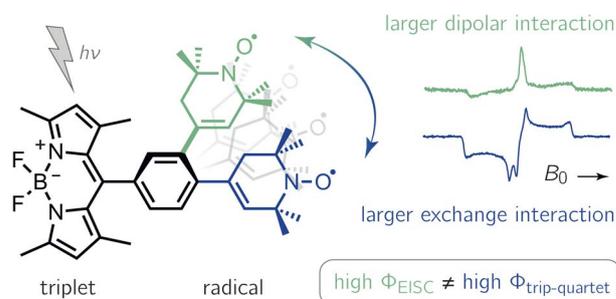
Hannes Michaels, Michael Rinderle, Iacopo Benesperi, Richard Freitag, Alessio Gagliardi and Marina Freitag\*



5361

## Distance dependence of enhanced intersystem crossing in BODIPY–nitroxide dyads

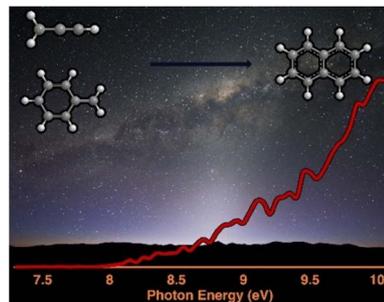
Maximilian Mayländer, Theresia Quintes, Michael Franz, Xavier Allonas, Andreas Vargas Jentzsch\* and Sabine Richert\*



5369

## Unconventional gas-phase preparation of the prototype polycyclic aromatic hydrocarbon naphthalene (C<sub>10</sub>H<sub>8</sub>) via the reaction of benzyl (C<sub>7</sub>H<sub>7</sub>) and propargyl (C<sub>3</sub>H<sub>3</sub>) radicals coupled with hydrogen-atom assisted isomerization

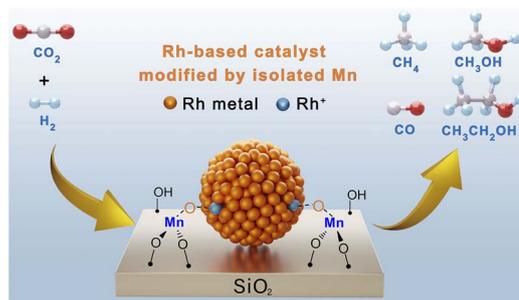
Chao He, Ralf I. Kaiser,\* Wenchao Lu, Musahid Ahmed,\* Vladislav S. Krasnoukhov, Pavel S. Pivovarov, Marsel V. Zagidullin, Valeriy N. Azyazov, Alexander N. Morozov and Alexander M. Mebel\*



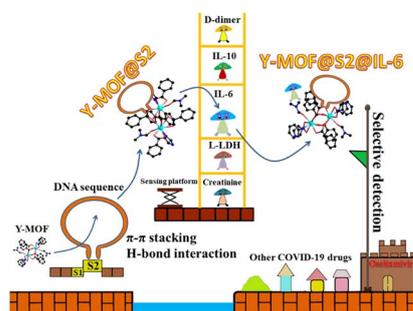
5379

## The promotional role of Mn in CO<sub>2</sub> hydrogenation over Rh-based catalysts from a surface organometallic chemistry approach

Wei Zhou, Scott R. Docherty, Christian Ehinger, Xiaoyu Zhou and Christophe Copéret\*



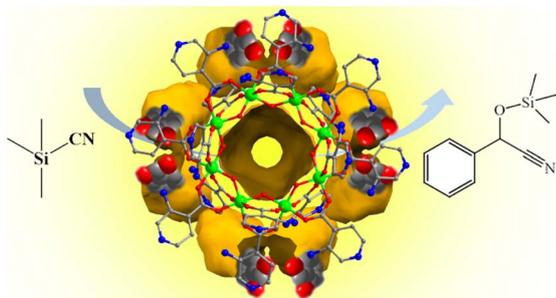
5386



### A MOF/DNA luminescent sensing platform for detection of potential COVID-19 biomarkers and drugs

Xinrui Wang, Gilles Clavier, Yan Zhang, Kamal Batra, Nanan Xiao, Guillaume Maurin, Bin Ding,\* Antoine Tissot\* and Christian Serre\*

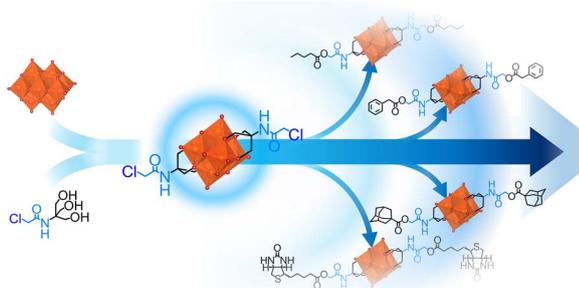
5396



### Accurate binding of porous aluminum molecular ring catalysts with the substrate

Dan Luo, Han Xiao, Min-Yi Zhang, Shang-Da Li, Liang He, Hong Lv, Chun-Sen Li, Qi-Pu Lin, Wei-Hui Fang\* and Jian Zhang

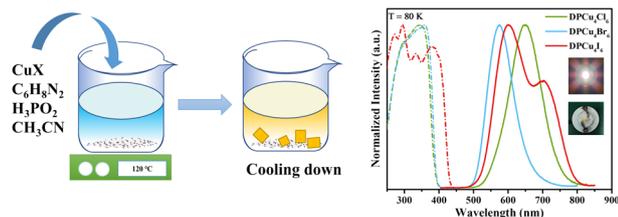
5405



### Rational synthesis of elusive organic-inorganic hybrid metal-oxo clusters: formation and post-functionalization of hexavanadates

David E. Salazar Marcano, Givi Kalandia, Mhamad Aly Moussawi, Kristof Van Hecke and Tatjana N. Parac-Vogt\*

5415



### Photophysical studies for Cu(I)-based halides: broad excitation bands and highly efficient single-component warm white-light-emitting diodes

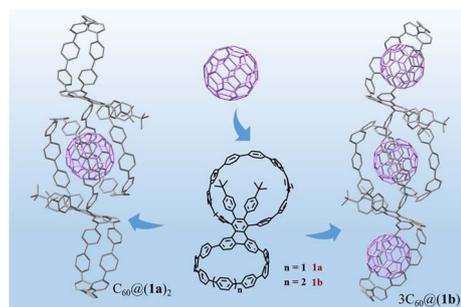
Shuigen Zhou, Yihao Chen, Kailei Li, Xiaowei Liu, Ting Zhang, Wei Shen, Ming Li, Lei Zhou\* and Rongxing He\*



5425

### Regulating supramolecular interactions in dimeric macrocycles

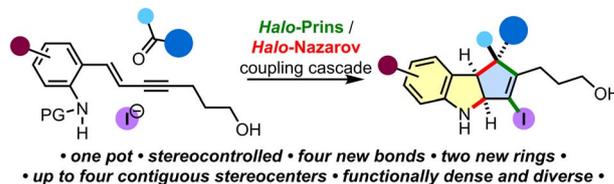
Pengwei Fang, Muqing Chen,\* Nan Yin, Guilin Zhuang,\* Tianyun Chen, Xinyu Zhang and Pingwu Du\*



5431

### Nitrogen-interrupted halo-Prins/halo-Nazarov fragment coupling cascade for the synthesis of indolines

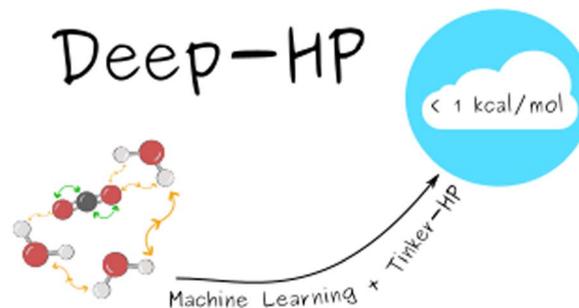
Aleksa Milosavljevic, Connor Holt and Alison J. Frontier\*



5438

### Scalable hybrid deep neural networks/polarizable potentials biomolecular simulations including long-range effects

Théo Jaffrelot Inizan, Thomas Plé, Olivier Adjoua, Pengyu Ren, Hatice Gökcan, Olexandr Isayev, Louis Lagardère and Jean-Philip Piquemal\*



5453

### A redox-active inorganic crown ether based on a polyoxometalate capsule

Nanako Tamai, Naoki Ogiwara, Eri Hayashi, Keigo Kamata, Toshiyuki Misawa, Takeru Ito, Tatsuhiro Kojima, Mireia Segado, Enric Petrus, Carles Bo and Sayaka Uchida\*



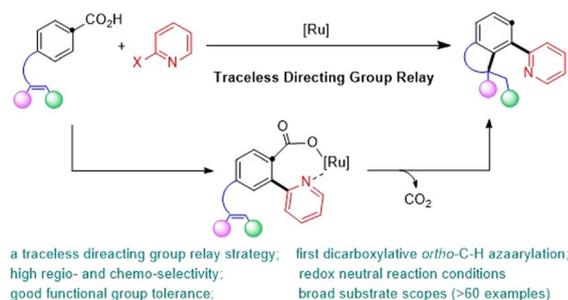
5460



### Electron-rich benzofulvenes as effective dipolarophiles in copper(I)-catalyzed asymmetric 1,3-dipolar cycloaddition of azomethine ylides

Xin Chang, Xue-Tao Liu, Fangfang Li, Yuhong Yang, Lung Wa Chung\* and Chun-Jiang Wang\*

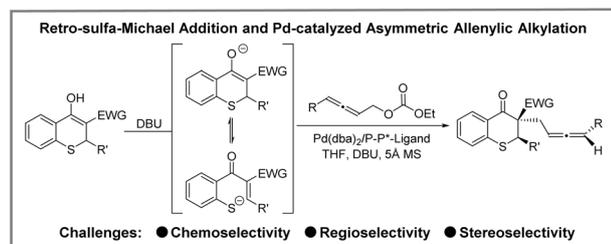
5470



### Ruthenium-catalysed decarboxylative unsymmetric dual *ortho*-/*meta*-C–H bond functionalization of arenecarboxylic acids

Xiankai Li, Xiaofei Wang and Jing Zhang\*

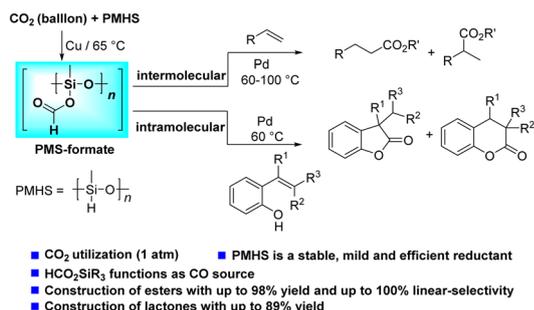
5477



### Palladium-catalyzed asymmetric allenyl alkylation: construction of multiple chiral thiochromanone derivatives

Li-Xia Liu, Yu-Qing Bai, Xiang Li, Chang-Bin Yu\* and Yong-Gui Zhou\*

5483



### Regioselective hydroesterification of alkenes and alkenylphenols utilizing CO<sub>2</sub> and hydrosilane

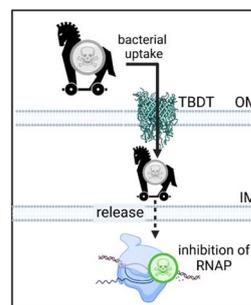
Meng-Meng Wang, Sheng-Mei Lu and Can Li\*



5490

### Siderophore conjugation with cleavable linkers boosts the potency of RNA polymerase inhibitors against multidrug-resistant *E. coli*

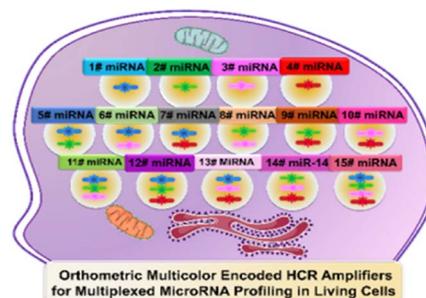
Carsten Peukert, Anna C. Vetter, Hazel L. S. Fuchs, Kirsten Harmrolfs, Bianka Karge, Marc Stadler and Mark Brönstrup\*



5503

### Orthometric multicolor encoded hybridization chain reaction amplifiers for multiplexed microRNA profiling in living cells

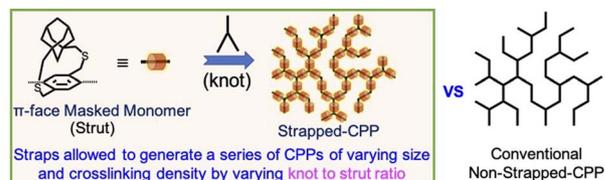
Wei Wei, Yiyi Zhang, Fan Yang, Liping Zhou, Yufan Zhang, Yeyu Wang, Shuangshuang Yang, Jinze Li and Haifeng Dong\*



5510

### Using molecular straps to engineer conjugated porous polymer growth, chemical doping, and conductivity

Manikandan Mohanan, Humayun Ahmad, Pooja Ajayan, Prashant K. Pandey, Benjamin M. Calvert, Xinran Zhang, Fu Chen, Sung J. Kim, Santanu Kundu and Nagarjuna Gavvalapalli\*



#### Advantages of Strapped-CPPs over Non-Strapped-CPP

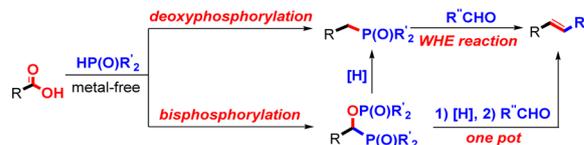
- ✓ Provides swollen network
- ✓ Higher percentage of crosslinked groups (38%)
- ✓ 16 times more dispersible
- ✓ 18 time higher doping efficiency
- ✓ 3 orders of magnitude higher conductivity
- ✓ Provides synthetic tunability, varies network size, and crosslinking density

5519

### Metal-free highly chemo-selective bisphosphorylation and deoxyphosphorylation of carboxylic acids

Liguang Gan, Tianhao Xu, Qihang Tan, Mengjie Cen, Lingling Wang, Jingwei Zhao, Kuang Liu, Long Liu, Wen-Hao Chen, Li-Biao Han,\* Jacek E. Nycz\* and Tieqiao Chen\*

Carboxylic acids as alkyl source via bisphosphorylation and deoxyphosphorylation, and their conversion into alkenes in one pot.



- Readily available starting materials
- High step and atom economy
- Scalable
- High functional group tolerance
- Mild conditions
- Modification of complex APIs
- New transforming mode of carboxylic acids as alkyl source
- Controlled synthesis



## CORRECTION

5527

**Correction: Novel synthetic route for (parent) phosphetanes, phospholanes, phosphinanes and phosphepanes**

Stephan Reichl, Gábor Balázs and Manfred Scheer\*

