

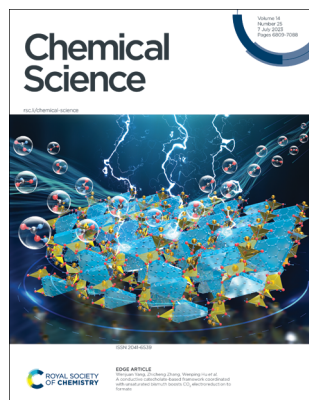
# Chemical Science

rsc.li/chemical-science

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.

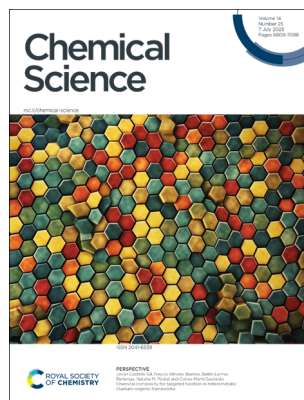
## IN THIS ISSUE

ISSN 2041-6539 CODEN CSHCBM 14(25) 6809–7088 (2023)



### Cover

See Wenjuan Yang, Zhicheng Zhang, Wenping Hu *et al.*, pp. 6860–6866.  
Image reproduced by permission of Zhicheng Zhang from *Chem. Sci.*, 2023, **14**, 6860.



### Inside cover

See Carlos Martí-Gastaldo *et al.*, pp. 6826–6840.  
Image reproduced by permission of Carlos Martí-Gastaldo from *Chem. Sci.*, 2023, **14**, 6826.

## EDITORIAL

6820

### Addressing the sustainability challenges for polymers in liquid formulations

Caroline Louise Kelly

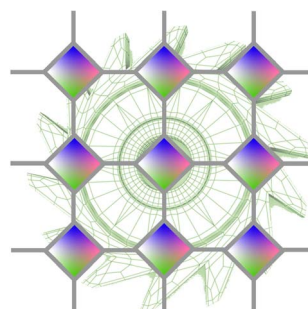


## PERSPECTIVES

6826

### Chemical complexity for targeted function in heterometallic titanium–organic frameworks

Javier Castells-Gil, Neyvis Almora-Barrios, Belén Lerma-Berlanga, Natalia M. Padial and Carlos Martí-Gastaldo\*



## Editorial Staff

### Executive Editor

May Copsey

### 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 Copsey, 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

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  
Jillian 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  
Mi Hee Lim, 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 Mindiola, 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 Sumerlin, 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

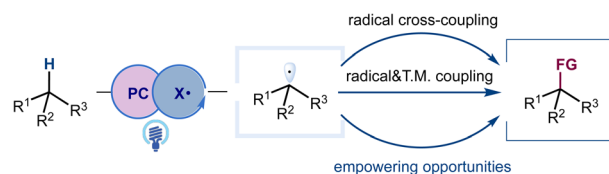


## PERSPECTIVES

6841

### Resurgence and advancement of photochemical hydrogen atom transfer processes in selective alkane functionalizations

Liang Chang, Shun Wang, Qing An, Linxuan Liu, Hexiang Wang, Yubo Li, Kaixuan Feng and Zhiwei Zuo\*

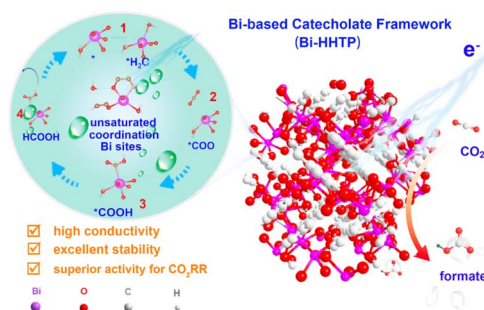


## EDGE ARTICLES

6860

### A conductive catechol-based framework coordinated with unsaturated bismuth boosts CO<sub>2</sub> electroreduction to formate

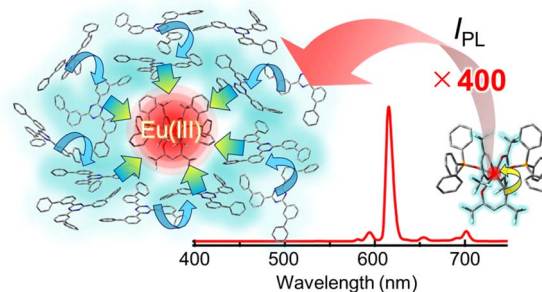
Zengqiang Gao, Man Hou, Yongxia Shi, Li Li, Qisheng Sun, Shuyuan Yang, Zhiqiang Jiang, Wenjuan Yang,\* Zhicheng Zhang\* and Wenping Hu\*



6867

### Highly efficient light harvesting of a Eu(III) complex in a host-guest film by triplet sensitization

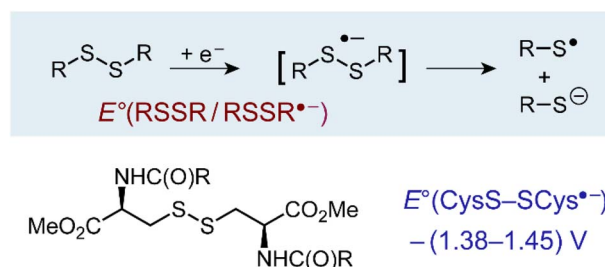
Shiori Miyazaki, Kenichi Goushi, Yuichi Kitagawa, Yasuchika Hasegawa, Chihaya Adachi, Kiyoshi Miyata\* and Ken Onda\*



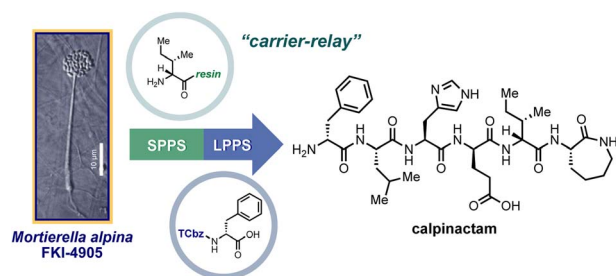
6876

### Disulfide radical anion as a super-reductant in biology and photoredox chemistry

Qilei Zhu,\* Cyrille Costentin, JoAnne Stubbe and Daniel G. Nocera\*



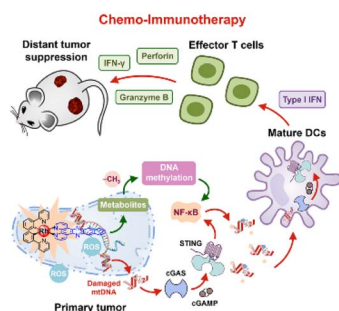
6882



### Development of a nitrogen-bound hydrophobic auxiliary: application to solid/hydrophobic-tag relay synthesis of calpinactam

Hiroki Nakahara, Goh Sennari, Yoshihiko Noguchi, Tomoyasu Hirose\* and Toshiaki Sunazuka\*

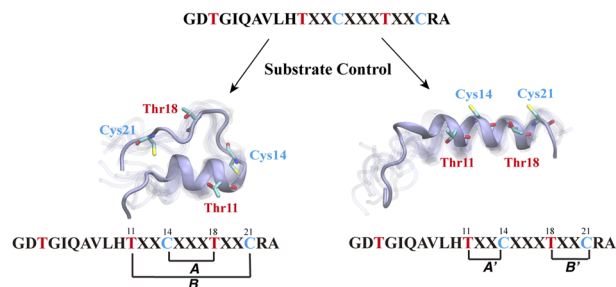
6890



### Activation of the cGAS-STING pathway by a mitochondrial DNA-targeted emissive rhodium(III) metallointercalator

Yue Zheng, Xiao-Xiao Chen, Dong-Yang Zhang, Wen-Jin Wang, Kun Peng, Zhi-Yuan Li, Zong-Wan Mao\* and Cai-Ping Tan\*

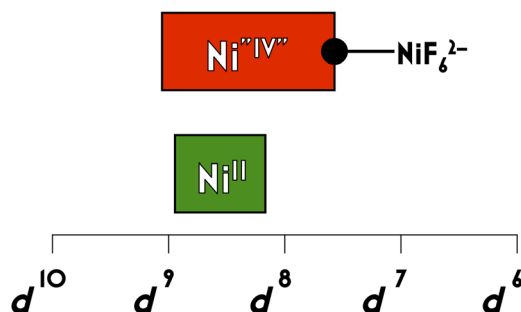
6904



### Sequence controlled secondary structure is important for the site-selectivity of lanthipeptide cyclization

Xuenan Mi, Emily K. Desormeaux, Tung T. Le, Wilfred A. van der Donk\* and Diwakar Shukla\*

6915



### Scrutinizing formally $\text{Ni}^{\text{IV}}$ centers through the lenses of core spectroscopy, molecular orbital theory, and valence bond theory

Ida M. DiMucci, Charles J. Titus, Dennis Nordlund, James R. Bour, Eugene Chong, Dylan P. Grigas, Chi-Heng Hu, Mikhail D. Kosobokov, Caleb D. Martin, Liviu M. Mirica, Noel Nebra, David A. Vicic, Lydia L. Yorks, Sam Yruegas, Samantha N. MacMillan\*, Jason Shearer\* and Kyle M. Lancaster\*

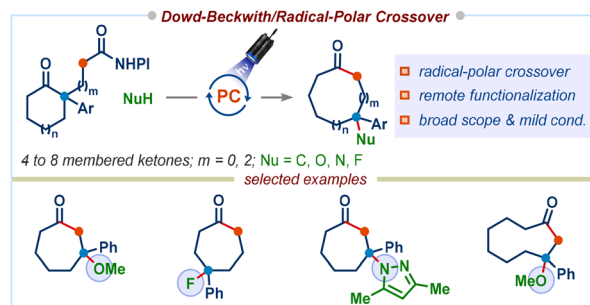




6930

## Photocatalyzed Dowd–Beckwith radical-polar crossover reaction for the synthesis of medium-sized carbocyclic compounds

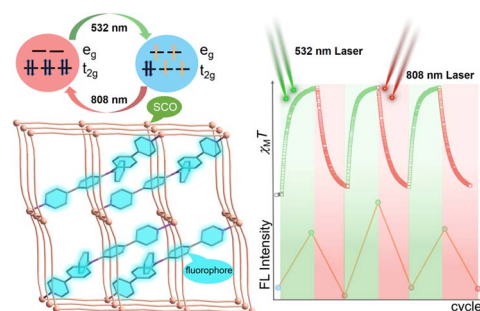
Tushar Singha, Ganesh Arjun Kadam and Durga Prasad Hari\*



6936

## Manipulating fluorescence by photo-switched spin-state conversions in an iron(II)-based SCO-MOF

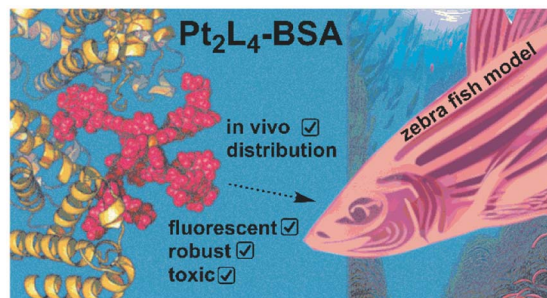
Fei-Fei Yan, Wen-Jing Jiang, Nian-Tao Yao, Pan-Dong Mao, Liang Zhao, Hui-Ying Sun, Yin-Shan Meng and Tao Liu\*



6943

## *In vivo* biodistribution of kinetically stable $Pt_2L_4$ nanospheres that show anti-cancer activity

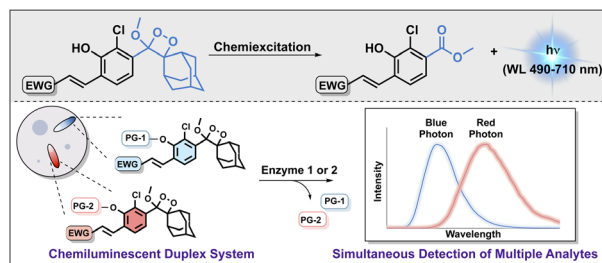
Eduard O. Bobylev, Renzo A. Knol, Simon Mathew, David A. Poole, III, Ioli Kotsogianni, Nathaniel I. Martin, Bas de Bruin, Alexander Kros\* and Joost N. H. Reek\*



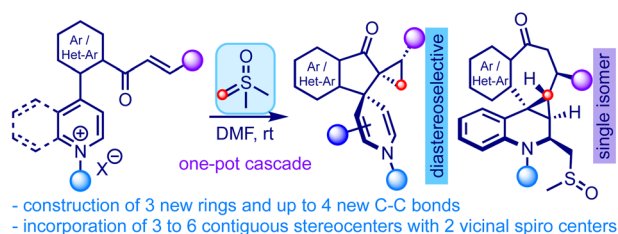
6953

## Chemiluminescent duplex analysis using phenoxy-1,2-dioxetane luminophores with color modulation

Sara Gutkin, Rozan Tannous, Qais Jaber, Micha Fridman and Doron Shabat\*



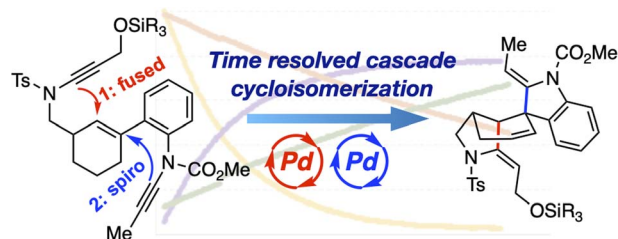
6963



### An interrupted Corey–Chaykovsky reaction of designed azaarenium salts: synthesis of complex polycyclic spiro- and fused cyclopropanoids

Bara Singh, Arshad J. Ansari, Nirmal Malik and S. S. V. Ramasastry\*

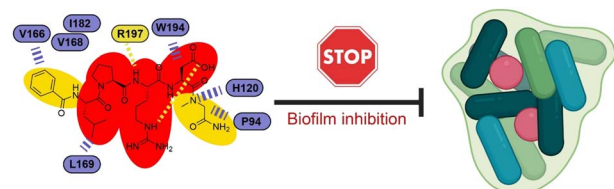
6970



### Sequencing palladium-catalyzed cycloisomerization cascades in a synthesis of the gelsemine core

Guoduan Liang and Edward A. Anderson\*

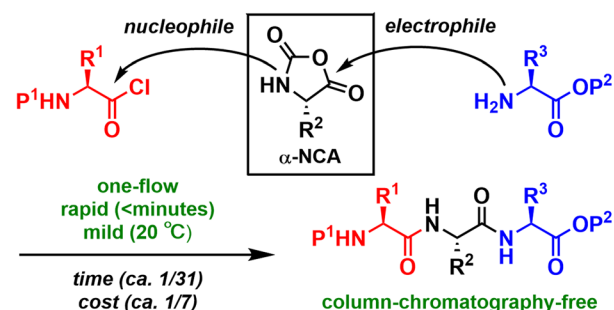
6975



### Substrate-derived Sortase A inhibitors: targeting an essential virulence factor of Gram-positive pathogenic bacteria

Helal Abujubara, Jordi C. J. Hintzen, Shadi Rahimi, Ivan Mijakovic, Daniel Tietze and Alesia A. Tietze\*

6986



### Rapid and column-chromatography-free peptide chain elongation via a one-flow, three-component coupling approach

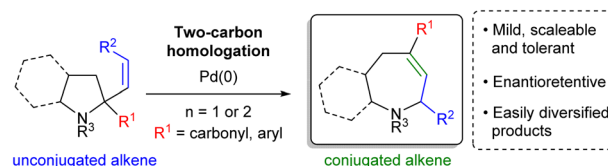
Naoto Sugisawa, Akira Ando and Shinichiro Fuse\*



6992

### Stereoselective two-carbon ring expansion of allylic amines via electronic control of palladium-promoted equilibria

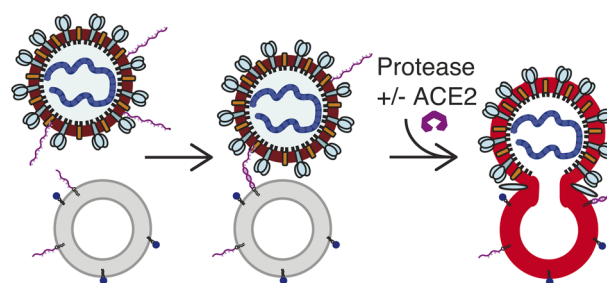
Charles P. Mikan, Aidan Matthews, Daniel Harris, Charlotte E. McIvor, Paul G. Waddell, Mark T. Sims and Jonathan P. Knowles\*



6997

### The ACE2 receptor accelerates but is not biochemically required for SARS-CoV-2 membrane fusion

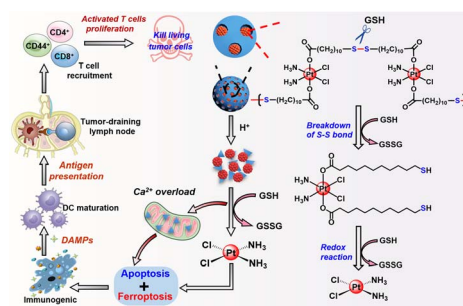
Marcos Cervantes, Tobin Hess, Giorgio G. Morbioli, Anjali Sengar and Peter M. Kasson\*



7005

### In situ oxidative polymerization of platinum(IV) prodrugs in pore-confined spaces of CaCO<sub>3</sub> nanoparticles for cancer chemoimmunotherapy

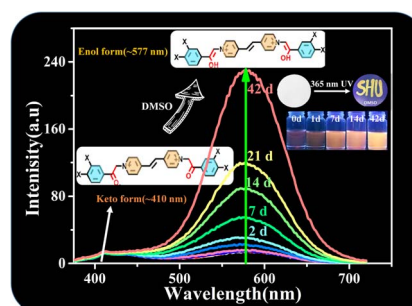
Fangmian Wei, Libing Ke, Siyuan Gao, Johannes Karges, Jinqian Wang, Yu Chen, Liangnian Ji and Hui Chao\*



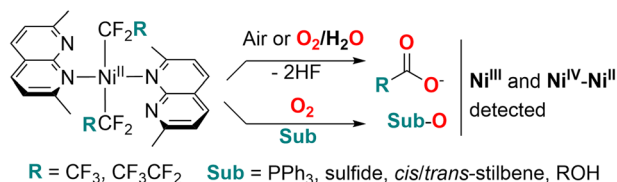
7016

### Isomerization-induced fluorescence enhancement of two new viologen derivatives: mechanism insight and DFT calculations

Xiuping Yin, Xinxing Li, Xuyi Li, Malgorzata Biczysko, Shourong Zhu, Jiaqiang Xu and Yue-Ling Bai\*



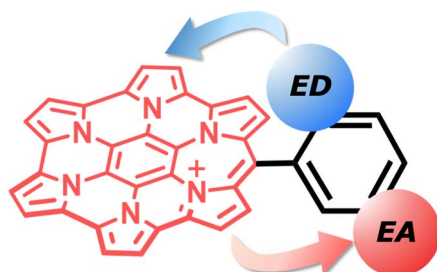
7026

Oxygenation by  $O_2$  via Ni long-chain perfluoroalkyl complexes

## Oxygen transfer reactivity mediated by nickel perfluoroalkyl complexes using molecular oxygen as a terminal oxidant

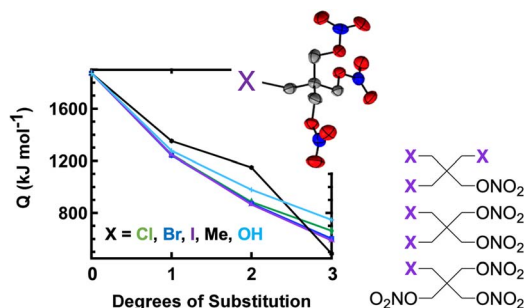
Shubham Deolka, R. Govindarajan, Eugene Khaskin, Serhii Vasylevskyi, Janet Bahri, Robert R. Fayzullin, Michael C. Roy and Julia R. Khusnutdinova\*

7036

**24π Antiaromatic**Substituent effects on paratropicity and diatropicity in  $\pi$ -extended hexapyrrolohexaazacoronene

Masayoshi Takase,\* Toranosuke Takata, Kosuke Oki, Shigeki Mori and Hidemitsu Uno\*

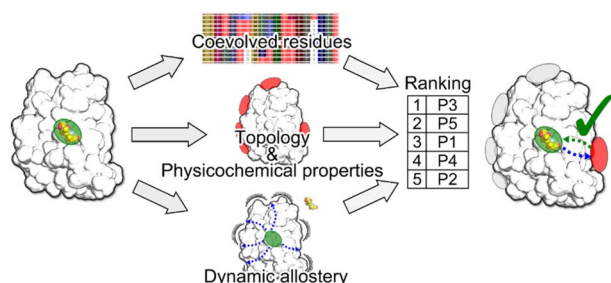
7044



## Halogenated PETN derivatives: interplay between physical and chemical factors in explosive sensitivity

Nicholas Lease,\* Kyle D. Spielvogel, Jack V. Davis, Jeremy T. Tisdale, Lisa M. Klamborowski, M. J. Cawkwell and Virginia W. Manner

7057



## Combining structural and coevolution information to unveil allosteric sites

Giuseppina La Sala,\* Christopher Pflieger, Helena Käck, Lisa Wissler, Philip Nevin, Kerstin Böhm, Jon Paul Janet, Marianne Schimpl, Christopher J. Stubbs, Marco De Vivo, Christian Tyrchan, Anders Hogner, Holger Gohlke\* and Andrey I. Frolov\*

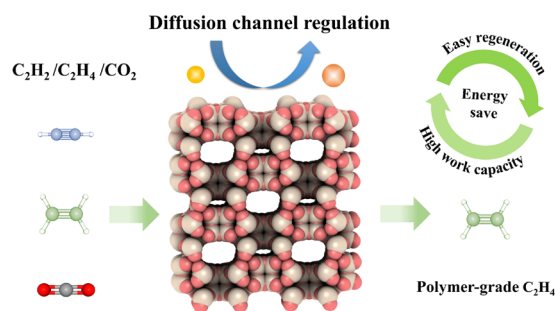




7068

### Deep removal of trace $C_2H_2$ and $CO_2$ from $C_2H_4$ by using customized potassium-exchange mordenite

Hongwei Chen, Binyu Wang, Bin Zhang, JiuHong Chen, Jiabao Gui, Xiufeng Shi, Wenfu Yan, Jinping Li and Libo Li\*



7076

### Near-infrared AIEgens with high singlet-oxygen yields for mitochondria-specific imaging and antitumor photodynamic therapy

Shasha Zhang, Wenfang Yang, Xiao Lu, Xinyi Zhang, Zhichao Pan, Da-Hui Qu, Dong Mei,\* Ju Mei\* and He Tian

