

# Chemical Science

[www.rsc.org/chemicalscience](http://www.rsc.org/chemicalscience)

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 6(6) 3273–3636 (2015)



### Cover

See V. P. Ananikov *et al.*, pp. 3302–3313.  
Image reproduced by permission of V. P. Ananikov from *Chem. Sci.*, 2015, **6**, 3302.



### Inside cover

See Gilmar F. Salgado *et al.*, pp. 3314–3320.  
Image reproduced by permission of Gilmar F. Salgado from *Chem. Sci.*, 2015, **6**, 3314.  
Image modified with permission from the original "Boat in Storm" by Artem Rhads Cheboha.

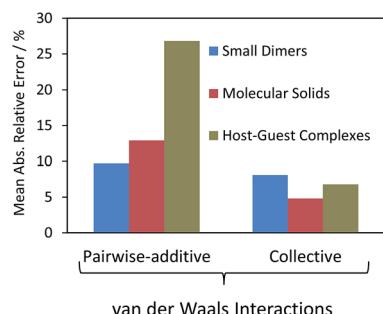
## PERSPECTIVE

3289

### van der Waals dispersion interactions in molecular materials: beyond pairwise additivity

Anthony M. Reilly and Alexandre Tkatchenko\*

In this perspective we discuss recent advances in the understanding of collective and many-body van der Waals interactions and their role and impact for molecular materials.



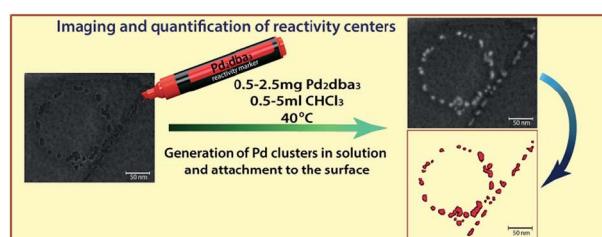
## EDGE ARTICLES

3302

### Spatial imaging of carbon reactivity centers in Pd/C catalytic systems

E. O. Pentsak, A. S. Kashin, M. V. Polynski, K. O. Kvashnina, P. Glatzel and V. P. Ananikov\*

In the present study state-of-the-art experimental techniques involving ultra high resolution SEM/STEM microscopy (1 Å resolution), high brilliance X-ray absorption spectroscopy and theoretical calculations on truly nanoscale systems were utilized to reveal the role of carbon centers in the formation and nature of Pd/C catalytic materials.



**Editorial staff****Interim executive editor**

May Copsey

**Deputy editor**

Jeanne Andres

**Editorial production manager**

Philippa Ross

**Development editors**

Alessia Millemaggi

Cesar Palmero

**Publishing editors**

Matthew Bown, Sage Bowser, Hugh Cowley,  
 Ruth Dilleen, Cally Haynes, Alan Holder,  
 Samantha Ivel, James Moore, Liisa Niitsoo,  
 Victoria Richards, Susan Weatherby, Rachel Wood

**Publishing assistants**

Natalie Ford, Bethany Johnson, Rebecca Wojturska

**Publisher**

Jamie Humphrey

For queries about submitted articles please contact  
 Philippa Ross, Editorial production manager, in the  
 first instance. E-mail [chemicalscience@rsc.org](mailto:chemicalscience@rsc.org)

For pre-submission queries please contact  
 May Copsey, Interim executive editor.  
 E-mail [chemicalscience-rsc@rsc.org](mailto:chemicalscience-rsc@rsc.org)

Chemical Science (electronic: ISSN 2041-6539)  
 is published monthly 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 RSC 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)

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

[www.rsc.org/chemicalscience](http://www.rsc.org/chemicalscience)**Editorial board****Editor-in-chief**

Daniel G. Nocera, Harvard University

Vy Dong, University of California,  
 IrvineJames K. McCusker, Michigan State  
 UniversityWonwoo Nam, Ewha Womans  
 UniversityCarsten Schultz, European Molecular  
 Biology LaboratoryF. Dean Toste, University of California,  
 Berkeley

Haw Yang, Princeton University

Jihong Yu, Jilin University

**Associate editors**Alán Aspuru-Guzik, Harvard  
 UniversityMatthew Gaunt, University of  
 CambridgeHubert Girault, Federal Polytechnic  
 School of LausanneZhenan Bao, Stanford University  
 Christopher C. Cummins,Christopher A. Hunter, University of  
 CambridgeMassachusetts Institute of  
 TechnologyDavid A. Leigh, University of  
 Manchester

Kazunari Domen, University of Tokyo

Kopin Liu, Academia Sinica

**Advisory board**Takuzo Aida, University of Tokyo  
 Markus Antonietti, Max Planck  
 Institute of Colloids and InterfacesJeremy Harvey, University of Bristol  
 Christy Haynes, University of  
 Minnesota

Polly Arnold, University of Edinburgh

Johan Hofkens, Catholic University  
 of LeuvenXinhe Bao, Dalian Institute of  
 Chemical PhysicsLinda Hsieh-Wilson, California  
 Institute of TechnologyGuy Bertrand, University of California,  
 Los Angeles

Eric Jacobsen, Harvard University

Jeffrey Bode, Swiss Federal Institute of  
 Technology Zurich

Takashi Kato, University of Tokyo

Christopher Chang, University of  
 California, BerkeleySeong Keun Kim, Seoul National  
 UniversityChi-Ming Che, University of Hong  
 Kong

Jerome Lacour, University of Geneva

Jason Chin, Medical Research Council  
 Laboratory of Molecular Biology

James Leighton, Columbia University

Daniel Chiu, University of Washington

Steve Ley, University of Cambridge

Graham Cooks, Purdue University

Chao-Jun Li, McGill University

Eugenio Coronado, University of  
 ValenciaWenbin Lin, University of North  
 Carolina

Lee Cronin, University of Glasgow

Watson Loh, Instituto de Química

Gautam R. Desiraju, Indian Institute of  
 Science, BangaloreJulie Macpherson, University of  
 WarwickJames Durrant, Imperial College  
 London

Stephen Mann, University of Bristol

Ben Feringa, University of Groningen

Bert Meijer, Eindhoven University of  
 Technology

Cynthia Friend, Harvard University

Nils Metzler-Nolte, Ruhr University  
 Bochum

Makoto Fujita, University of Tokyo

Scott Miller, Yale University

Philip Gale, University of Southampton

Daniel Mirmidola, Indiana University

Song Gao, Peking University

Mohammad Movassaghi,  
 Massachusetts Institute of  
 Technology

Jinlong Gong, Tianjin University

Jonathan Nitschke, University of  
 CambridgeJustin Gooding, University of New  
 South Wales

Kyoko Nozaki, University of Tokyo

Michael Graetzel, Federal Polytechnic  
 School of Lausanne

Takashi Ooi, Nagoya University

Duncan Graham, University of  
 Strathclyde

Rachel O'Reilly, University of Warwick

Buxing Han, Chinese Academy of  
 Sciences

Michel Orrit, Leiden University

Oleg Ozerov, Texas A&amp;M University

Hongkun Park, Harvard University

Rasmita Raval, University of Liverpool  
 Paul Reider, Princeton UniversityStuart Rowan, Case Western Reserve  
 UniversityRichmond Sarpong, University of  
 California, BerkeleyGregory Scholes, University of  
 TorontoOliver Seitz, Humboldt University of  
 BerlinKay Severin, Federal Polytechnic  
 School of Lausanne

Mikiko Sodeoka, RIKEN

Brian Stoltz, California Institute of  
 Technology

Weihong Tan, University of Florida

He Tian, East China University of  
 Science and Technology

Zhong-Qun Tian, Xiamen University

Andrei Tokmakoff, University of  
 Chicago

Jan Van Hest, Radboud University

Tom Welton, Imperial College London

Christina White, University of Illinois

Martin Wolf, Fritz Haber Institute of  
 the Max Planck SocietyOmar Yaghi, University of California,  
 Los Angeles

Vivian Yam, University of Hong Kong

Yang Yang, University of California,  
 Los AngelesShu-Hong Yu, University of Science  
 and Technology of China

Qi-Lin Zhou, Nankai University

**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:  
<http://www.rsc.org/chemicalscience>.

Authors may reproduce/republish portions of their  
 published contribution without seeking permission  
 from the RSC, 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 2015.  
 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.

The Royal Society of Chemistry takes reasonable care in  
 the preparation of this publication but does not accept  
 liability for the consequences of any errors or omissions.

© The paper used in this publication meets the  
 requirements of ANSI/NISO Z39.48–1992  
 (Permanence of Paper).

Registered Charity No. 207890.



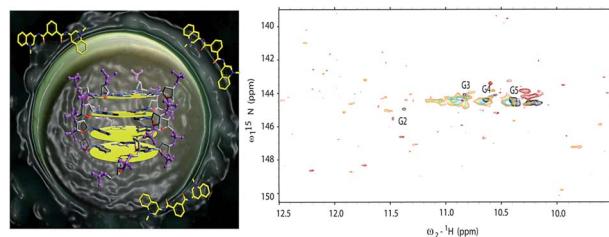
## EDGE ARTICLES

3314

**G-quadruplex DNA and ligand interaction in living cells using NMR spectroscopy**

Gilmar F. Salgado,\* Christian Cazenave, Abdelaziz Kerkour and Jean-Louis Mergny

Using in-cell NMR spectroscopy to probe ligand binding to a G-quadruplex nucleic acid.

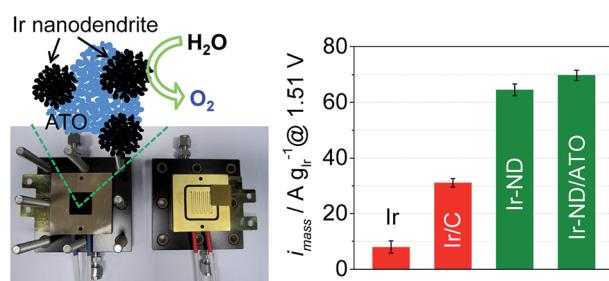


3321

**Oxide-supported Ir nanodendrites with high activity and durability for the oxygen evolution reaction in acid PEM water electrolyzers**

Hyung-Suk Oh, Hong Nhan Nong, Tobias Reier, Manuel Gleich and Peter Strasser\*

Ir nanodendrites (Ir-ND) supported on antimony doped tin oxide (ATO) show enhanced catalytic activity and stability for oxygen evolution reaction (OER) in polymer electrolyte membrane (PEM) water electrolysis.

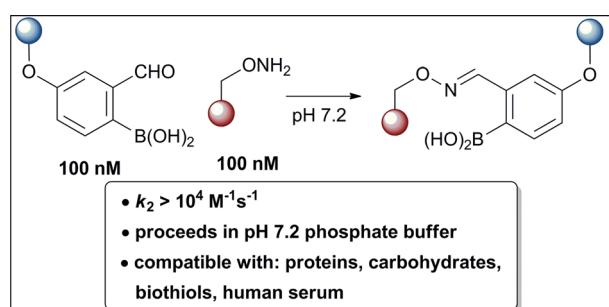


3329

**Boronic acids facilitate rapid oxime condensations at neutral pH**

Pascal Schmidt, Cedric Stress and Dennis Gillingham\*

We report here the discovery and development of boron-assisted oxime formation as a powerful connective reaction for chemical biology.

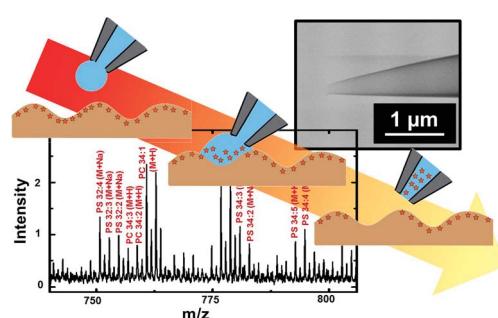


3334

**Nanopipettes: probes for local sample analysis**

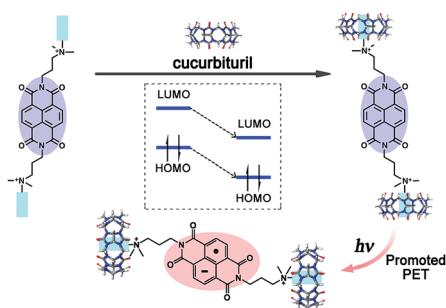
Anumita Saha-Shah, Anna E. Weber, Jonathan A. Karty, Steven J. Ray, Gary M. Hieftje and Lane A. Baker\*

Nanopipettes are demonstrated as probes for local mass spectrometric analysis with potential for small-scale extraction of analytes from single cells, tissue and organisms.



## EDGE ARTICLES

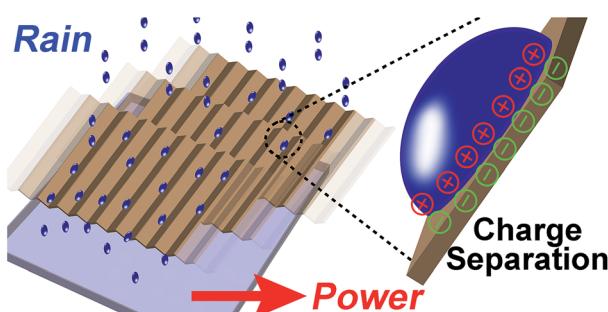
3342


**A supramolecular strategy for tuning the energy level of naphthalenediimide: Promoted formation of radical anions with extraordinary stability**

Qiao Song, Fei Li, Zhiqiang Wang and Xi Zhang\*

We report a supramolecular strategy to promote the formation of naphthalenediimide radical anions with extraordinary stability through tuning the energy level of naphthalenediimide.

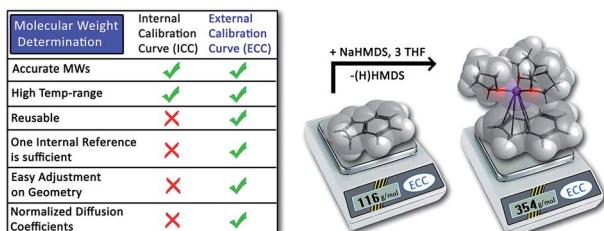
3347


**Using the gravitational energy of water to generate power by separation of charge at interfaces**

Yajuan Sun, Xu Huang and Siowling Soh\*

When water droplets (e.g., from rain) flow down a solid surface due to gravity, they can generate power.

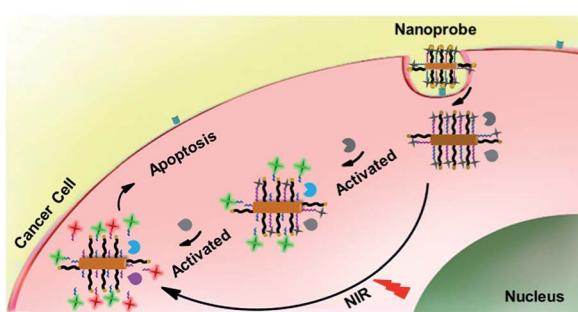
3354


**Accurate molecular weight determination of small molecules via DOSY-NMR by using external calibration curves with normalized diffusion coefficients**

Roman Neufeld and Dietmar Stalke\*

We describe a novel development of MW-determination by using an external calibration curve approach with normalized diffusion coefficients.

3365


***In situ* activation and monitoring of the evolution of the intracellular caspase family**

Lei Zhang, Jianping Lei,\* Jintong Liu, Fengjiao Ma and Huangxian Ju\*

An integrated nano-platform is designed to achieve *in situ* activation, monitoring and signal feedback of the caspase family evolution from upstream to downstream.



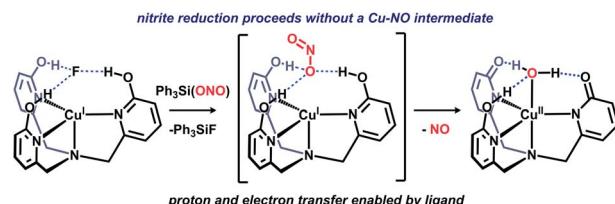
## EDGE ARTICLES

3373

**Nitrite reduction by copper through ligand-mediated proton and electron transfer**

Cameron M. Moore and Nathaniel K. Szymczak\*

A copper complex featuring a proton-responsive tripodal ligand reduces nitrite *via* a proton/electron transfer process, which parallels copper nitrite reductase.

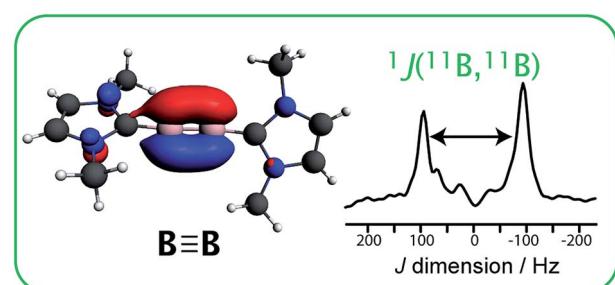


3378

**Spying on the boron–boron triple bond using spin–spin coupling measured from  $^{11}\text{B}$  solid-state NMR spectroscopy**

Frédéric A. Perras, William C. Ewing, Theresa Dellermann, Julian Böhnke, Stefan Ullrich, Thomas Schäfer, Holger Braunschweig\* and David L. Bryce\*

Boron–boron  $J$  coupling constants provide new insight into the nature of the boron–boron triple bond.

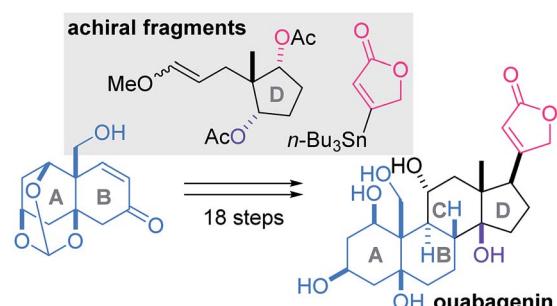


3383

**A convergent total synthesis of ouabagenin**

Ken Mukai, Satoshi Kasuya, Yuki Nakagawa, Daisuke Urabe and Masayuki Inoue\*

A convergent total synthesis of ouabagenin, an aglycon of cardenolide glycoside ouabain, was achieved by assembly of the AB-ring, D-ring and butenolide moieties.

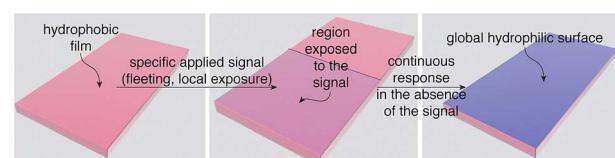


3388

**Polymeric materials that convert local fleeting signals into global macroscopic responses**

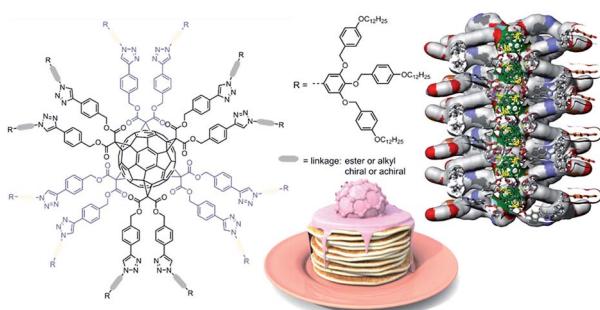
Hyungwoo Kim, Matthew S. Baker and Scott T. Phillips\*

Polymers that support self-propagating reactions are used to create materials that change global wetting properties in response to specific fleeting, local stimuli.



## EDGE ARTICLES

3393

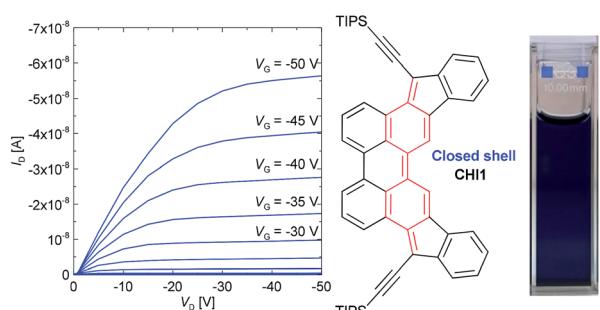


**Self-organisation of dodeca-dendronized fullerene into supramolecular discs and helical columns containing a nanowire-like core**

Sebastiano Guerra, Julien lehl, Michel Holler, Mihai Peterca, Daniela A. Wilson, Benjamin E. Partridge, Shaodong Zhang, Robert Deschenaux,\* Jean-François Nierengarten\* and Virgil Percec\*

C<sub>60</sub> dendronized with 12 chiral or achiral self-assembling dendrons form discs with C<sub>60</sub> at their centre that self-organise into helical columns with a nanowire-like core.

3402

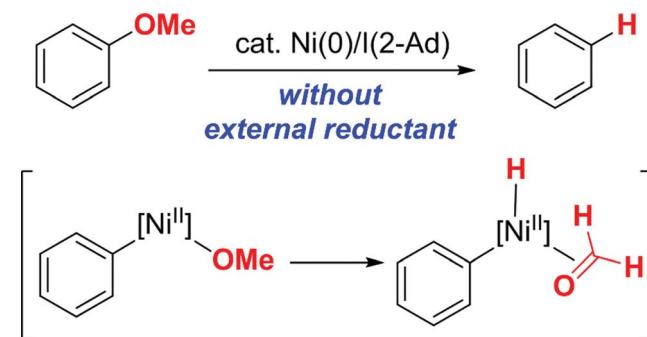


**Diindeno[1,2-b:2',1'-n]perylene: a closed shell related Chichibabin's hydrocarbon, the synthesis, molecular packing, electronic and charge transport properties**

Kamal Sbargoud, Masashi Mamada,\* Jérôme Marrot, Shizuo Tokito, Abderrahim Yassar\* and Michel Frigoli\*

A fixed Chichibabin's hydrocarbon CHI1 shows a closed shell configuration with a broad absorption from 400 up to 900 nm.

3410

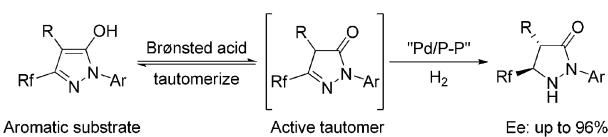


**Nickel-catalyzed reductive cleavage of aryl alkyl ethers to arenes in absence of external reductant**

Mamoru Tobisu,\* Toshifumi Morioka, Akimichi Ohtsuki and Naoto Chatani\*

A nickel catalyst for reductive cleavage of aryl ethers in the absence of an external reductant is developed. The alkoxy group of the substrate serves as an internal reductant.

3415



**Pd-catalyzed asymmetric hydrogenation of fluorinated aromatic pyrazol-5-ols via capture of active tautomers**

Zhang-Pei Chen, Mu-Wang Chen, Lei Shi, Chang-Bin Yu and Yong-Gui Zhou

Here we explore a novel strategy for asymmetric hydrogenation of aromatic pyrazol-5-ols via capture of the active tautomers.



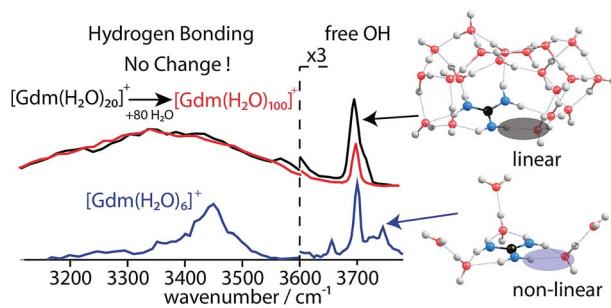
## EDGE ARTICLES

3420

**Hydration of guanidinium depends on its local environment**

Sven Heiles, Richard J. Cooper, Matthew J. DiTucci and Evan R. Williams\*

Infrared spectroscopy of guanidinium confined in gaseous nanodrops shows hydration depends on local environment and lends new insights into its effectiveness as a protein denaturant.

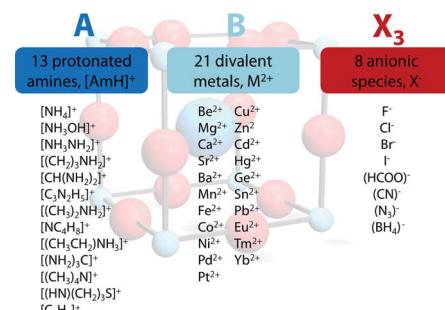


3430

**An extended Tolerance Factor approach for organic-inorganic perovskites**

Gregor Kieslich,\* Shijing Sun and Anthony K. Cheetham\*

Tolerance Factors of possible hybrid perovskites are calculated for over 2500 amine-metal-anion permutations of the periodic table.

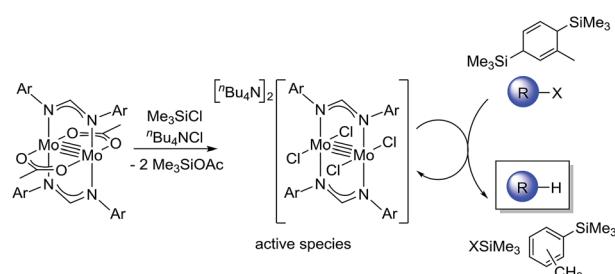


3434

**Mixed-ligand complexes of paddlewheel dinuclear molybdenum as hydrodehalogenation catalysts for polyhaloalkanes**

Hayato Tsurugi,\* Akio Hayakawa, Shun Kando, Yoshitaka Sugino and Kazushi Mashima\*

A mixed-ligated dimolybdenum complex  $\text{Mo}_2(\text{OAc})_2[\text{CH}(\text{NAr})_2]_2$  in combination with 1-methyl-3,6-bis(trimethylsilyl)-1,4-cyclohexadiene and  ${}^n\text{Bu}_4\text{NCl}$  exhibited high catalytic activity for hydrodehalogenation reactions.

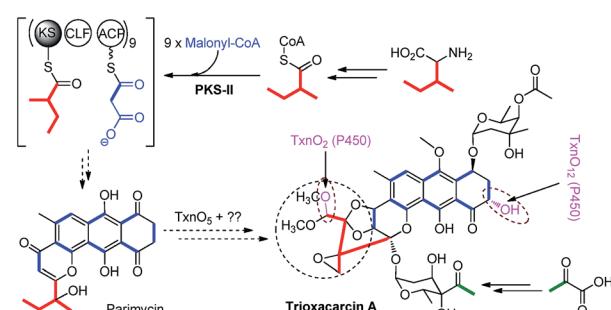


3440

**Biosynthesis of trioxacarcin revealing a different starter unit and complex tailoring steps for type II polyketide synthase**

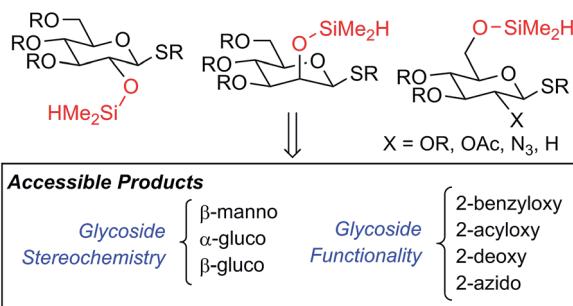
Mei Zhang, Xian-Feng Hou, Li-Hua Qi, Yue Yin, Qing Li, Hai-Xue Pan, Xin-Ya Chen and Gong-Li Tang\*

Different starter unit and complex tailoring steps for type II polyketide synthase in trioxacarcin biosynthesis.



## EDGE ARTICLES

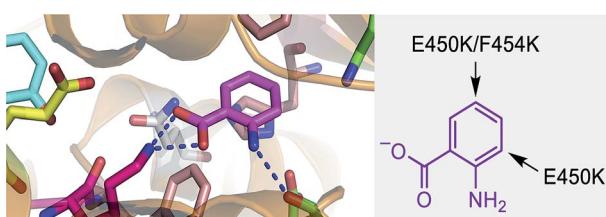
3448

**Sugar silanes: versatile reagents for stereocontrolled glycosylation *via* intramolecular aglycone delivery**

Jordan T. Walk, Zachary A. Buchan and John Montgomery\*

A new method for the intramolecular glycosylation of alcohols is described.

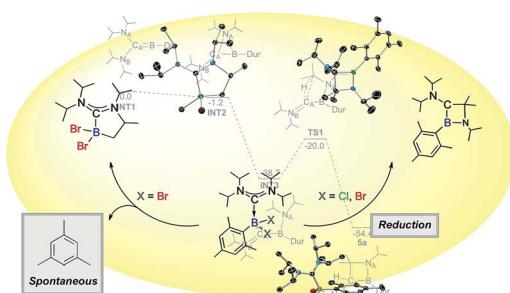
3454

**Extending the biocatalytic scope of regiocomplementary flavin-dependent halogenase enzymes**

Sarah A. Shepherd, Chinnan Karthikeyan, Jonathan Latham, Anna-Winona Struck, Mark L. Thompson, Binuraj R. K. Menon, Matthew Q. Styles, Colin Levy, David Leys and Jason Micklefield\*

Targeted mutagenesis increases the activity and alters the regioselectivity of flavin-dependent halogenases.

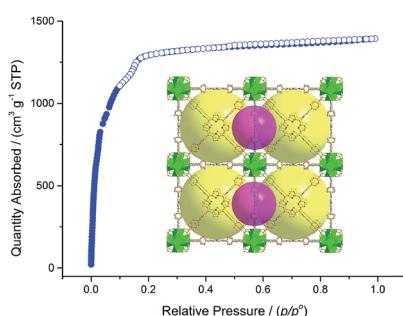
3461

**Generation of 1,2-azaboretidines *via* reduction of ADC borane adducts**

H. Braunschweig,\* A. Gackstatter, T. Kupfer, T. Scheller, F. Hupp, A. Damme, N. Arnold and W. C. Ewing

ADC borane adducts  $\text{RBX}_2 \cdot \text{ADC}$  ( $\text{R} = \text{Mes, Dur}$ ;  $\text{X} = \text{Cl, Br}$ ;  $\text{ADC} = :C(\text{NiPr}_2)_2$ ) have been prepared and reduced by  $\text{KC}_8$  to afford air stable 1,2-azaboretidines with high selectivity.

3466

**Stable porphyrin Zr and Hf metal-organic frameworks featuring 2.5 nm cages: high surface areas, SCSC transformations and catalyses**

Jun Zheng, Mingyan Wu,\* Feilong Jiang, Weiping Su\* and Maochun Hong

Two isostructural porphyrin Zr and Hf metal-organic frameworks (FJI-H6 and FJI-H7) are rationally synthesized, and are constructed from 2.5 nm cubic cages.



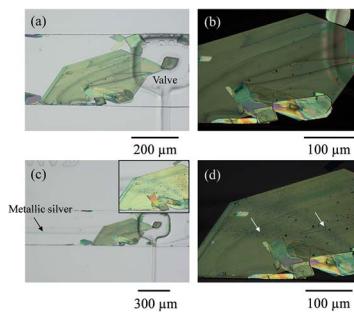
## EDGE ARTICLES

3471

**Bottom-up on-crystal in-chip formation of a conducting salt and a view of its restructuring: from organic insulator to conducting “switch” through microfluidic manipulation**

Josep Puigmartí-Luis,\* Markos Paradinas, Elena Bailo, Romen Rodríguez-Trujillo, Raphael Pfattner, Carmen Ocal\* and David B. Amabilino\*

The chemical modification of an immobilized single crystal in a fluid cell is reported, whereby a material with switching functions is generated with reagent in the stream.

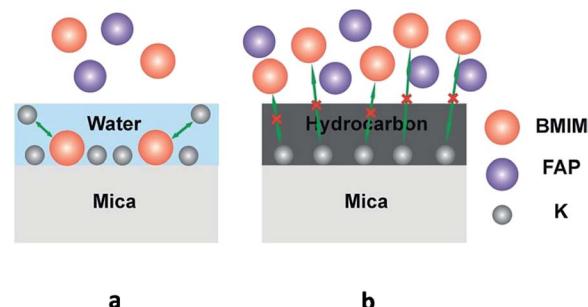


3478

**What causes extended layering of ionic liquids on the mica surface?**

Xiao Gong, Andrew Kozbial and Lei Li\*

The adsorbed water on the mica surface is the key to the extended layering of ILs.

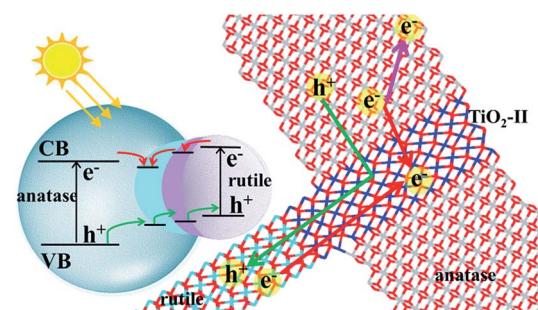


3483

**Three-phase junction for modulating electron–hole migration in anatase–rutile photocatalysts**

Wei-Na Zhao, Sheng-Cai Zhu, Ye-Fei Li and Zhi-Pan Liu\*

Theory resolves the anatase–rutile phase junction structure and characterizes its role in photocatalysis as a *single-way* valve modulating electron–hole separation.

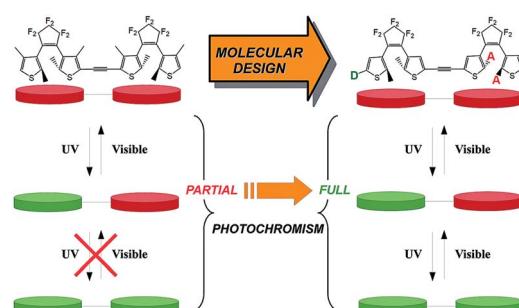


3495

**Designing efficient photochromic dithienylethene dyads**

Arnaud Fihey and Denis Jacquemin\*

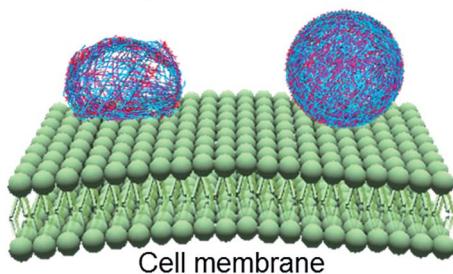
The impact of chemical substitution on the optical properties of ca. 30 dithienylethene (DTE) dyads is investigated with first-principles approaches, with the aim to provide useful guidelines for obtaining more efficient DTE multimers.



## EDGE ARTICLES

3505

Soft HA capsules Stiff HA capsules

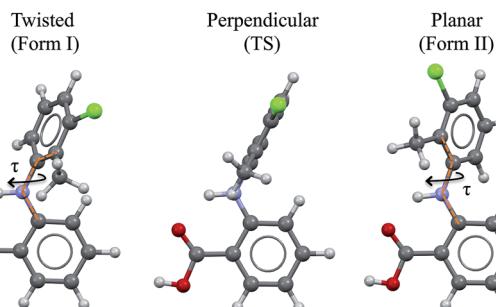


## The role of capsule stiffness on cellular processing

Huanli Sun, Edgar H. H. Wong, Yan Yan, Jiwei Cui, Qiong Dai, Junling Guo, Greg G. Qiao\* and Frank Caruso\*

A systematic and quantitative study on the role of capsule stiffness in cellular processing was performed using hyaluronic acid capsules with tunable stiffness constructed via continuous assembly of polymers.

3515

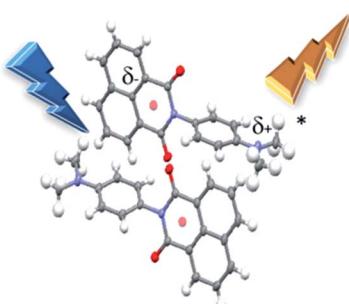


## Can the study of self-assembly in solution lead to a good model for the nucleation pathway? The case of tolfenamic acid.

W. Du, A. J. Cruz-Cabeza, S. Woutersen, R. J. Davey\* and Q. Yin

To further our understanding of the role of solution chemistry in directing nucleation processes new experimental and computational data are presented on the solution and crystallisation chemistry of tolfenamic acid (TA), a benchmark polymorphic compound.

3525

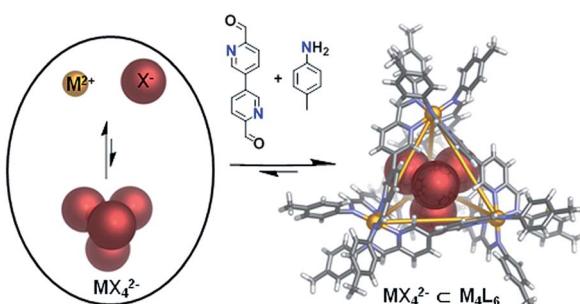


## Polymorph crystal packing effects on charge transfer emission in the solid state

Xiaoyan He, Andrew C. Benniston,\* Hanna Saarenpää, Helge Lemmetyinen, Nikolia V. Tkachenko\* and Ulrich Baisch

Condensation of 1,8-naphthalic anhydride with *N,N*-(dimethylamino)aniline produced the donor-acceptor compound DMIM, which crystallised from a chloroform-diethyl ether mixture to afford two different coloured crystal polymorphs.

3533

Mutual stabilisation between  $M^{II}L_6$  tetrahedra and  $M^{II}X_4^{2-}$  metallate guests

Imogen A. Riddell, Tanya K. Ronson and Jonathan R. Nitschke\*

A series of  $[M^{II}X_4]^{2-} \subset M^{II}L_6$  host-guest complexes are formed through the mutual stabilisation of the host and guest complexes; neither the host nor guest is stable in the absence of the other.

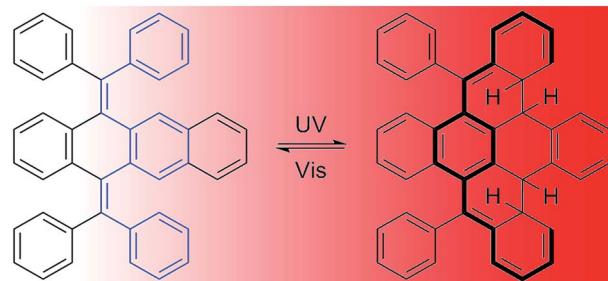


## EDGE ARTICLES

3538

**Aggregation-induced emission and aggregation-promoted photochromism of bis(diphenylmethylene)dihydroacenes**

Zikai He, Liang Shan, Ju Mei, Hong Wang, Jacky W. Y. Lam, Herman H. Y. Sung, Ian D. Williams, Xiao Gu, Qian Miao\* and Ben Zhong Tang\*

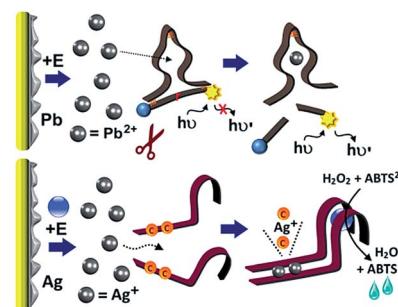
Solid-state photochromism was found in bis(diphenylmethylene)dihydrotetracene, caused by photocyclization of the embedded *cis*-stilbene motifs.

3544

**Addressing, amplifying and switching DNAzyme functions by electrochemically-triggered release of metal ions**

Lina Freage, Alexander Trifonov, Ran Tel-Vered, Eyal Golub, Fuan Wang, John S. McCaskill and Itamar Willner\*

The addressable potential-controlled release of metal ions into electrolyte solutions containing mixtures of nucleic acids leads to the metal ion-guided generation of different DNAzymes and to the activation of DNA cascades.

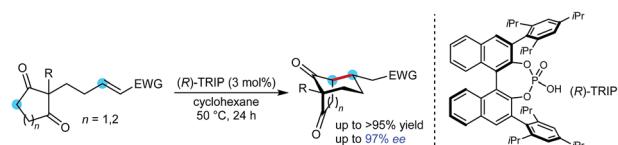


3550

**Enantioselective synthesis of bicyclo[3.n.1]alkanes by chiral phosphoric acid-catalyzed desymmetrizing Michael cyclizations**

Alan R. Burns, Amaël G. E. Madec, Darryl W. Low, Iain D. Roy and Hon Wai Lam\*

2,2-Disubstituted cyclic 1,3-diketones containing a tethered electron-deficient alkene undergo chiral phosphoric acid-catalyzed desymmetrizing Michael cyclizations to give bridged bicyclic products in high enantioselectivities.

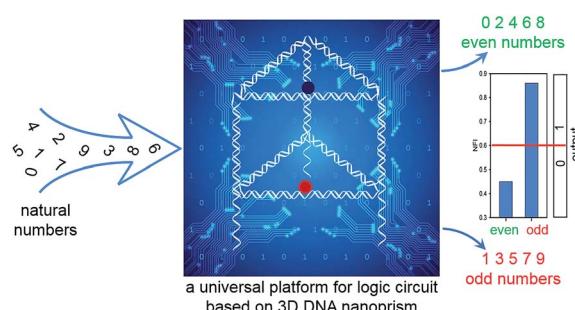


3556

**A universal platform for building molecular logic circuits based on a reconfigurable three-dimensional DNA nanostructure**

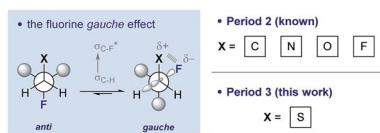
Kaiyu He, Yong Li, Binbin Xiang, Peng Zhao, Yufang Hu, Yan Huang, Wang Li, Zhou Nie\* and Shouzhuo Yao

Integrating multiple components of a logic device into a 3D DNA nanopism provides a universal platform for constructing diverse logic gates.



## EDGE ARTICLES

3565



• the fluorine gauche effect

Period 2 (known)

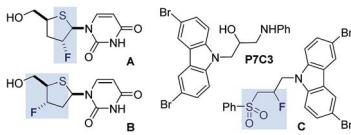


X

=

S

• bioactive molecules containing the F-C-C-S motif



A

B

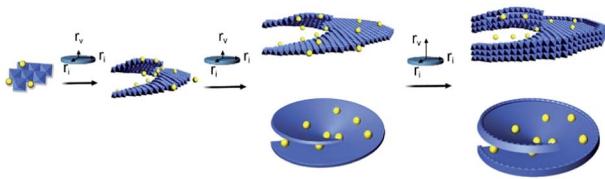
C

## Can acyclic conformational control be achieved via a sulfur–fluorine gauche effect?

C. Thiehoff, M. C. Holland, C. Daniliuc, K. N. Houk\* and R. Gilmour\*

Herein detailed conformational analyses of  $\beta$ -fluorosulfides, -sulfoxides and -sulfones are disclosed, thus extending the scope of the fluorine gauche effect to the 3<sup>rd</sup> Period (X = SR, SOR, SO<sub>2</sub>R;  $\phi_{FCCS} \approx 60^\circ$ ).

3572

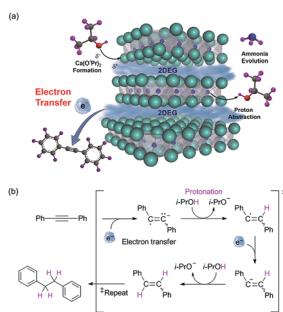


## Edge overgrowth of spiral bimetallic hydroxides ultrathin-nanosheets for water oxidation

Bing Ni and Xun Wang\*

We have synthesized spiral ultrathin-nanosheets with overgrown edges of NiFe, CoNi and CoFe bimetallic hydroxides which show excellent performance for the OER.

3577

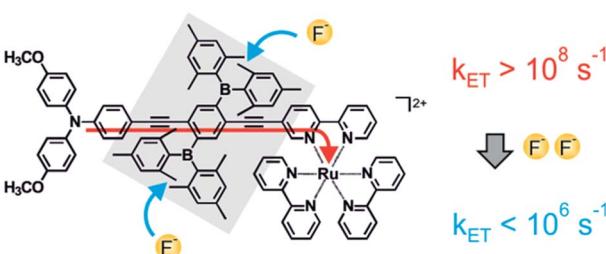


## Two dimensional inorganic electride-promoted electron transfer efficiency in transfer hydrogenation of alkynes and alkenes

Ye Ji Kim, Sun Min Kim, Eun Jin Cho, Hideo Hosono, Jung Woon Yang\* and Sung Wng Kim\*

A simple and highly efficient transfer hydrogenation of alkynes and alkenes by using a two-dimensional electride, dicalcium nitride ( $[\text{Ca}_2\text{N}]^+ \cdot \text{e}^-$ ), as an electron transfer agent is disclosed.

3582



## Fluoride binding to an organoboron wire controls photoinduced electron transfer

Jing Chen and Oliver S. Wenger\*

The efficiency of organoboron wires as mediators of long-range electron transfer can be controlled by anion binding.



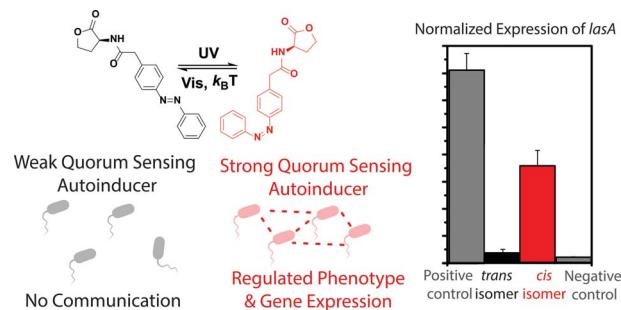
## EDGE ARTICLES

3593

## Controlling the activity of quorum sensing autoinducers with light

J. P. Van der Berg, W. A. Velema, W. Szymanski, A. J. M. Driessens\* and B. L. Feringa\*

Bacteria use Quorum Sensing (QS) to organize into communities and synchronize gene expression. Here we report on a method to externally interfere with QS system using light.

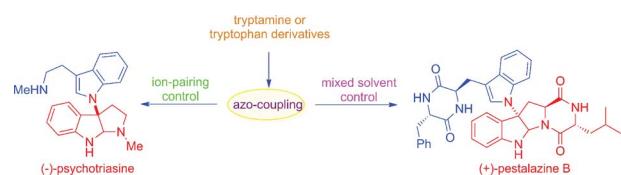


3599

## Enantioselective and diastereoselective azo-coupling/iminium-cyclizations: a unified strategy for the total syntheses of (−)-psychotriasin and (+)-pestalazine B

Qi Li, Tingting Xia, Licheng Yao, Haiteng Deng\* and Xuebin Liao\*

We report a unified strategy for the total syntheses of (−)-psychotriasin and (+)-pestalazine B based on the advanced intermediates of *3*α-amino-hexahydropyrrolo[2,3-*b*]indole.

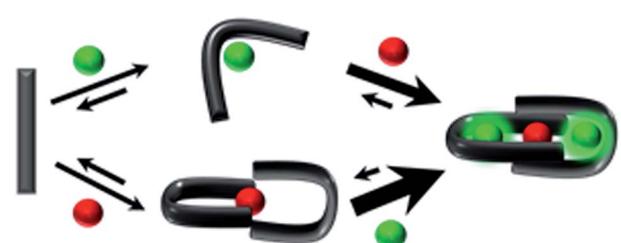


3606

## A prochelator peptide designed to use heterometallic cooperativity to enhance metal ion affinity

Bruno Alies, Jacob D. Wiener and Katherine J. Franz\*

A peptide has been designed so that its chelating affinity for one type of metal ion regulates its affinity for a second, different type of metal ion.

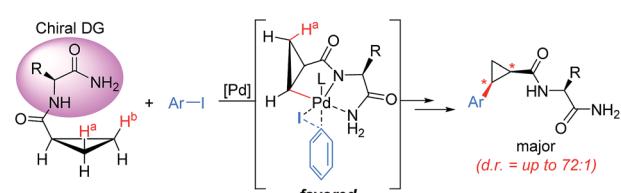


3611

Asymmetric C–H functionalization of cyclopropanes using an isoleucine-NH<sub>2</sub> bidentate directing group

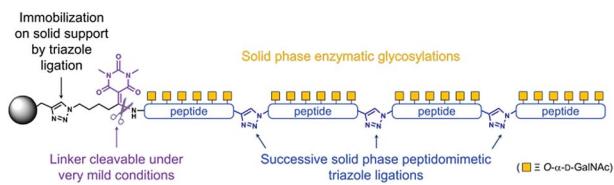
Jinhee Kim, Mikyung Sim, Namhoon Kim and Sungwoo Hong\*

The use of an Ile-NH<sub>2</sub> auxiliary can provide excellent levels of asymmetric induction in the Pd(II)-catalyzed C(sp<sup>3</sup>)-H functionalization of cyclopropanes.



## EDGE ARTICLES

3617



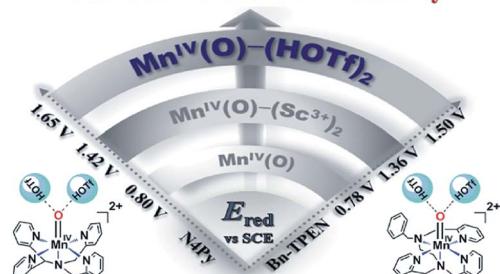
**Combining triazole ligation and enzymatic glycosylation on solid phase simplifies the synthesis of very long glycoprotein analogues**

Mathieu Galibert, Véronique Piller, Friedrich Piller, Vincent Aucagne\* and Agnès F. Delmas

Solid phase chemical ligation followed by enzymatic glycosylation exploits the advantages of a solid support to minimize the purification steps, constituting a promising approach for the synthesis of complex glycoproteins.

3624

**Enhanced ET and OAT Reactivity**



**Tuning the reactivity of mononuclear nonheme manganese(IV)-oxo complexes by triflic acid**

Junying Chen, Heejung Yoon, Yong-Min Lee, Mi Sook Seo, Ritimukta Sarangi, Shunichi Fukuzumi\* and Wonwoo Nam\*

Binding of two HOTf molecules to Mn<sup>IV</sup>(O) species resulted in contrasting effects on the reactivities in oxygen atom transfer and H-atom transfer reactions.

## CORRECTION

3633

**Correction: Cobalt co-catalysis for cross-electrophile coupling: diarylmethanes from benzyl mesylates and aryl halides**

Laura K. G. Ackerman, Lukiana L. Anka-Lufford, Marina Naodovic and Daniel J. Weix\*

## RETRACTION

3634

**Retraction: Homonuclear bond activation using a stable *N,N'*-diamidocarbene**

Kelly M. Wiggins, Jonathan P. Moerdijk and Christopher W. Bielawski\*

