

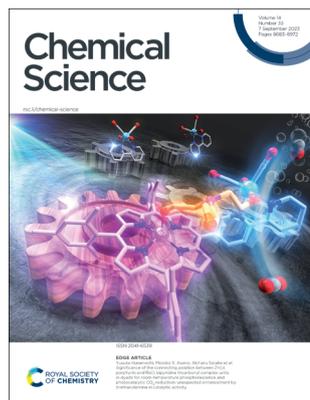
Chemical Science

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(33) 8683–8972 (2023)



Cover
See Yusuke Kuramochi, Motoko S. Asano, Akiharu Satake *et al.*, pp. 8743–8765. Image reproduced by permission of Yusuke Kuramochi from *Chem. Sci.*, 2023, 14, 8743.



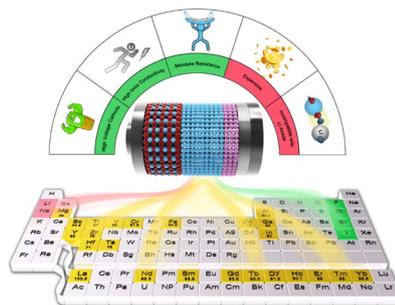
Inside cover
See Yohei Katsuyama *et al.*, pp. 8766–8776. Image reproduced by permission of Yusuke Shikai and Yohei Katsuyama from *Chem. Sci.*, 2023, 14, 8766.

REVIEW

8693

Halide solid-state electrolytes for all-solid-state batteries: structural design, synthesis, environmental stability, interface optimization and challenges

Boran Tao, Dailin Zhong, Hongda Li, Guofu Wang and Haixin Chang*

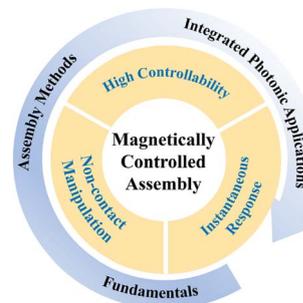


PERSPECTIVE

8723

Magnetically controlled assembly: a new approach to organic integrated photonics

Lixin Xu, Hao Jia, Chuang Zhang, Baipeng Yin* and Jiannian Yao*



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

For pre-submission queries please contact May Copsy, Executive Editor. E-mail 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 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

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

Chemical Science

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
Ryan Gilmour, WWU Münster
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
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 Mndiola, 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 Plumeré, 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 Martin
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 Chinese University of Hong Kong
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

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.

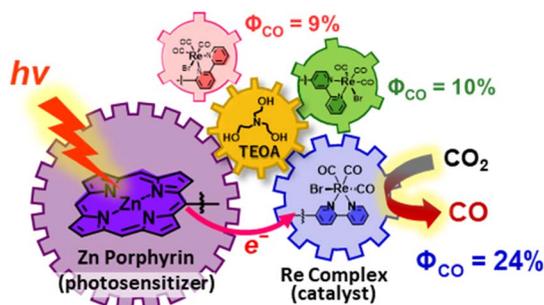
Registered charity number: 207890



8743

Significance of the connecting position between Zn(II) porphyrin and Re(I) bipyridine tricarbonyl complex units in dyads for room-temperature phosphorescence and photocatalytic CO₂ reduction: unexpected enhancement by triethanolamine in catalytic activity

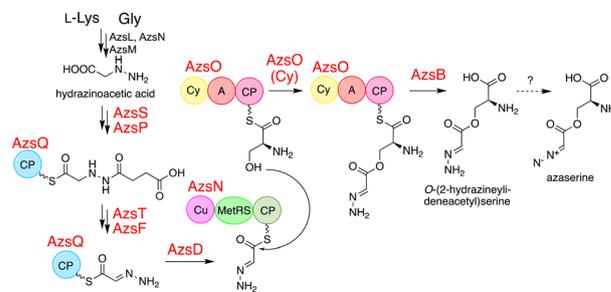
Yusuke Kuramochi,* Yuto Suzuki, Somyo Asai, Tomohiro Suzuki, Hiroki Iwama, Motoko S. Asano* and Akiharu Satake*



8766

In vitro characterization of nonribosomal peptide synthetase-dependent O-(2-hydrazineylideneacetyl) serine synthesis indicates a stepwise oxidation strategy to generate the α -diazo ester moiety of azaserine

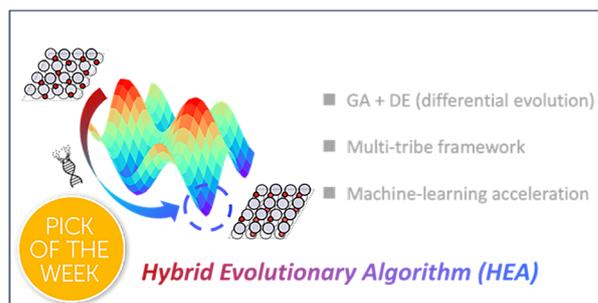
Yusuke Shikai, Seiji Kawai, Yohei Katsuyama* and Yasuo Ohnishi



8777

Accessing complex reconstructed material structures with hybrid global optimization accelerated via on-the-fly machine learning

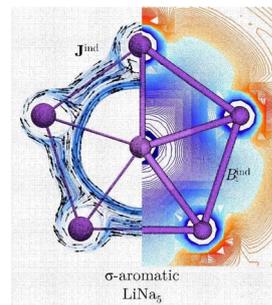
Xiangcheng Shi, Dongfang Cheng, Ran Zhao, Gong Zhang, Shican Wu, Shiyu Zhen, Zhi-Jian Zhao* and Jinlong Gong*



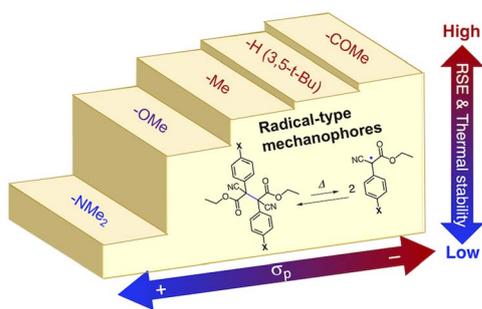
8785

Planar pentacoordinate s-block metals

Meng-hui Wang, Amlan J. Kalita, Mesías Orozco-Ic, Gai-ru Yan, Chen Chen, Bing Yan, Gabriela Castillo-Toraya, William Tiznado,* Ankur K. Guha,* Sudip Pan,* Gabriel Merino* and Zhong-hua Cui*



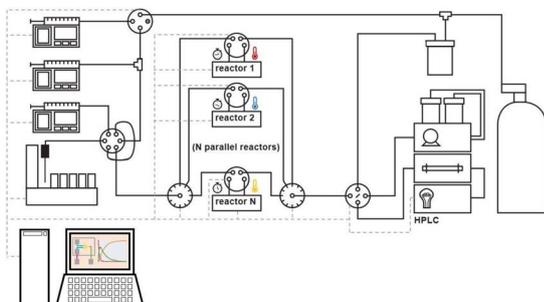
8792



A rational design strategy of radical-type mechanophores with thermal tolerance

Yi Lu, Hajime Sugita, Koichiro Mikami,* Daisuke Aoki and Hideyuki Otsuka*

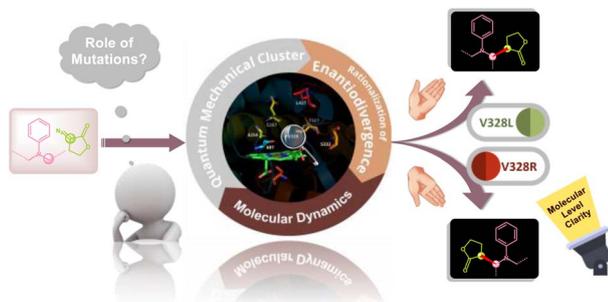
8798



Parallel multi-droplet platform for reaction kinetics and optimization

Natalie S. Eyke, Timo N. Schneider, Brooke Jin, Travis Hart, Sebastien Monfette, Joel M. Hawkins, Peter D. Morse, Roger M. Howard, David M. Pfisterer, Kakasaheb Y. Nandiwale and Klavs F. Jensen*

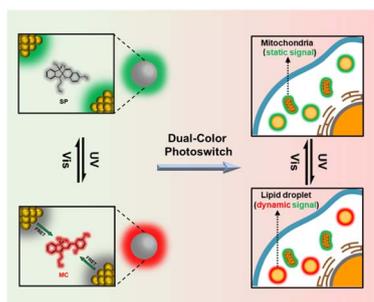
8810



Role of mutations in a chemoenzymatic enantiodivergent C(sp³)-H insertion: exploring the mechanism and origin of stereoselectivity

Ritwika Chatterjee and Garima Jindal*

8823



Ligand-protected nanocluster-mediated photoswitchable fluorescent nanoprobe towards dual-color cellular imaging

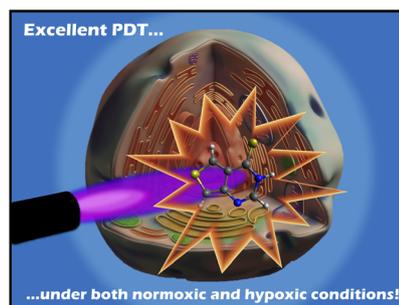
Wencheng Zhong, Kangqiang Liang, Wenfeng Liu and Li Shang*



8831

Thieno[3,4-*d*]pyrimidin-4(3*H*)-thione: an effective, oxygenation independent, heavy-atom-free photosensitizer for cancer cells

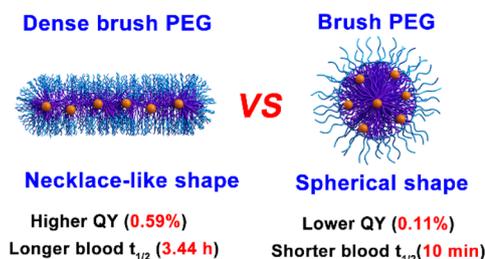
Luis A. Ortiz-Rodríguez, Ye-Guang Fang, Germain Niogret, Kaivin Hadidi, Sean J. Hoehn, Heather J. Folkwein, Steffen Jockusch, Yitzhak Tor,* Ganglong Cui,* Liraz Levi* and Carlos E. Crespo-Hernández*



8842

Controlling NIR-II emitting gold organic/inorganic nanohybrids with tunable morphology and surface PEG density for dynamic visualization of vascular dysfunction

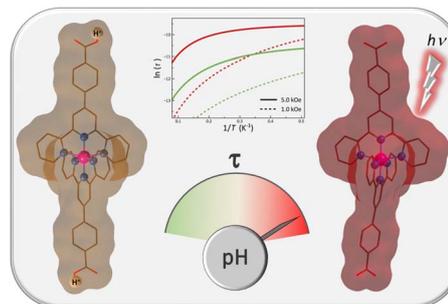
Tingyao Zhou, Menglei Zha, Hao Tang, Kai Li and Xingyu Jiang*



8850

pH-Switching of the luminescent, redox, and magnetic properties in a spin crossover cobalt(II) molecular nanomagnet

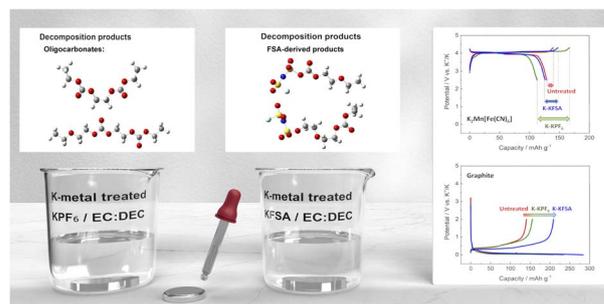
Renato Rabelo, Luminita Toma, Nicolás Moliner, Miguel Julve, Francesc Lloret, Mario Inclán, Enrique García-España, Jorge Pasán, Rafael Ruiz-García and Joan Cano*



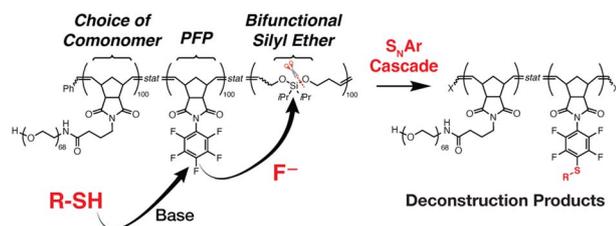
8860

Impact of electrolyte decomposition products on the electrochemical performance of 4 V class K-ion batteries

Tomooki Hosaka, Tatsuo Matsuyama, Ryoichi Tatara, Zachary T. Gossage and Shinichi Komaba*



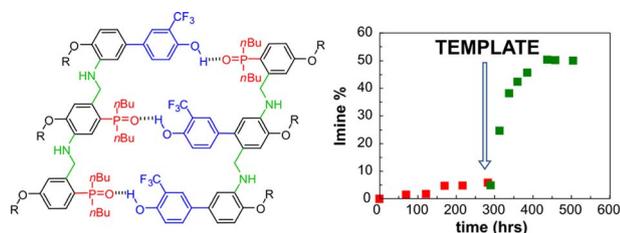
8869



Thiol-triggered deconstruction of bifunctional silyl ether terpolymers via an S_NAr-triggered cascade

Christopher M. Brown, Keith E. L. Husted, Yuyan Wang, Landon J. Kilgallon, Peyton Shieh, Hadiqa Zafar, David J. Lundberg and Jeremiah A. Johnson*

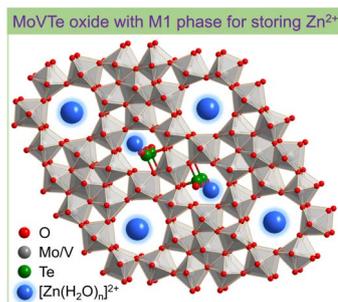
8878



Sequence-selective duplex formation and template effect in recognition-encoded oligoanilines

Daniele Rosa-Gastaldo, Andrea Dalla Valle, Tommaso Marchetti and Luca Gabrielli*

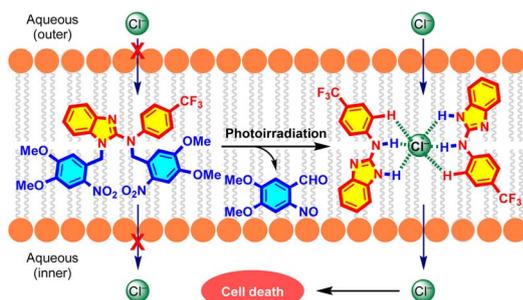
8889



Atomic scale analysis of Zn²⁺ storage in robust tunnel frameworks

Kaiyue Zhu, Hongxin Wang, Weikang Jiang, Weili Xie, Xu Li, Zhenghao Jia and Weishen Yang*

8897



Photocontrolled activation of doubly *o*-nitrobenzyl-protected small molecule benzimidazoles leads to cancer cell death

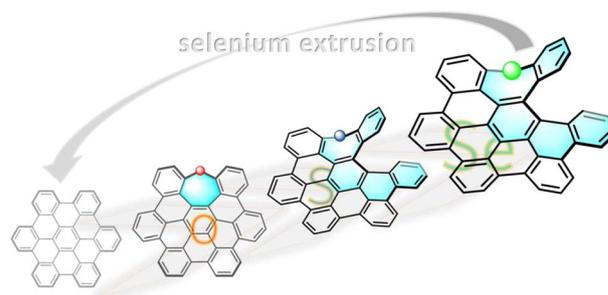
Manzoor Ahmad, Naveen J. Roy, Anurag Singh, Debashis Mondal, Abhishek Mondal, Thangavel Vijayakanth, Mayurika Lahiri and Pinaki Talukdar*



8905

Chalcogen-doped, (*seco*)-hexabenzocoronene-based nanographenes: synthesis, properties, and chalcogen extrusion conversion

Ranran Li, Bin Ma, Shengtao Li, Chongdao Lu and Peng An*



8914

Surface polarization-induced emission and stability enhancement of CsPbX₃ nanocrystals

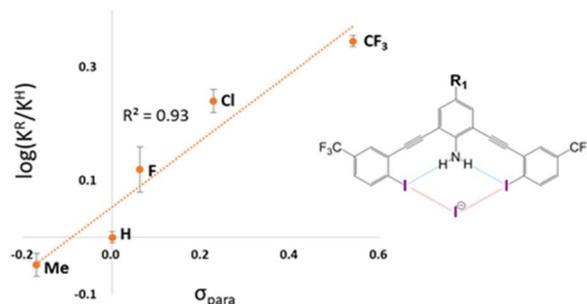
Keqiang Chen, Zixin Gu, Zhiqing Wang, Mengyu Guan, Xiu Tan, Wanqing Xu, Xinyu Ji, Weiqi Lu, Yueli Liu* and Guogang Li*



8924

The interplay between hydrogen and halogen bonding: substituent effects and their role in the hydrogen bond enhanced halogen bond

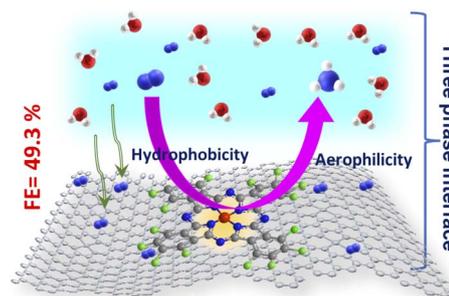
Jiyu Sun, Daniel A. Decato, Vyacheslav S. Bryantsev, Eric A. John and Orion B. Berryman*



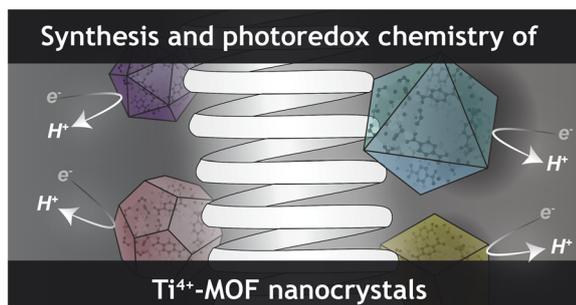
8936

Engineering hydrophobic–aerophilic interfaces to boost N₂ diffusion and reduction through functionalization of fluorine in second coordination spheres

Sakshi Bhardwaj, Sabuj Kanti Das, Ashmita Biswas, Samadhan Kapse, Ranjit Thapa and Ramendra Sundar Dey*



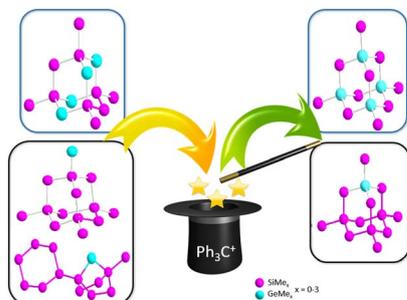
8946



Gram-scale synthesis of MIL-125 nanoparticles and their solution processability

Kevin Fabrizio, Eoghan L. Gormley, Audrey M. Davenport, Christopher H. Hendon* and Carl K. Brozek*

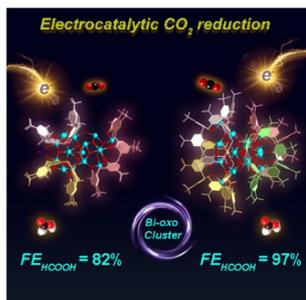
8956



Selective synthesis of germsila-adamantanes through germanium-silicon shift processes

Steffen Kühn, Benedikt Köstler, Celine True, Lena Albers, Matthias Wagner,* Thomas Müller* and Christoph Marschner*

8962



Electron delocalization of robust high-nuclear bismuth-oxo clusters for promoted CO₂ electroreduction

Baoshan Hou, Haiyan Zheng, Kunhao Zhang, Qi Wu, Chao Qin, Chunyi Sun,* Qinhe Pan, Zhenhui Kang, Xinlong Wang* and Zhongmin Su

