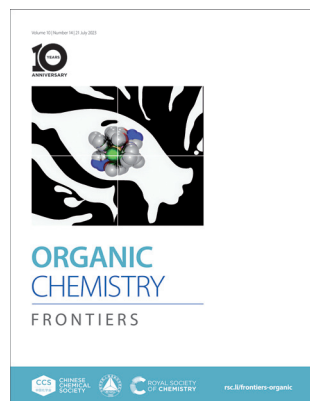


## IN THIS ISSUE

ISSN 2052-4129 CODEN OCFRA8 10(14) 3449–3702 (2023)



## Cover

See William D. G. Brittain,  
Benjamin R. Buckley,  
John S. Fossey *et al.*,  
pp. 3460–3466.

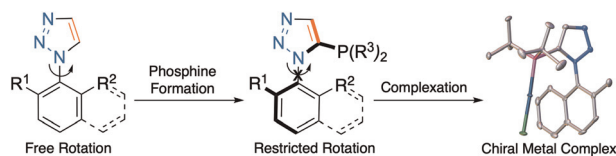
Artwork created by  
John S. Fossey from  
*Org. Chem. Front.*, 2023,  
**10**, 3460.

## RESEARCH ARTICLES

3460

**Synthesis of atropisomeric phosphino-triazoles and their corresponding gold(i) complexes**

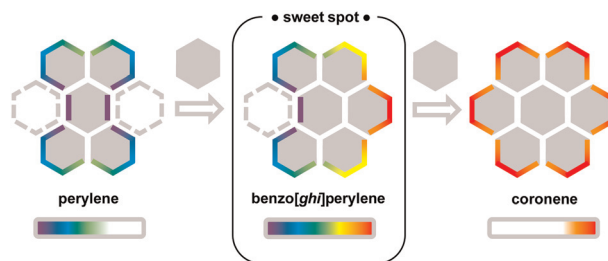
Yiming Zhao, Fernanda Meloni, Louise Male,  
Cécile S. Le Duff, William D. G. Brittain,\*  
Benjamin R. Buckley\* and John S. Fossey\*



3467

**Rational assembly of benzenoid rings in benzo[ghi]perylene yields a diversity of edge features with site-selective reactivity**

David T. Hogan, Wen Zhou, Benjamin S. Gelfand and  
Todd C. Sutherland\*



## EDITORIAL STAFF

## Executive Editor

Wenjun Liu

## Deputy Editor

Kailin Deng

## Development Editor

Cheng Du

## Editorial Production Manager

Helen Saxton

## Senior Publishing Editor

Becky Webb

## Publishing Editors

Kirstine Anderson, Matthew Bown, Laura Cooper, Hannah Fielding, Clare Fitzgerald, Anoushka Handa, Claire Harding, Alan Holder, Charlie Palmer, Rosie Rothwell, Donna Smith, Laura Smith

## Assistant Editors

Jie Gao, Yu Zhang

## Publisher

Jeanne Andres

For queries about submitted papers, please contact Helen Saxton, Editorial Production Manager, in the first instance. E-mail: [OrgChemFrontiersPROD@rsc.org](mailto:OrgChemFrontiersPROD@rsc.org)

For pre-submission queries please contact Wenjun Liu,

Executive Editor. Email: [OrgChemFrontiersED@rsc.org](mailto:OrgChemFrontiersED@rsc.org)

Organic Chemistry Frontiers (electronic: ISSN 2052-4129) is published 24 times a year by the Royal Society of Chemistry, Thomas Graham House, Science Park, Milton Road, Cambridge, CB4 0WF, UK

All orders, with cheques made payable to the Royal Society of Chemistry, should be sent to 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)

2023 Annual (electronic) subscription price: £2,182; US\$3,492. Customers in Canada will be subject to a surcharge to cover GST. Customers in the EU subscribing to the electronic version only will be charged VAT.

If you take an institutional subscription to any Royal Society of Chemistry journal you are entitled to free, site-wide web access to that journal. You can arrange access via Internet Protocol (IP) address at [www.rsc.org/ip](http://www.rsc.org/ip)

Customers should make payments by cheque in sterling payable on a UK clearing bank or in US dollars payable on a US clearing bank.

Whilst this material has been produced with all due care, the Royal Society of Chemistry cannot be held responsible or liable for its accuracy and completeness, nor for any consequences arising from any errors or the use of the information contained in this publication. The publication of advertisements does not constitute any endorsement by the Royal Society of Chemistry or Authors of any products advertised. The views and opinions advanced by contributors do not necessarily reflect those of the Royal Society of Chemistry which shall not be liable for any resulting loss or damage arising as a result of reliance upon this material. The Royal Society of Chemistry is a charity, registered in England and Wales, Number 207890, and a company incorporated in England by Royal Charter (Registered No. RC000524), registered office: Burlington House, Piccadilly, London W1J 0BA, UK, Telephone: +44 (0) 207 4378 6556.

## Advertisement sales:

Tel +44 (0) 1223 432246; Fax +44 (0) 1223 426017;

E-mail [advertising@rsc.org](mailto:advertising@rsc.org)

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

# ORGANIC CHEMISTRY

## FRONTIERS

An international, high impact journal for cutting-edge researches from all disciplines of organic chemistry.



CHINESE  
CHEMICAL  
SOCIETY



### rsc.li/frontiers-organic

Published in collaboration with the Chinese Chemical Society and Shanghai Institute of Organic Chemistry, Chinese Academy of Sciences

### Editorial Board

#### Editor-in-Chief

Shengming Ma, Shanghai Institute of Organic Chemistry, China

#### Associate Editors

Arjan W. Kleij, Institute of Chemical Research of Catalonia, Spain  
Chulbom Lee, Seoul National University, Korea  
Bill Morandi, ETH Zurich, Switzerland

Jennifer M. Schomaker, University of Wisconsin-Madison, USA  
Frank Würthner, University of Würzburg, Germany  
Pei-Qiang Huang, Xiamen University, China  
Qian Zhang, Northeast Normal University, China

#### Members

Guy Bertrand, University of California, San Diego, USA  
Nicolai Cramer, EPFL, Switzerland  
Louis Fensterbank, Sorbonne Université, France  
Lichang Wang, Southern Illinois University, USA  
Dan Yang, Westlake University, China

### Advisory Board

Ayyappanpillai Ajayaghosh, National Institute for Interdisciplinary Science and Technology, India  
Lutz Ackermann, Georg-August-Universität Göttingen, Germany  
Marco Bandini, University of Bologna, Italy  
Matthias Beller, University of Rostock, Germany  
Akshattu T. Biju, Indian Institute of Science, India  
Xi Chen, University of California-Davis, USA  
Yiyun Chen, Shanghai Institute of Organic Chemistry, China  
Yonggui Robin Chi, Nanyang Technological University, Singapore  
Stuart Conway, University of Oxford, UK  
Shuanhu Gao, East China Normal University, China  
Véronique Gouverneur, University of Oxford, UK

Frank Glorius, Westfälische Wilhelms-Universität Münster, Germany  
Zhenhua Gu, University of Science and Technology of China, China  
Masayuki Inoue, The University of Tokyo, Japan  
Guochen Jia, Hong Kong University of Science & Technology, China  
Michael Kerr, University of Western Ontario, Canada  
Ohyun Kwon, University of California, Los Angeles, USA  
Rai-Shung Liu, National Tsing Hua University, Hsinchu  
Sanzhong Luo, Tsinghua University, China  
Cristina Nevado, University of Zurich, Switzerland  
Christoph Schalley, Freie Universität Berlin, Germany

Daniel Seidel, University of Florida, USA  
Feng Shi, Jiangsu Normal University, China  
Yian Shi, Colorado State University, USA  
Vinod K. Singh, IIT Kanpur, India  
Wenjun Tang, Shanghai Institute of Organic Chemistry, China  
Yong Tang, Shanghai Institute of Organic Chemistry, China  
Chen-Ho Tung, Technical Institute of Physics and Chemistry, CAS, China  
Tao Ye, Peking University (Shenzhen), China  
Tomoki Ogoshi, Kanazawa University, Japan  
Zhaohui Wang, Tsinghua University, China  
Lizhu Wu, Technical Institute of Physics and Chemistry, CAS, China  
Xingang Zhang, Shanghai Institute of Organic Chemistry, China

### Information for Authors

Full details on how to submit material for publication in Organic Chemistry Frontiers 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/frontiers-organic](http://rsc.li/frontiers-organic)

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 Partner Organisations 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

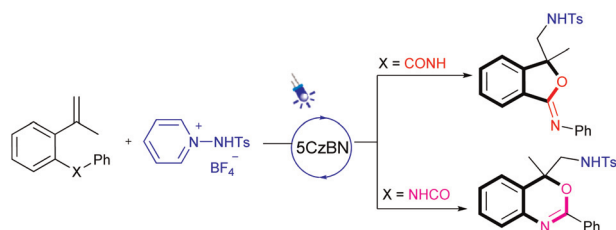


## RESEARCH ARTICLES

3479

### Photo-induced cyclization of olefinic amides towards sulfonamidylated iminoisobenzofurans and benzoxazines

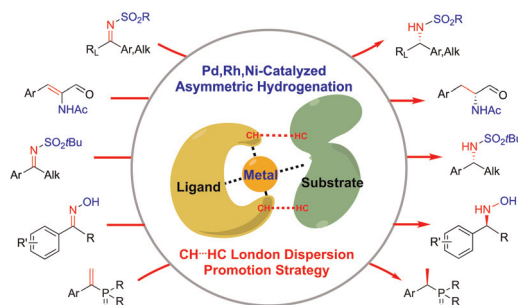
Changduo Pan, Shipeng Luo, Yechun Wu, Jin-Tao Yu\* and Chengjian Zhu\*



3485

### The role of attractive dispersion interaction in promoting the catalytic activity of asymmetric hydrogenation

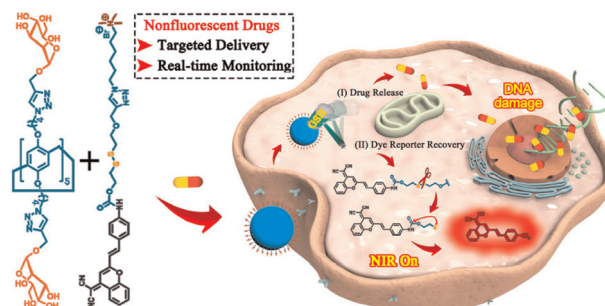
Limin Yang,\* Bo Li and K. N. Houk\*



3491

### A mannose-functionalized pillar[5]arene-based supramolecular fluorescent probe for real-time monitoring of gemcitabine delivery to cancer cells

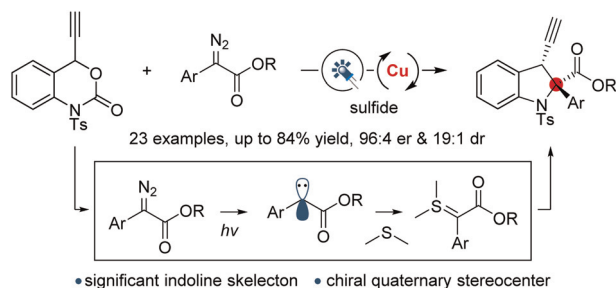
Shuang Chao, Pei Huang, Ziyang Shen, Yuxin Pei, Yinghua Lv,\* Yuchao Lu\* and Zhichao Pei\*



3498

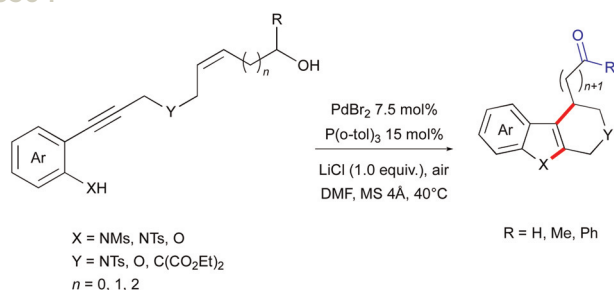
### Photoinduced carbene transfer for copper-catalyzed asymmetric [4 + 1] cycloadditions: an entry to chiral indolines bearing quaternary stereocenters

Bao-Le Qu, Bin Shi, Lin He, Jun-Wei Shi, Wen-Jing Xiao and Liang-Qiu Lu\*



## RESEARCH ARTICLES

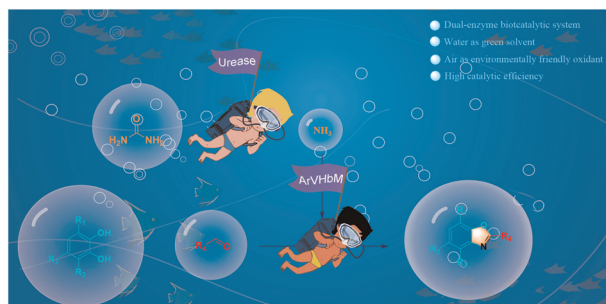
3504



**Palladium-catalyzed cascade cyclization/  
intramolecular redox-relay Heck arylation of  
alkenols: access to tetrahydro-β-carbolines from  
2-(hydroxyalkenynyl)sulfonanilides**

Tao Liu, Tuanli Yao,\* Ruihua Guo\* and Xiangyang Qin\*

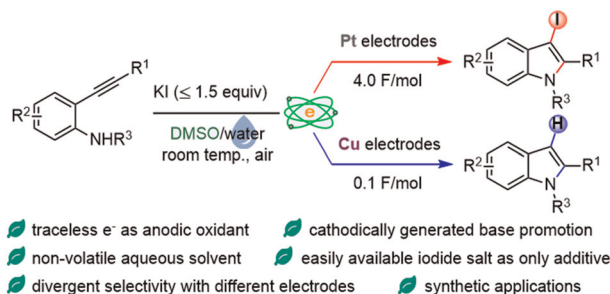
3509



**Novel dual-enzyme system for synthesis of 2-alkyl  
and 2-arylbenzoxazoles via aerobic oxidation**

Fengxi Li, Yaning Xu, Yuelin Xu, Jinglin Ma, Hanqing Xie, Hengzheng Yang, Weiwei Han, Chunyu Wang, Zhengqiang Li\* and Lei Wang\*

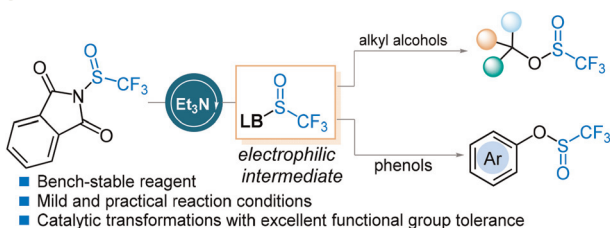
3515



**Divergent electrosynthesis of 3-iodoindoles and  
indoles from 2-ethynylanilines under ambient and  
aqueous conditions**

Binbin Huang,\* Guiling Chen, Haoxiang Zhang, Xinye Tang, Jiawei Yuan, Caicai Lu and Junlei Wang\*

3522



**Lewis base-catalyzed trifluoromethylsulfonylation  
of alcohols and phenols: modular synthesis of  
trifluoromethanesulfonate esters**

Wen Liu, Shuya Xing, Shao-Fei Ni, Cheng Ma, Qiujin Fan, Zhiyong Ye, Yanchuang Zhao, Ting Ouyang, Ying Bai\* and Xinxin Shao

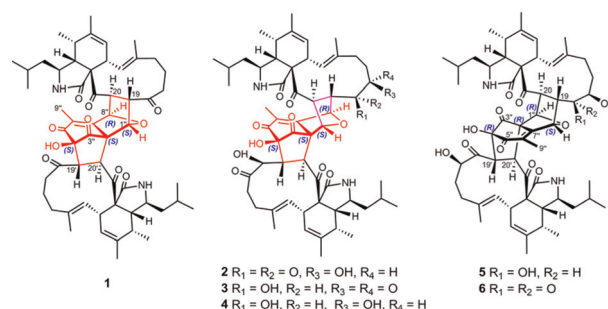


## RESEARCH ARTICLES

3530

### Amichalazines F–J: cytochalasan heterotrimers with mirror-imaged core structures from *Aspergillus micronesiensis*

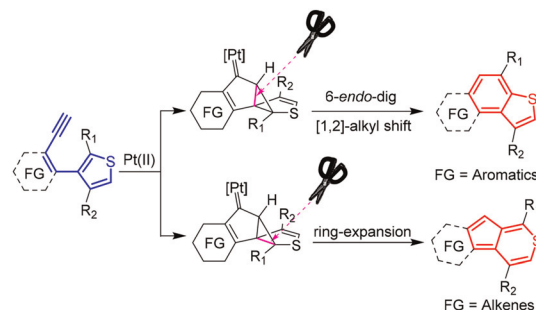
Zhaodi Wu, Xiaotian Zhang, Qin Li, Qingyi Tong, Jing Yang, Chunmei Chen,\* Hucheng Zhu\* and Yonghui Zhang\*



3537

### Selective 6-*endo-dig* and ring-expansion cycloisomerizations of *ortho*-disubstituted thiophenes bearing 1-en-3-yne moieties

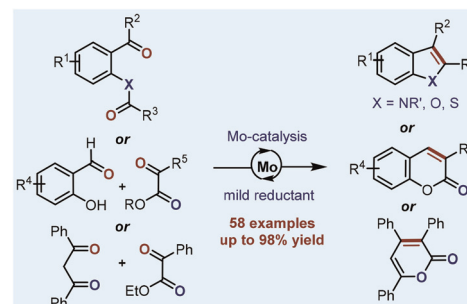
Yingjian Ren, Zhanglang Zhou, Weinan Chen, Si Liu, Min Wang and Gang Zhou\*



3544

### Molybdenum-catalyzed carbonyl–carbonyl olefination reaction for heterocycle syntheses

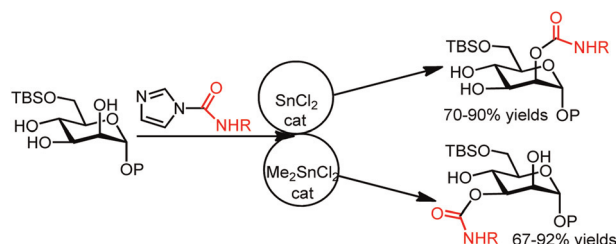
Yuan-Qing Dong, Xiao-Nan Shi, Li-Ya Cao, Jin Bai and Chun-Xiang Zhuo\*



3553

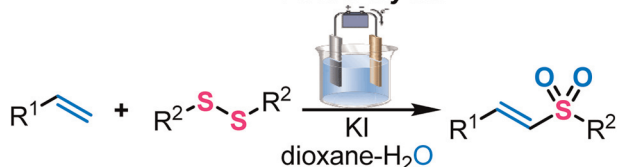
### Site-selective carbamoylation of carbohydrates catalyzed by SnCl<sub>2</sub>/Me<sub>2</sub>SnCl<sub>2</sub> leading to complementary selectivity

Yang-Fan Guo, Tao Luo and Hai Dong\*



## RESEARCH ARTICLES

3559

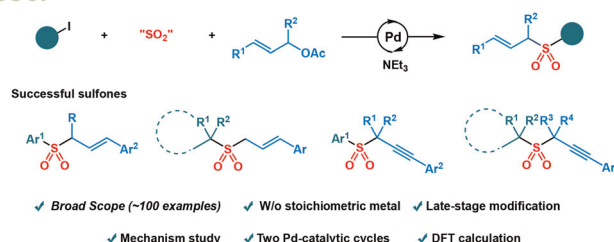
**Electrolysis**

- **electrochemically induced disulfides activation**
- **multistep sulfonylation in one laboratory step**
- **easily reproducible**

**Disulfides as versatile starting reagents: effective sulfonylation of alkenes with disulfides under electrochemical conditions**

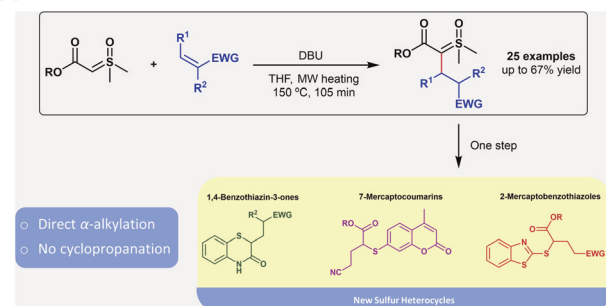
Olga M. Mulina, Mikhail M. Doronin, Liang-Nian He and Alexander O. Terent'ev\*

3567

**A palladium-catalyzed cross-electrophile coupling reaction involving sulfur dioxide for the direct synthesis of diversely functionalized sulfones**

Baojian Xiong, Jinyu Zhang, Ting Wang, Xuemei Zhang, Gui-juan Cheng\* and Zhong Lian\*

3577

**The  $\alpha$ -alkylation of carbonyl sulfoxonium ylides: studies and applications in the synthesis of new sulfur heterocycles**

Matheus P. de Jesus, Radell Echemendía and Antonio C. B. Burtoloso\*

3585

**Organophotoredochemical silylation cyclization for the synthesis of silylated 3-CF<sub>3</sub>-2-oxindoles**

Qinhui Wan, Chen-Yin Huang, Zhong-Wei Hou,\* Huajiang Jiang and Lei Wang\*



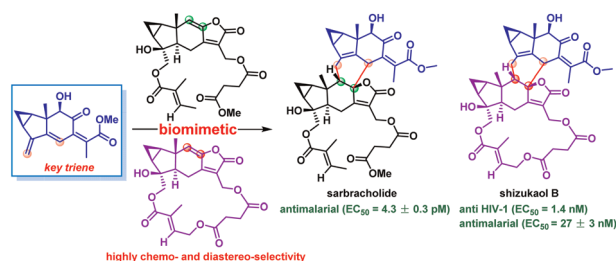


## RESEARCH ARTICLES

3591

## Asymmetric total syntheses of sarbracholide and shizukaol B

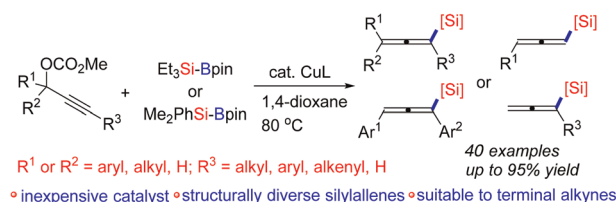
Ganxing Huang, Zhengsong Huang, Xianjian Ma, Zhihu Feng, Fengxia Yuan, Song Qin, Shaomin Fu\* and Bo Liu\*



3598

## Copper-catalyzed silylation of propargyl carbonates: a general entry to allenylsilanes

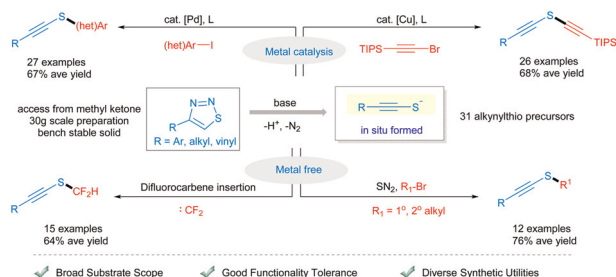
He Zhang, Linjuan Jiang, Mei Yang and Yuanhong Liu\*



3603

Alkyne/thio umpolung tactic replacement: synthesis of alkynyl sulfides via capturing the *in situ* formed alkynylthiolate anion

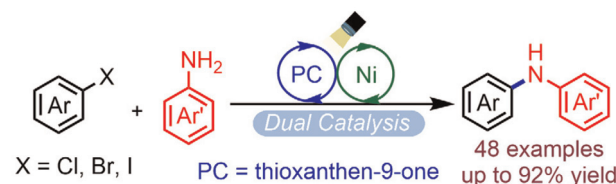
Donghui Xing, Mengxia Feng, Yuzhen Zheng, Bin Huang, Huanfeng Jiang and Liangbin Huang\*



3612

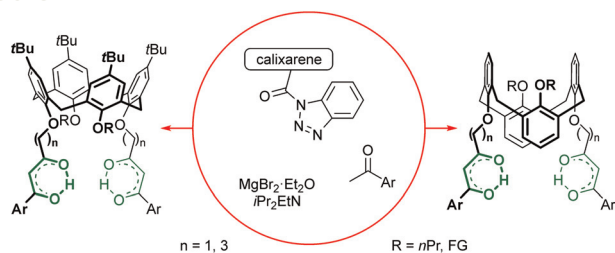
## Visible-light-initiated nickel-catalyzed amination of aryl halides using thioxanthen-9-one as a photocatalyst

Da-Liang Zhu, Jie Li, David James Young, Yanqing Wang\* and Hong-Xi Li\*



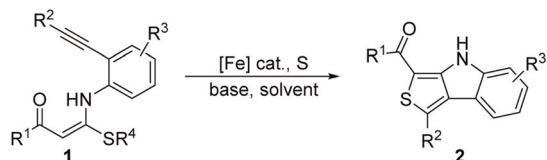
## RESEARCH ARTICLES

3619

**Enriching calixarene functionality with 1,3-diketone groups**

Maria Sakovich, Daria Sokolova, Ivan Alekseev, Ivan Lentin, Alexander Gorbunov, Maria Malakhova, Ivan Ershov, Rustem Zairov, Ilia Korniltsev, Sergey Podyachev, Stanislav Bezzubov, Vladimir Kovalev and Ivan Vatsouro\*

3637

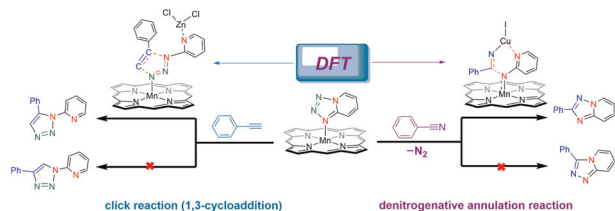


- 1,2-S migration ■  $\text{Csp}^3$ -S bond cleavage and  $\text{Csp}^2$ -S bond formation
- a indole ring and a fused thiophene ring formation in one step
- good functional group tolerance and broad substrate scope

**Fe/S cluster catalyzed cascade cyclization of *N,S*-1,6-enynes for the synthesis of thieno[3,4-*b*]indoles**

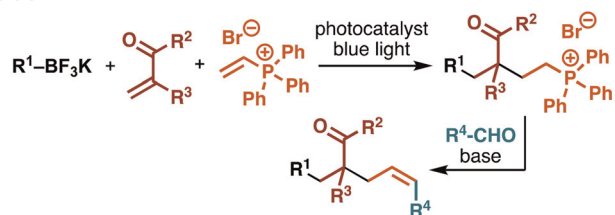
Zhuqing Liu, Shaobin Sun and Jiang Lou\*

3642

**Mechanisms and origin of regioselectivity for manganese-catalyzed denitrogenative annulation and click reactions**

Guanghui Song, Wei Rong, Yongyin Liu and Juan Li\*

3654



- Radical addition to two electron-deficient alkenes in a specific order
- Z-Selective synthesis of  $\gamma,\delta$ -unsaturated ketones and esters

**Sequence-selective three-component reactions of alkyltrifluoroborates with  $\alpha,\beta$ -unsaturated carbonyl compounds and vinylphosphonium salts**

Masaki Yoshida, Masaya Sawamura\* and Yusuke Masuda\*



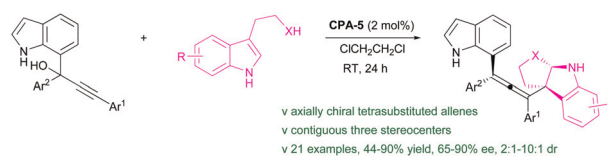


## RESEARCH ARTICLES

3662

**Organocatalytic enantioselective reaction of tertiary  $\alpha$ -(7-indolyl)methanols with tryptamines**

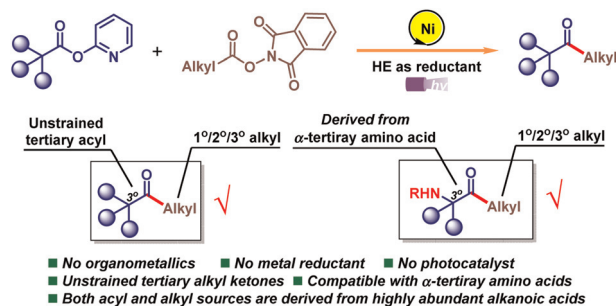
Zhibin Yue, Boming Shen, Jie Cao, Xuling Chen, Fang Fang, Pengfei Li,\* Peiyuan Yu\* and Wenjun Li\*



3669

**Photoinduced nickel-catalyzed reductive acyl cross-coupling: facile access to all carbon quaternary aliphatic ketones**

Yukun Chen, Xiaoxiang Xi and Weiming Yuan\*

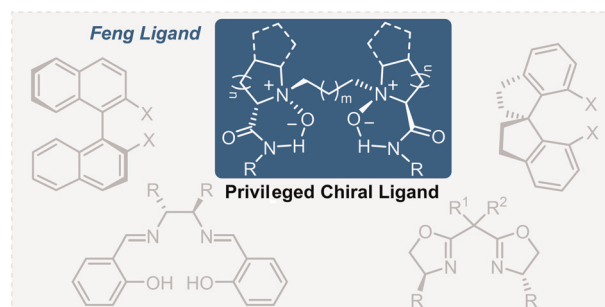


## HIGHLIGHT

3676

**Feng chiral  $N,N'$ -dioxide ligands: uniqueness and impacts**

Dian-Feng Chen and Liu-Zhu Gong\*



## REVIEW

3684

**Recent advances in the chemistry of  $\alpha$ -oxylboronate reagents**

Nanquan Jiang, Du Chen and Chao Liu\*

