

# Green Chemistry

Cutting-edge research for a greener sustainable future

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## IN THIS ISSUE

ISSN 1463-9262 CODEN GRCHFJ 25(24) 10103–10696 (2023)



### Cover

See Jean-Philippe Tessonnier, Luke T. Roling *et al.*, pp. 10387–10397.

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### Inside cover

See Yun Jeong Hwang, Jonggeol Na *et al.*, pp. 10398–10414.

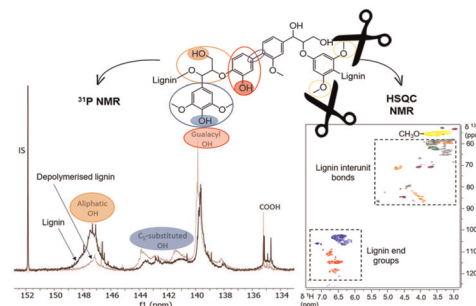
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## TUTORIAL REVIEWS

10117

### Selective demethylation reactions of biomass-derived aromatic ether polymers for bio-based lignin chemicals

Florian M. Harth, Brigita Hočevár, Tina Ročnik Kozmelj, Edita Jasiukaitytė-Grozddek, Jana Blüm, Michael Fiedel, Blaž Likozar\* and Miha Grilc\*



10144

### Electrochemical cascade reactions: an account of recent developments for this modern strategic tool in the arsenal of chemical synthesis

Manoj Kumar Yadav and Sushobhan Chowdhury\*



**Electrochemical Cascade process**  
Electricity as green catalyst-oxidant-mediator!!  
Integrated reaction steps!! Shorter reaction time!!  
Minimal chemical waste!!

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# Green Chemistry

Cutting-edge research for a greener sustainable future

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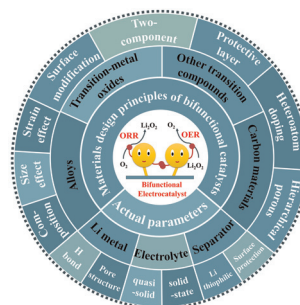


## TUTORIAL REVIEWS

10182

**Advanced nano-bifunctional electrocatalysts in Li–air batteries for high coulombic efficiency**

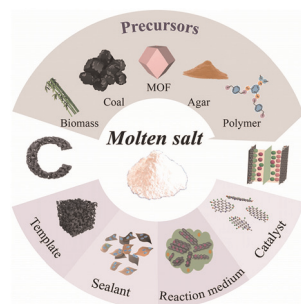
Jinyu Zhao, Rajesh Pathak,\* Zhenxin Zhao, Xu Chen, Madan Bahadur Saud, Hansheng Li, Fan Wu, Quinn Qiao, Jeffrey W. Elam\* and Xiaomin Wang\*



10209

**Molten salt technique for the synthesis of carbon-based materials for supercapacitors**

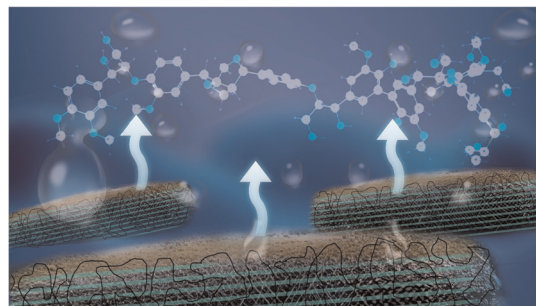
Yu Yang, Yunping Ma, Congcong Lu, Songjun Li\* and Maiyong Zhu\*



10235

**The dawn of aqueous deep eutectic solvents for lignin extraction**

Mingyang Hu, Yanyan Yu, Xiaoyan Li, Xinyu Wang and Yun Liu\*



10263

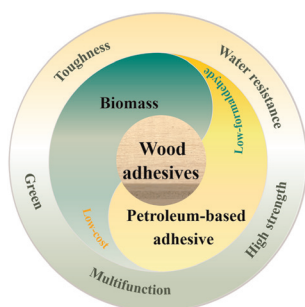
**Salt-assisted synthesis of advanced carbon-based materials for energy-related applications**

Maiyong Zhu,\* Yu Yang and Yunping Ma



## CRITICAL REVIEWS

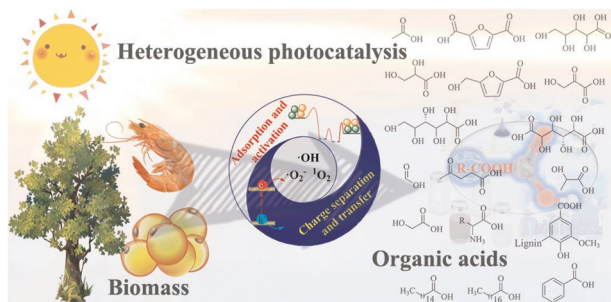
10304



## Recent progress of biomass in conventional wood adhesives: a review

Wei Tian, Xiaoyi Wang, Yuhang Ye, Weijie Wu, Yuli Wang, Shaohua Jiang, Jiangbo Wang and Xiaoshuai Han\*

10338

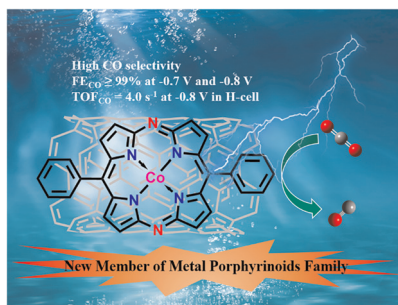


## Heterogeneous photocatalysis for biomass valorization to organic acids

Tengyu Liu, Jinshu Huang, Jie Li, Keping Wang, Zhenyan Guo, Hongguo Wu,\* Song Yang and Hu Li\*

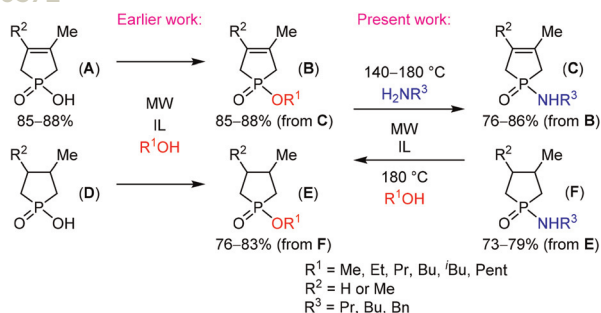
## COMMUNICATIONS

10366

Cobalt macrocyclic complex-catalyzed selective electroreduction of CO<sub>2</sub> to CO

Wen-Jun Xie, Jin-Mei Chen, Zhi-Wen Yang and Liang-Nian He\*

10372



## Microwave-assisted, ionic liquid-catalyzed aminolysis and alcoholysis of phosphinic derivatives: the interconversion of phosphinates and phosphinic amides

György Keglevich,\* Nikolett Harsági and Sarolta Szilágyi



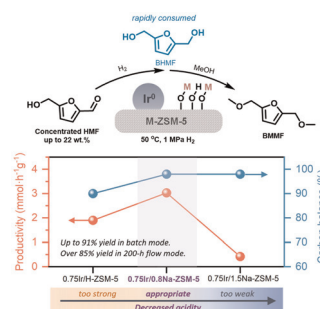


## COMMUNICATIONS

10381

## Towards scalable reductive etherification of 5-hydroxymethyl-furfural through iridium-zeolite-based bifunctional catalysis

Zehui Sun, Mugeng Chen, Kaizhi Wang, Chen Chen, Jiachen Fei, Wendi Guo, Conglin Zhu, Heyong He, Yongmei Liu\* and Yong Cao\*

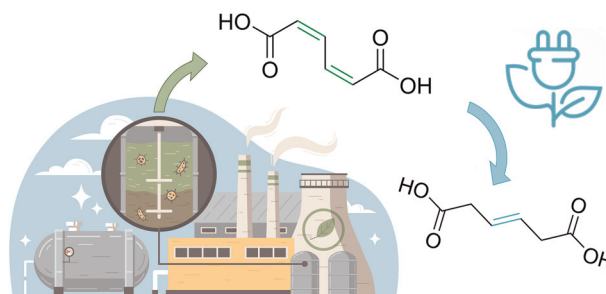


## PAPERS

10387

## Local reactivity descriptors to decipher the electrochemical hydrogenation of unsaturated carboxylic acids

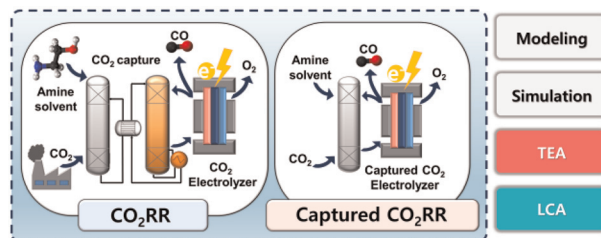
Marco Nazareno Dell'Anna, Geet Gupta, Prathamesh T. Prabhu, Ting-Hung Chu, Luke T. Roling\* and Jean-Philippe Tessonier\*



10398

## Techno-economic analysis and life-cycle assessment of the electrochemical conversion process with captured CO₂ in an amine-based solvent

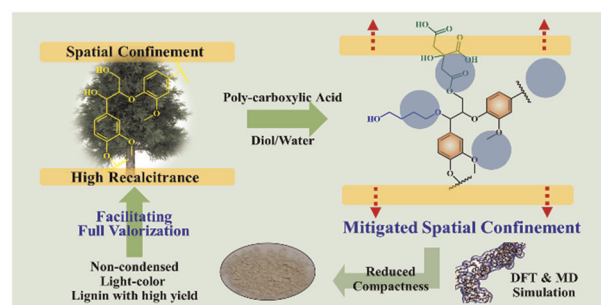
Suhyun Lee, Woong Choi, Jae Hyung Kim, Sohyeon Park, Yun Jeong Hwang\* and Jonggeol Na\*



10415

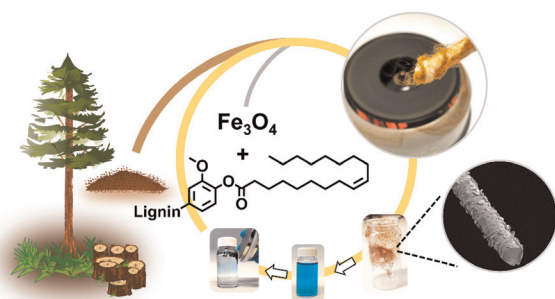
## Synergizing mitigated spatial confinement and chemical stabilization of lignin facilitates full utilization of lignocellulose

Jiayi Zheng, Liheng Chen,\* Xueqing Qiu,\* Shirong Sun and Xuliang Lin



## PAPERS

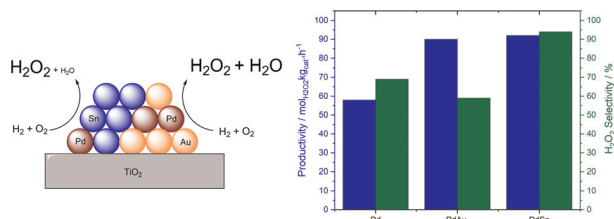
10424



### Mechanically recyclable melt-spun fibers from lignin esters and iron oxide nanoparticles: towards circular lignin materials

Unnimaya Thalakkale Veettil, Adrian Moreno, Alberto J. Huertas-Alonso, Mohammad Morsali, Ievgen V. Pylypchuk, Li-Yang Liu and Mika H. Sipponen\*

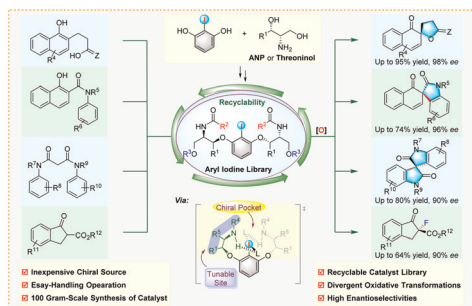
10436



### A comparative study of palladium-gold and palladium-tin catalysts in the direct synthesis of H<sub>2</sub>O<sub>2</sub>

Dávid Kovačič, Richard J. Lewis,\* Caitlin M. Crombie, David J. Morgan, Thomas E. Davies, Ángeles López-Martín, Tian Qin, Christopher S. Allen, Jennifer K. Edwards, Liwei Chen, Martin Skov Skjøth-Rasmussen, Xi Liu\* and Graham J. Hutchings\*

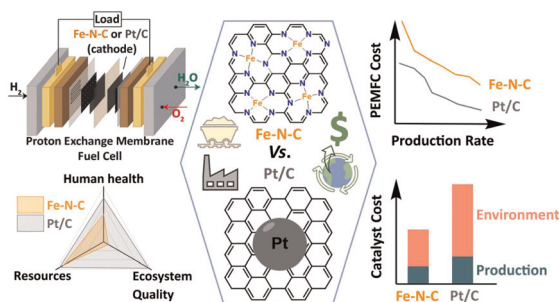
10447



### New conformationally flexible and recyclable aryl iodine catalysts from an inexpensive chiral source for asymmetric oxidations

Hai-Jie Zhou, Yi-Ping Yao, Tonghui Zhang, Biao Chen, Xu Wang, Hang Zhao, Jie Zeng, Jian-Ai Chen, Xiao Xiao\* and Fen-Er Chen\*

10458



### Comparative techno-economic and life-cycle analysis of precious versus non-precious metal electrocatalysts: the case of PEM fuel cell cathodes

Angus Pedersen, Jinil Pandya, Grazia Leonzio, Alexey Serov, Andrea Bernardi, Ifan E. L. Stephens, Maria-Magdalena Titirici, Camille Petit and Benoît Chachuat\*

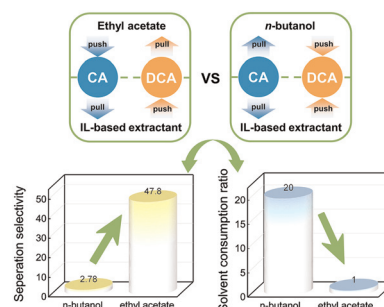


## PAPERS

10472

# A synergistic 'push and pull' ionic liquid biphasic system for enhanced extraction separation of cholic acid and deoxycholic acid

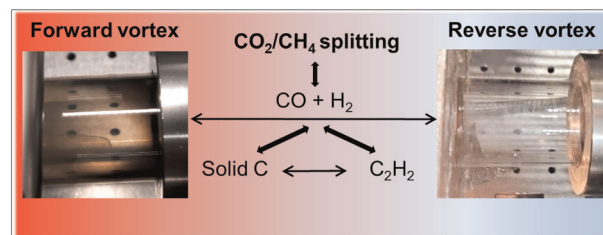
Zexiang Ding, Fanding Rong, Yifeng Cao,\*  
Yuanyuan Shen, Liu Yang, Lihang Chen, Qiwei Yang,  
Zhiguo Zhang, Qilong Ren and Zongbi Bao\*



10485

# Avoiding solid carbon deposition in plasma-based dry reforming of methane

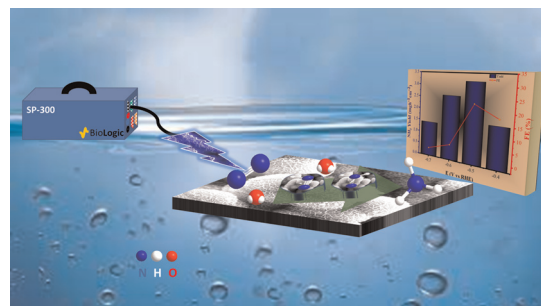
Omar Biondo,\* Cas F. A. M. van Deursen,  
Ashley Hughes, Alex van de Steeg, Waldo Bongers,  
M. C. M. van de Sanden, Gerard van Rooij and  
Annemie Bogaerts



10498

# One-step synthesized Nb<sub>2</sub>O<sub>5-y</sub>-decorated spinel-type (Ni,V,Mn)<sub>3</sub>O<sub>4-x</sub> nanoflowers for boosting electrocatalytic reduction of nitrogen into ammonia

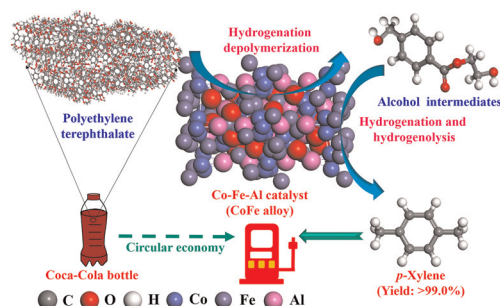
Tadele Negash Gameda, Dong-Hau Kuo\* and  
Quoc-Nam Ha



10513

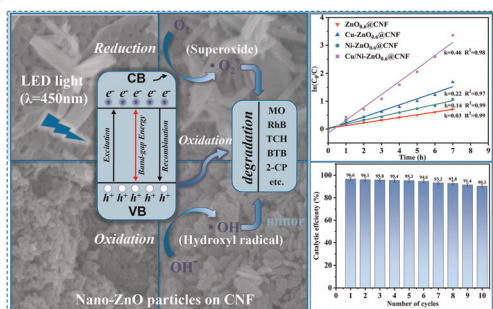
# The quantitative conversion of polyethylene terephthalate (PET) and Coca-Cola bottles to p-xylene over Co-based catalysts with tailored activities for deoxygenation and hydrogenation

Yuewen Shao, Mengjiao Fan, Kai Sun, Guoming Gao,  
Chao Li, Dianqiang Li, Yuchen Jiang, Lijun Zhang,  
Shu Zhang and Xun Hu\*



## PAPERS

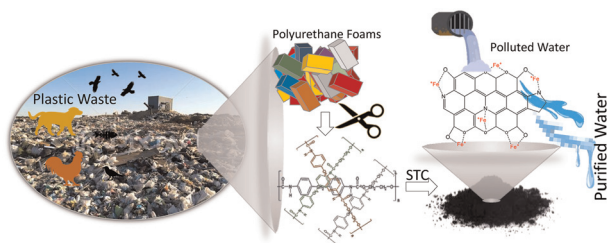
10530



### Cu and Ni dual-doped ZnO nanostructures templated by cellulose nanofibrils for the boosted visible-light photocatalytic degradation of wastewater pollutants

Jiangang Yu,\* Pingnian Bao, Jia Liu, Yi Jin, Jie Li and Yanwen Lv\*

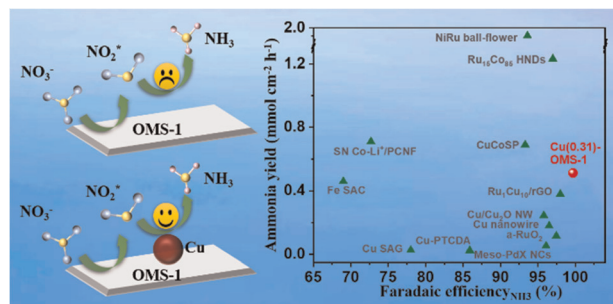
10538



### A sustainable waste plastic valorisation: conversion of discarded polyurethane into an active micro-cleaner using a DES system

Ashok Shrishail Maraddi, Manohara Halanur Mruthunjayappa, Smitha V. Kamath, Glenita D'Souza, Hyeonseok Yoon\* and S. K. Nataraj\*

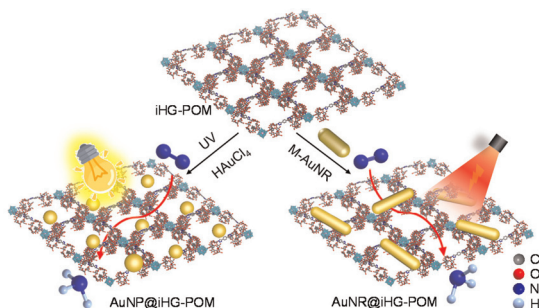
10549



### Near 100% selectivity for ammonia synthesis at a high current density by promoting nitrate protonation on the copper dispersed todorokite-type manganese oxide

Shijia Li, Chuqian Xiao, Rongzhen Chen, Mengyi Wang, Yuting Ma, Kaiwen Luo, Muyao Shen, Yihua Zhu, Yuhang Li\* and Chunzhong Li\*

10556



### Gold nanocrystal-loaded 2D supramolecular network for plasmon-enhanced nitrogen fixation

Gengxin Wang, Bingjin Li, Bao Li\* and Lixin Wu\*



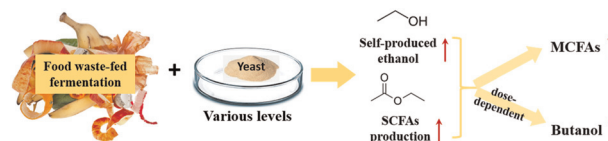


## PAPERS

10567

### Converting food waste into high-value medium chain fatty acids and long chain alcohols *via* chain elongation with an internally produced electron donor

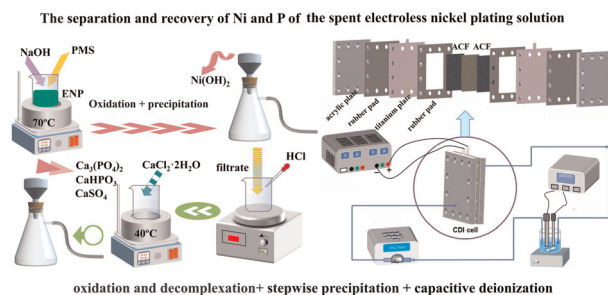
Lan Wu, Wei Wei,\* Jin Qian, Xueming Chen and Bing-Jie Ni\*



10576

### Integrating multi-method approaches for the green separation and retrieval of nickel and phosphorus from spent electroless nickel plating solutions

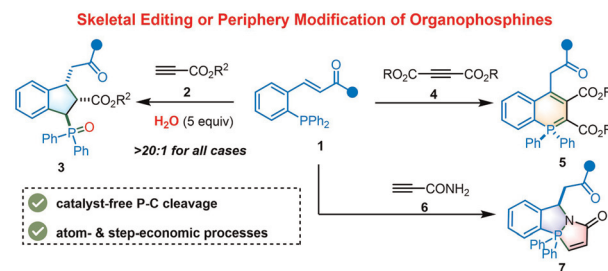
Zhontian Dong, Zhiren Zhao, Fenghe Wang, Fengyun Wang\* and Mingzhu Xia\*



10587

### Distinct reactivities of *ortho*-chalcone-substituted organophosphines with activated alkynes: skeletal editing or periphery modification

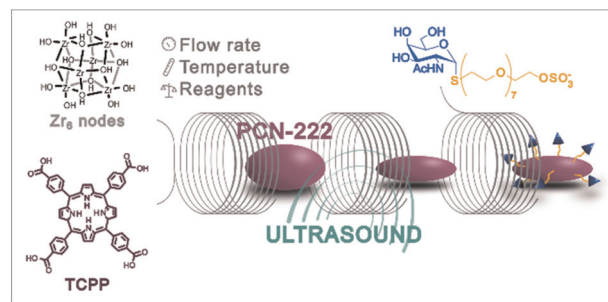
Chaoyang Li, Xinyue Niu, Wan Xu,\* Zhanwei Bu, Wenjing Zhang\* and Qilin Wang\*



10596

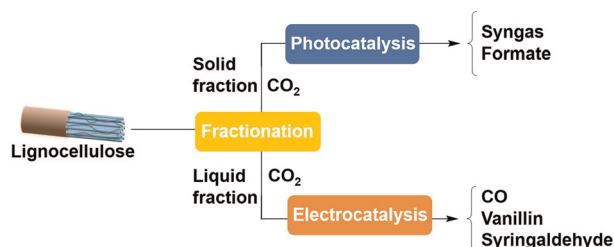
### Continuous flow synthesis of PCN-222 (MOF-545) with controlled size and morphology: a sustainable approach for efficient production

Alessio Zuliani,\* M. Carmen Castillejos and Nouredine Khier\*



## PAPERS

10611



### Valorisation of lignocellulose and low concentration $\text{CO}_2$ using a fractionation–photocatalysis–electrolysis process

Santiago Rodríguez-Jiménez, Erwin Lam, Subhajit Bhattacharjee and Erwin Reisner\*

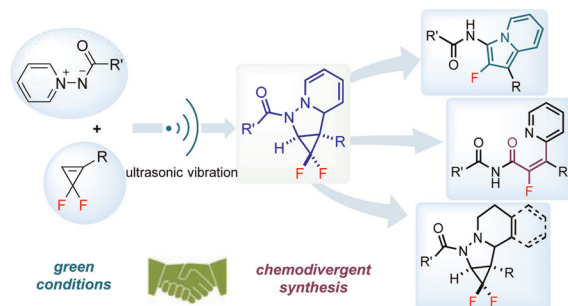
10622



### Selective chemical disassembly of elastane fibres and polyurethane coatings in textiles

Martin B. Johansen, Bjarke S. Donslund, Martin L. Henriksen, Steffan K. Kristensen\* and Troels Skrydstrup\*

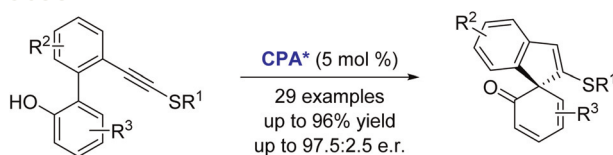
10630



### Practical conversion of *gem*-difluorocyclopropenes for the chemodivergent assembly of fluorinated heterocyclic frameworks

Dongping Pan, Fu-Xiaomin Liu, Zhongyi Zeng, Junwei Ye, Ying Cai, Shengdong Wang, Zhi Zhou\* and Wei Yi\*

10638



### Chiral Brønsted acid-catalyzed asymmetric dearomative spirocyclization of alkynyl thioethers

Xin-Yang Fan, Jia-Cheng Li, Ji-Jia Zhou,\* Bo Zhou and Long-Wu Ye\*

- 1st metal-free asymmetric reaction of alkynyl thioethers
- CADA reaction via direct alkyne activation
- unique S-containing products
- high enantioselectivity

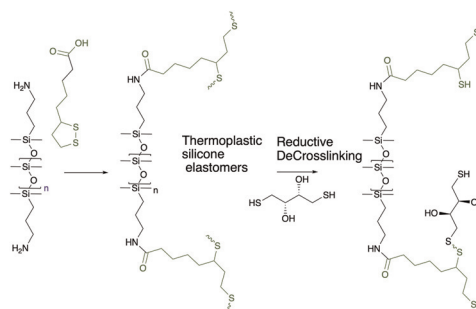


## PAPERS

10644

## Thermoplastic, redox recyclable silicone–lipoamide elastomers

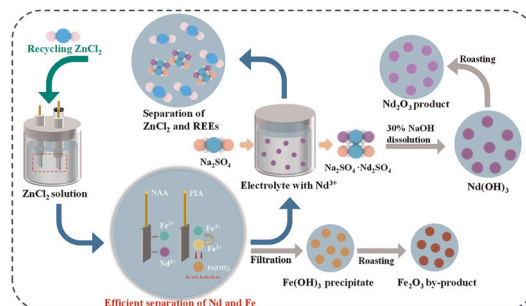
Muhammad Ebad Noman, Sijia Zheng, Haiyan Xue and Michael A. Brook\*



10653

## An acid-free process for selective REE recovery from spent NdFeB magnets by room-temperature electrolysis

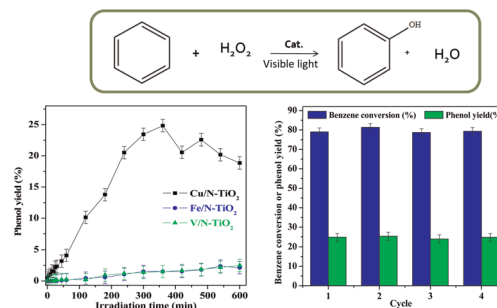
Zhang Zhihan, Wang Zhi, Wang Dong,\* Min Rui, Xiao Wanhai, Lin Yong and Li Guobiao\*



10664

## Tuning the selectivity of visible light-driven hydroxylation of benzene to phenol by using Cu, Fe and V oxides supported on N-doped TiO2

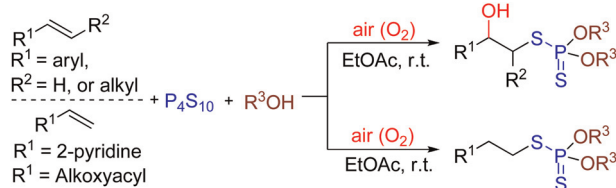
Antonietta Mancuso, Alessandro Gottuso, Francesco Parrino,\* Rosaria Anna Picca, Vincenzo Venditto, Olga Sacco\* and Vincenzo Vaiano



10678

## Additive-free aerobic oxidative difunctionalization of alkenes with P4S10 and alcohols to access β-hydroxy phosphorodithioates

Chengming Qu, Yufen Lv, Jian Huang, Chao Ma, Huilan Yue, Wei Wei\* and Dong Yi\*

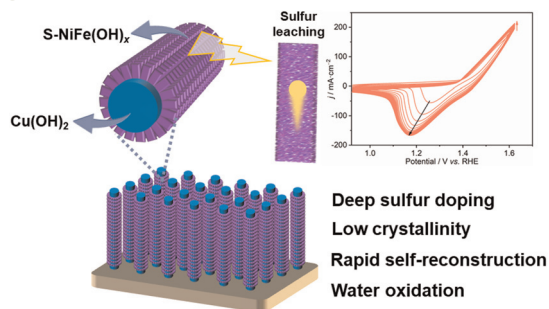


\* Additive-free \* Mild conditions \* Simple operation  
 Broad substrate scope \* Good functional group tolerance



## PAPERS

10684



### Deep sulfur doping induces the rapid electrochemical self-reconstruction of Ni–Fe hydroxide to drive water oxidation

Xiaoge Li,<sup>\*</sup> Jun Zhao, Jinhua Zhou, Qinchao Wang<sup>\*</sup> and Jie Han<sup>\*</sup>

## CORRECTION

10693

### Correction: Utilization of fluoroform for difluoromethylation in continuous flow: a concise synthesis of $\alpha$ -difluoromethyl-amino acids

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