

Green Chemistry

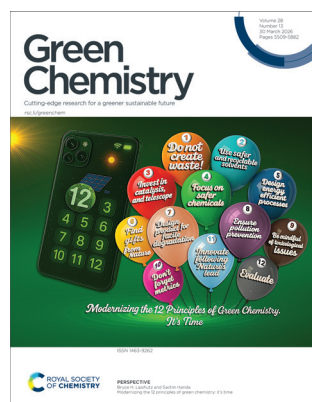
Cutting-edge research for a greener sustainable future

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IN THIS ISSUE

ISSN 1463-9262 CODEN GRCHFJ 28(13) 5509-5882 (2026)



Cover
See Bruce H. Lipshutz and Sachin Handa, pp. 5606–5612.

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Inside cover
See Yang Xu, Xianqing Zhu *et al.*, pp. 5620–5632.

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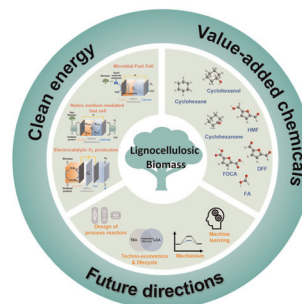
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CRITICAL REVIEW

5520

Lignocellulosic biomass in electrochemical energy conversion and value-added chemicals production

Guohao Xu, Xiaotong Chen, Weizhuo Xu, Qiujin Shi, Yun Lu and Wei Liu*

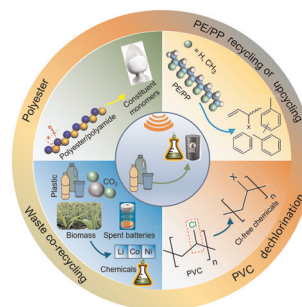


TUTORIAL REVIEWS

5558

Microwave-assisted recycling of plastic waste into value-added chemicals: challenges, recent advances, and perspectives

Jun Zhao,* Mengran Sun, Chao Tang, Lei Zhang, Sui Zhao, Lu Zhang and Wangjing Ma*



Environmental Science: Atmospheres

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Fundamental questions
Elemental answers

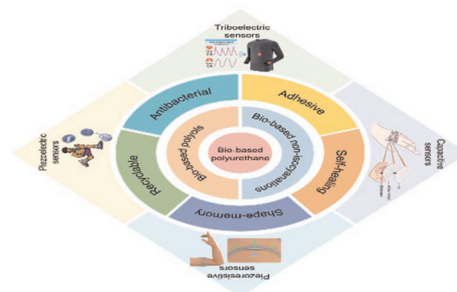


TUTORIAL REVIEWS

5578

Bio-based polyurethanes for flexible wearable mechanical sensors: synthesis, functional design and applications

Siqi Chen, Miaomiao Zhu,* Xiaoxue Hu, Ranhua Xiong and Chaobo Huang



PERSPECTIVE

5606

Modernizing the 12 principles of green chemistry: it's time

Bruce H. Lipshutz* and Sachin Handa*

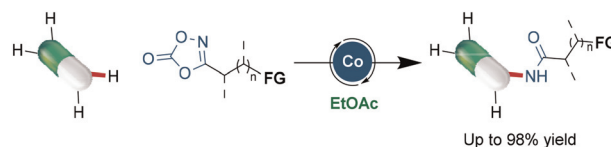


COMMUNICATION

5613

Late-stage C–H amidation of pharmaceuticals enabled by earth-abundant Co(III)-catalysis

Daniele Antermite, Elisa Y. Lai, João C. A. Oliveira, Stig D. Friis, Johan R. Johansson, Lutz Ackermann* and Magnus J. Johansson*



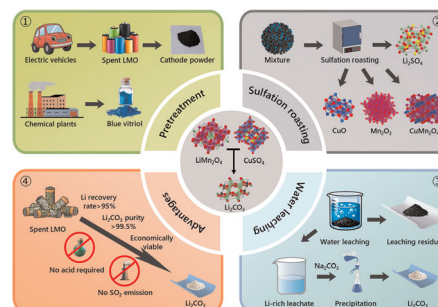
- ✓ Late-stage functionalisation of advanced drugs or late-stage intermediates
- ✓ Faster access to new drug analogues and biological conjugates
- ✓ Step economy and PMI reduction

PAPERS

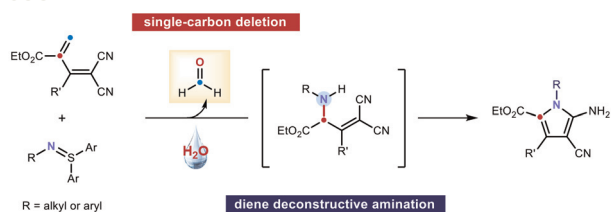
5620

Green and economical lithium recovery from spent LiMn_2O_4 batteries through blue vitriol-driven selective sulfation roasting

Jiaxin Zhu, Yang Xu,* Ziyao Yang, Qiqi Yao, Deyu Hua, Jiahao Huang, Xianqing Zhu,* Jun Li and Qingzhu Zhang



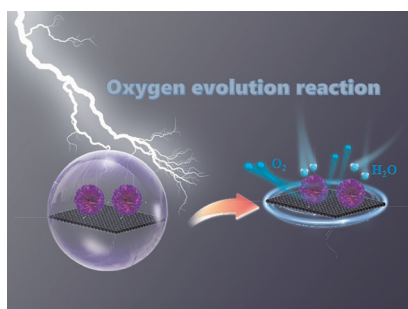
5633



Water-promoted deconstructive amination of alkenes through single-carbon deletion: access to fully substituted pyrroles

Xue-Ju Fu, Ting Qi, Xin Zhang, Ke Xu, Wei Huang, Cheng Peng, Jun-Long Li, Bo Han* and Gu Zhan*

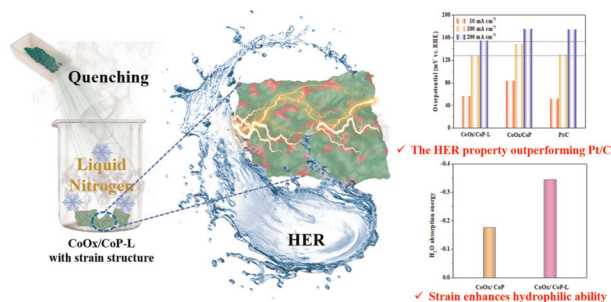
5642



Crystal phase engineering and surface reconstruction in Co–Mn phosphides: unraveling the mechanisms of high-performance water oxidation catalysis

Tingting Tang, Yanfang Teng, Kuoteng Sun, Yanhan Liu, Zhendong Gao, Tayirjan Taylor Isimjan, Jingya Guo,* Jianniao Tian* and Xiulin Yang*

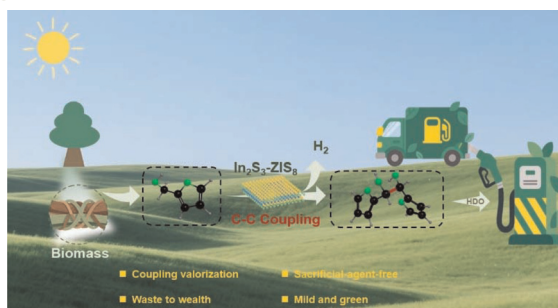
5652



Quenching-triggered amorphous/crystalline-heterostructure with tensile strain achieves efficient alkaline HER kinetics by operating the unique Co₁-P-Co₂ electrocatalytic mechanism

Yunmei Du, Jinghan Xu, Shan Lu, Zhenyu Xiao, Yanru Liu, Kang Liu and Lei Wang*

5661



Visible-light-driven valorization of biomass-derived furfuryl alcohol to diesel precursors with simultaneous H₂ evolution over a dual functional In₂S₃-Zn₅In₂S₈ photocatalyst

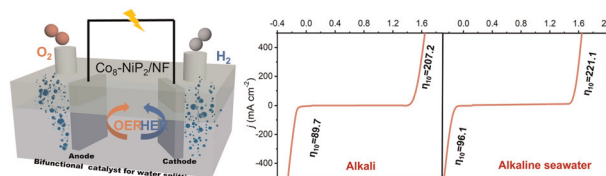
Yibei Zhang, Hongyun Lu, Xuekai Qu, Lunan Wu, Zhenghao Song, Xinyi Ding, Peng Li, Xiu-Jie Yang* and Dong Liu



5670

Co-doped NiP₂ as an efficient and robust bifunctional electrocatalyst for overall water splitting in alkaline electrolytes and seawater

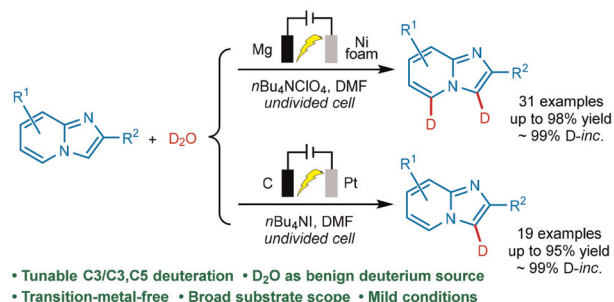
Xiaoyu Hao, Qian Sun, Tianyi Zhang, Panpan Song, Jinglun Guo, Svetlana Peshaya, Longlong Chen, Xiaolei Huang* and Xuqing Liu*



5682

Switchable electroreductive C3 or C3,C5 deuteration of imidazo[1,2-a]pyridines

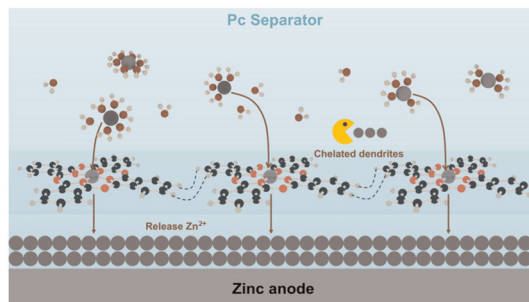
Xuan Liu, Dongdong Liu, Zhihao Yang, Xun Xiao, Heping Li, Mao-Ping Song, Xinju Zhu,* Tianyuan Zhang* and Xin-Qi Hao*



5690

Phthalocyanine separator with "chelation-relay" behavior for homogeneous Zn²⁺ flux and ultra-stable aqueous zinc-ion batteries

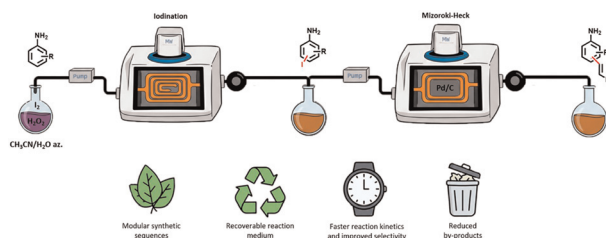
Wujiao Tan, Wenhao Yang, Dan You, Yiwei Yu, Ao Yan, Li Zhang, Xue Li,* Ziyi Zhu* and Yiyong Zhang*



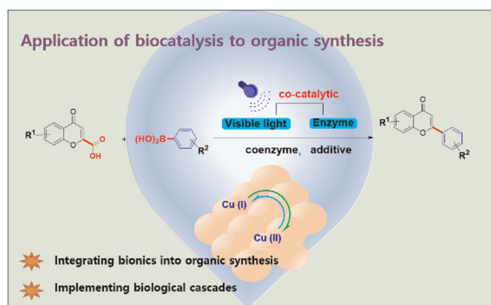
5701

A combined microwave/continuous flow approach for the iodination of anilines and consecutive Mizoroki–Heck cross-coupling

Matteo Bartalucci, Filippo Bocerani, Francesco Ferlin, Luciano Lattuada, Fulvio Uggeri and Luigi Vaccaro*



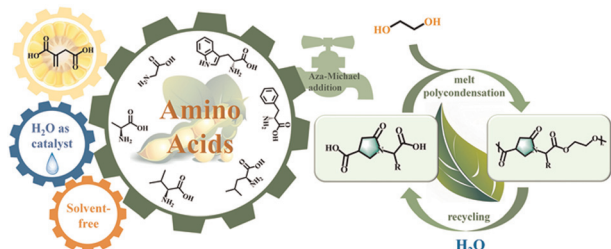
5709



Visible-light-driven photobiocatalytic regioselective arylation/decarboxylation cascade between chromocarb and phenylboronic acid

Rui Guo, Wenyi Chu* and Wenbin Sun*

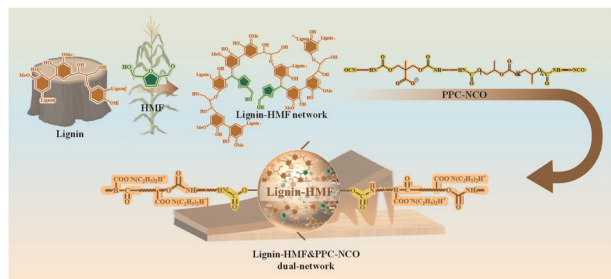
5718



Fully bio-based monopyrrolidone-containing monomers towards the synthesis of renewable polyesters with high T_g and hydrolyzable closed-loop recycling

Yumeng Zhang, Yang Yu* and Ziyi Feng*

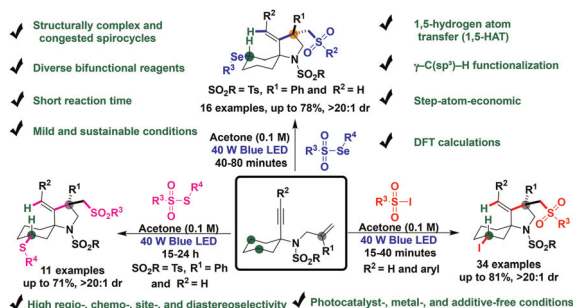
5732



Sustainable lignin–hydroxymethyl furfural-based waterborne polyurethane adhesive with high bonding strength and weather resistance

Ying-An Mai, Xitai Cai, Libo Li, Zhipeng Qiu,* Weifeng Liu,* Xueqing Qiu, Rongxian Ou, Jingpeng Zhou, Fengshan Zhang and Fan Bu

5753



Diastereoselective construction of complex spiroheterocycles via $\gamma\text{-C}(\text{sp}^3)\text{-H}$ functionalization of 1,1-disubstituted cyclohexanes with diverse bifunctional reagents

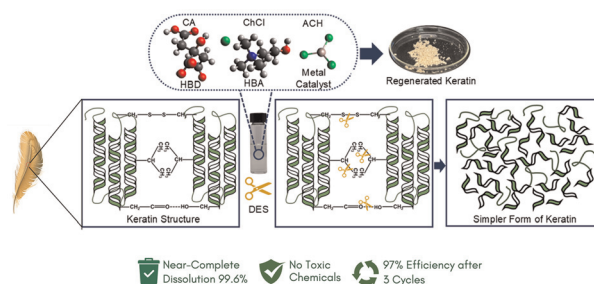
Mohana Reddy Mutra, T. L. Chandana, Hsing-Yin Chen, Yun-Jou Wang and Jeh-Jeng Wang*



5767

Metal-assisted hydrogen-bond restructuring in a ternary deep eutectic solvent for near-complete keratin dissolution and circular biomass valorization

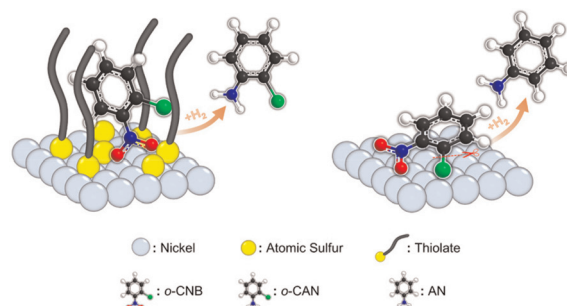
Andrei E. Etom, Ann Pearl G. Triana, Jady Lee E. Amarillas, Rhea D. Casipong, Jayson Rey A. Gilbolingo, April John C. Galagnara, Roger G. Dingcong, Jr, Arnold C. Alguno, Roberto M. Malaluan and Arnold A. Lubguban*



5780

Engineering nickel catalysts with atomic-sulfur-stabilized thiolate adlayers for durable selectivity in hydrogenation of halonitrobenzenes

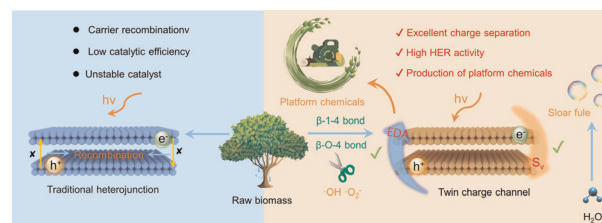
Yujian Fan, Xuechun Sang, Juwen Gu, Qian Zhang, Songbai Qiu* and Tiejun Wang*



5788

Twin interfacial charge channels enable efficient photorefining of raw biomass

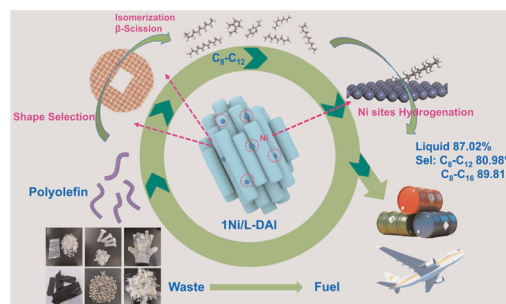
Fuyan Kang, Chao Xu, Chengfang Wang, Zhanhua Huang,* Hongwei Ma,* Chaoji Chen* and Jinguang Hu*



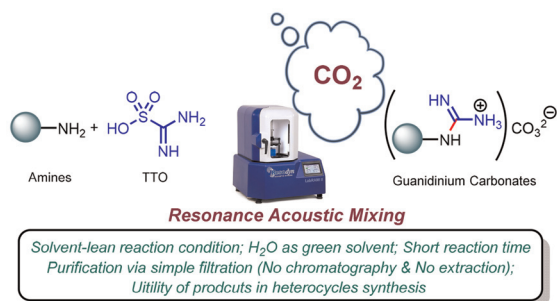
5803

Dual advantages of rapid zeolite channel diffusion and Ni sites: 1Ni/L-DAI zeolite enables efficient polyolefin hydrocracking to liquid fuel

Hongyu Fu, Huibin Liu,* Abulikemu Abulizi,* Kenji Okitsu, Yasuaki Maeda, Tiezhen Ren, Aisha Nulahong and Changhai Liang



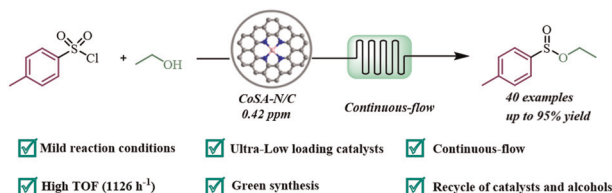
5818



Resonant acoustic mixing for green guanylation: thiourea trioxide as a solid cyanamide surrogate toward guanidine carbonate salts

Dipak J. Fartade, Andrea Porcheddu* and Francesco Basoccu

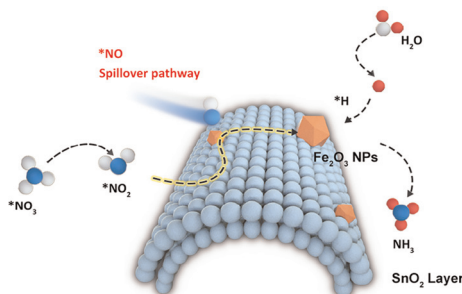
5828



Cobalt single-atom catalyst at PPM level reduces sulfonyl chlorides to sulfinates

Jingheng Li, Xinglei He,* Chunlong Yu, Zhihua Wang, Wangfu Liang, Chenguang Liu and Ke-Yin Ye*

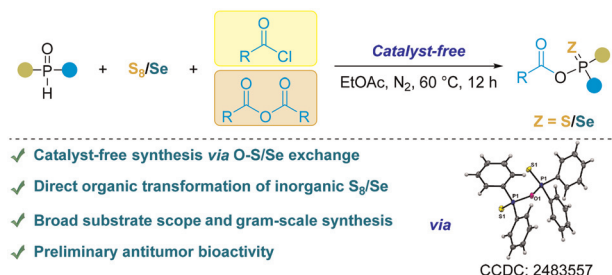
5837



Unlocking green ammonia production from nitrate through NO spillover in a dual-site relay catalyst

Yaxi Li, Xiangbo Shen, Zhiquan Lang,* Zhibo Yang, Xinya Yuan, Xinyue Zhang, Hong Li, Longfei Guo,* Naiyun Liu* and Haitao Li*

5848



Catalyst-free synthesis of phosphinochalcogenoic anhydrides via the oxygen–chalcogen exchange with elemental sulfur or selenium

Longzhi Zhu,* Shuangjiao Xie, Hongbo Yang, Yingle Hong, Lin Chen, Weiwei Luo, Sha Jin, Lixin Liu* and Biquan Xiong*

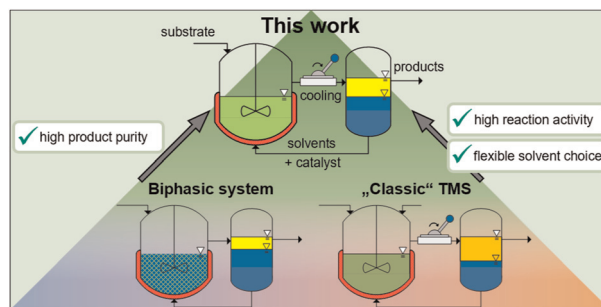


PAPERS

5857

Next-generation multiphase systems for homogeneous catalyst recycling: overcoming the reactivity vs. separation dilemma

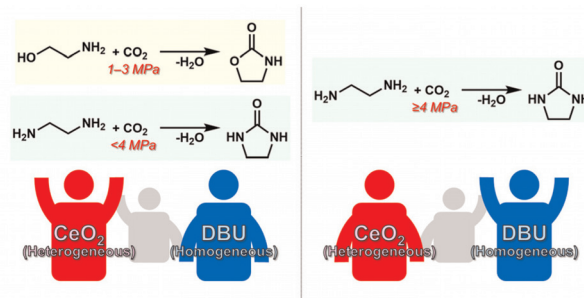
Tim B. Riemer, Anna Kampwerth, Tim Sinnhoffer, Moritz Prange, Marc Häusler, Dieter Vogt and Thomas Seidensticker*



5869

A comparative study on heterogeneous CeO_2 and homogeneous 1,8-diazabicyclo[5.4.0]-7-undecene catalysts for conversion of CO_2 and monoethanolamine/ethylenediamine into cyclic compounds

Hiroki Sato, Mizuho Yabushita,* Yingai Li, Yoshinao Nakagawa and Keiichi Tomishige*



CORRECTION

5879

Correction: Enhanced production of dimethyl carbonate from the alternating polarity electrolysis of methanol and carbon dioxide

Momoko Ishii, Maria M. Paulsen, Remi A. Mellinghoff, Heather O. LeClerc, Ho Yin Tse, Hanno C. Erythropel, Julie B. Zimmerman, Paul T. Anastas* and Darren S. Lee*

