

Green Chemistry

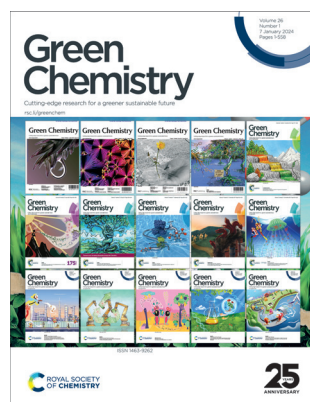
Cutting-edge research for a greener sustainable future

rsc.li/greenchem

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Cover
Celebrating 25 years of covers on Green Chemistry



Inside cover
See Yong-Dong Niu, Dong Li, Hai-Dong Xia *et al.*, pp. 323–329.

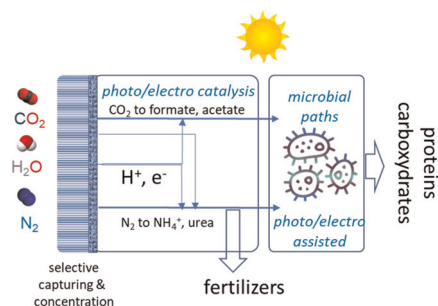
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Making chemicals from the air: the new frontier for hybrid electrosyntheses in artificial tree-like devices

Gabriele Centi* and Siglinda Perathoner*

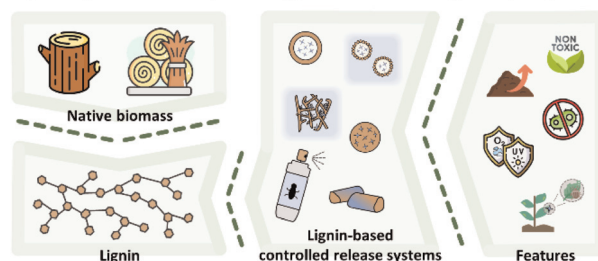


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High-value utilization of lignin: construction of an intelligent release system for targeting the delivery of pesticides

Yitong Wang, Xiaona Yu, Shuaishuai Ma, Shuling Cao, Xufeng Yuan, Wanbin Zhu and Hongliang Wang*

Empowering the reduction of pesticide application and enhancing efficacy in agriculture



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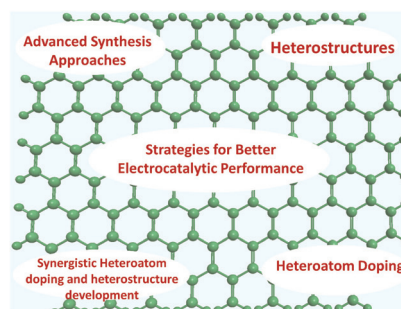
Fundamental questions
Elemental answers

CRITICAL REVIEWS

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Recent advances in nitrogen-doped graphene-based heterostructures and composites: mechanism and active sites for electrochemical ORR and HER

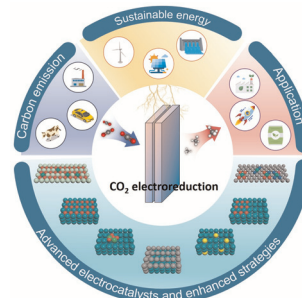
Reena Saini, Farha Naaz, Ali H. Bashal, Ashiq Hussain Pandit and Umar Farooq*



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Status and challenges for CO₂ electroreduction to CH₄: advanced catalysts and enhanced strategies

Bingkun Li, Lu Liu, Mingzhu Yue, Qingman Niu, Min Li, Tianyu Zhang, Wenfu Xie* and Qiang Wang*

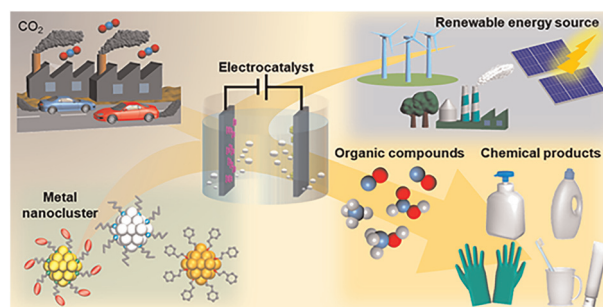


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Atomically precise metal nanoclusters as catalysts for electrocatalytic CO₂ reduction

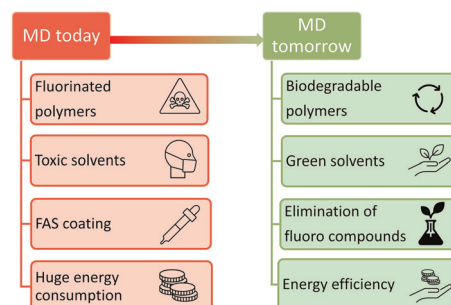
Tokuhisa Kawawaki,* Tomoshige Okada, Daisuke Hirayama and Yuichi Negishi*



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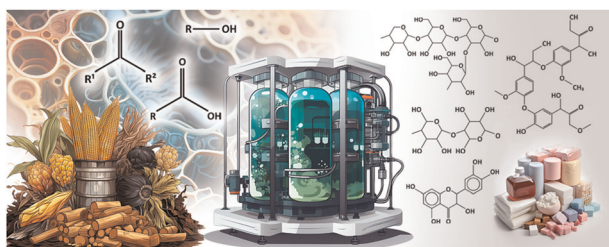
How to make membrane distillation greener: a review of environmentally friendly and sustainable aspects

Emilia Gontarek-Castro* and Roberto Castro-Muñoz



TUTORIAL REVIEWS

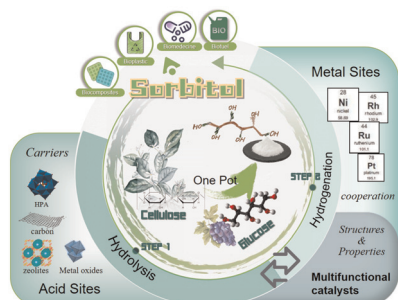
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Organosolv biorefinery: resource-based process optimisation, pilot technology scale-up and economics

Giorgio Tofani,* Edita Jasiukaitytė-Grojzdek, Miha Grilc and Blaž Likozar*

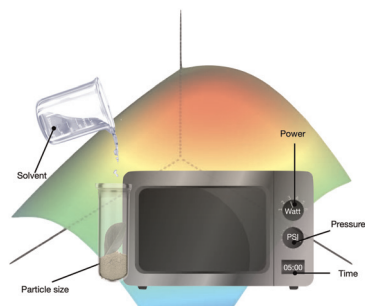
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Chemocatalytic production of sorbitol from cellulose via sustainable chemistry – a tutorial review

Yingqiao Zhou, Richard L. Smith, Jr and Xinhua Qi*

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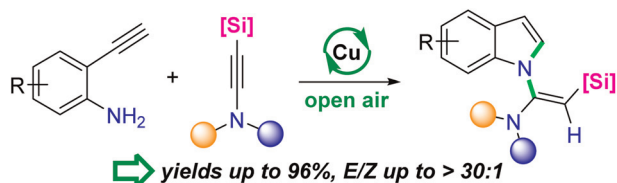


Combining DoE and MASE: a winning strategy for the isolation of natural bioactive compounds from plant materials

Valeria Cavalloro, Giorgio Marrubini,* Giacomo Rossino, Emanuela Martino* and Simona Collina

COMMUNICATIONS

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- ♦ one-step synthesis
- ♦ ligand-free catalysis
- ♦ open vial operation
- ♦ cheap CuBr₂ as catalyst
- ♦ 100% atom-economical
- ♦ valuable organosilanes

Unexpected stereoselective CuBr₂-catalyzed cascade reaction of 2-ethynylanilines with silylynamides: facile and atom-economical access to N-vinylsilylindoles

Zengzeng Li, Fei Lu, Qingchun Xu, Gang Liu, Ximei Zhao* and Guanghui Wang*

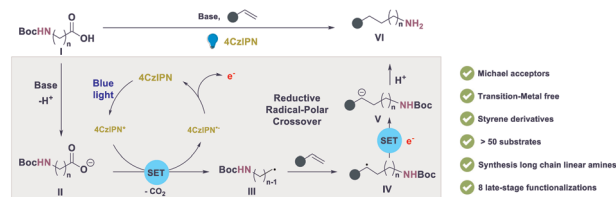


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Selective synthesis of functionalized linear aliphatic primary amines *via* decarboxylative radical-polar crossover

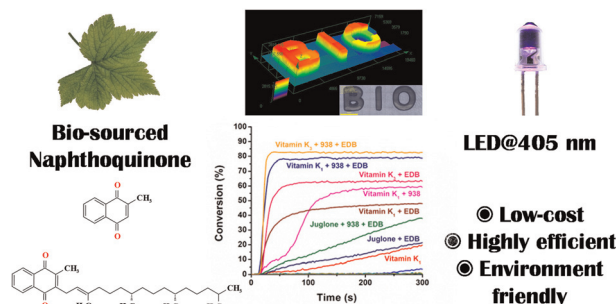
Robin Cauwenbergh, Prakash Kumar Sahoo, Rakesh Maiti, Abra Mathew, Rositha Kuniyil and Shoubhik Das*



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Photoinitiators from bio-sourced naphthoquinone – the application of naphthoquinone-based vitamins K1 and K3 in free radical photopolymerization

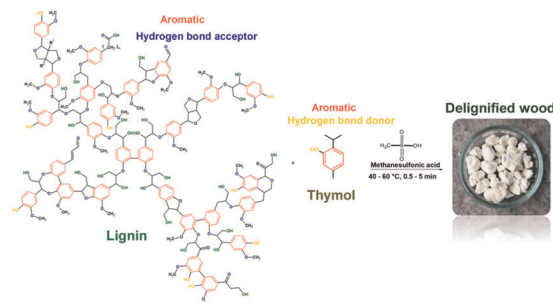
Timur Borjigin, Ji Feng, Michael Schmitt, Di Zhu, Fabrice Morlet-Savary, Pu Xiao* and Jacques Lalevée*



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Supramolecular interaction-driven delignification of lignocellulose

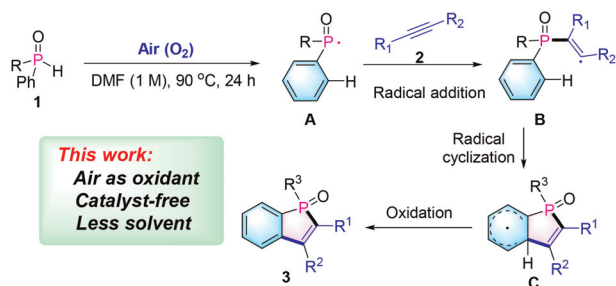
Juho Antti Sirviö,* Idamaria Romakkaniemi, Juha Ahola, Svitlana Filonenko, Juha P. Heiskanen and Ari Ämmälä



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Direct air-induced arylphosphinoyl radicals for the synthesis of benzo[*b*]phosphole oxides

Mingqing Huang, Haiyang Huang,* Mengyao You, Xinxin Zhang, Longgen Sun, Chao Chen, Zhichao Mei, Ruchun Yang and Qiang Xiao*



COMMUNICATIONS

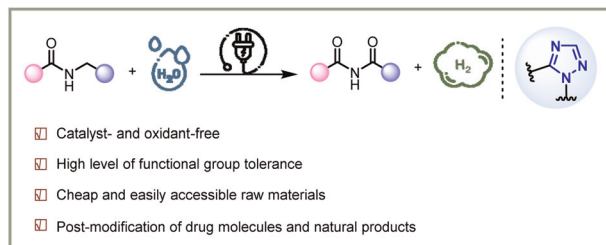
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Photocatalytic synthesis of 2,3-diamines from anilines and DIPEA via C–N bond cleavage and C–C bond formation

Yunyan Meng, Chunxiang Pan, Na Liu, Hongjiang Li, Zixiu Liu, Yao Deng, Zixiang Wei, Jianbin Xu* and Baomin Fan*

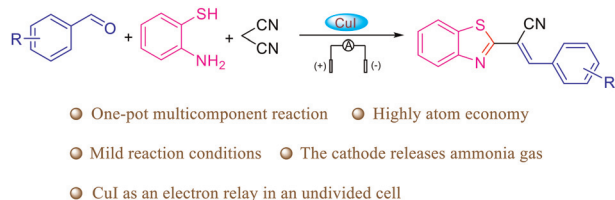
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Sustainable electrocatalytic oxidation of N-alkylamides to acyclic imides using H₂O

Jing Qi, Xiyan Wang, Gan Wang, Srinivas Reddy Dubbaka, Patrick O'Neill, Hwee Ting Ang* and Jie Wu*

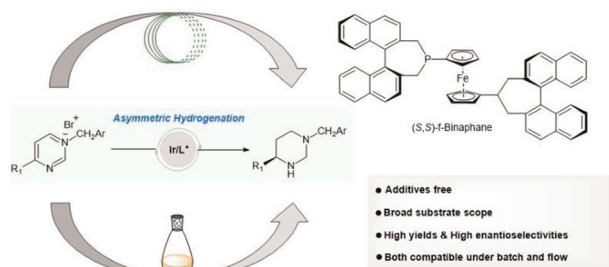
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Cu-Catalyzed, electron-relayed three-component synthesis of 2-alkenylbenzothiazoles with cathodic ammonia evolution

Chengxian Hu, Dan Wang, Lu Wang, Ying Fu* and Zhengyin Du*

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Iridium-catalyzed asymmetric, complete hydrogenation of pyrimidinium salts under batch and flow

Zhi Yang, Yu Chen, Linxi Wan, Yuxiao Li, Dan Chen, Jianlin Tao, Pei Tang* and Fen-Er Chen*

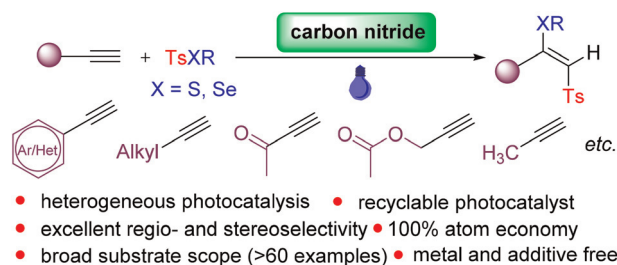


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Visible-light-driven graphitic carbon nitride-catalyzed ATRA of alkynes: highly regio- and stereoselective synthesis of (E)- β -functionalized vinylsulfones

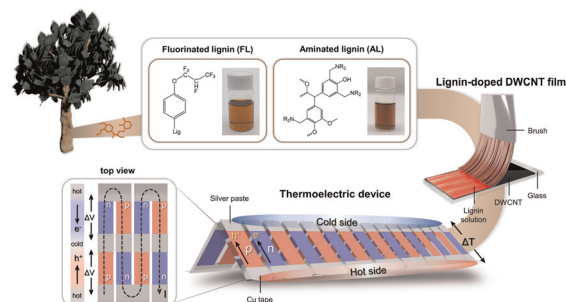
Shu-Li Xie, Jian-Zhong Yan, Meng-Jun Xie, Xuan Li, Fan Zhou, Mei-Qiong Zheng, Xue-Lin Wang, Junhao Feng, Yao Zhang, Ya-Nan Duan, Yong-Dong Niu,* Dong Li* and Hai-Dong Xia*



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Eco-friendly conversion between n- and p-type carbon nanotubes based on rationally functionalized lignin biopolymers

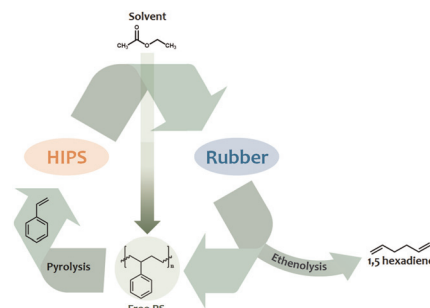
Yoohyeon Choi, Ngoc Tuan Tran, Doojoon Jang, Minju Park, Chun-Jae Yoo, Jin Young Kim, Hyunjoon Lee* and Heesuk Kim*



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Total revalorization of high impact polystyrene (HIPS): enhancing styrene recovery and upcycling of the rubber phase

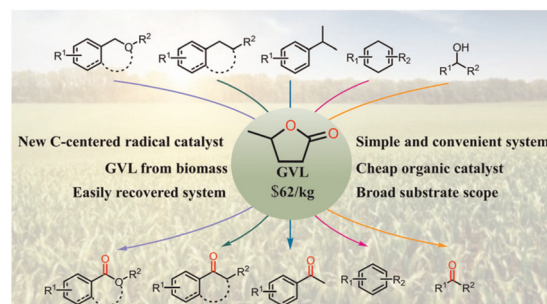
Nikolaos S. Giakoumakis, Christophe Vos, Kwinten Janssens, Jelle Vekeman, Mats Denayer, Frank De Proft, Carlos Marquez* and Dirk De Vos*



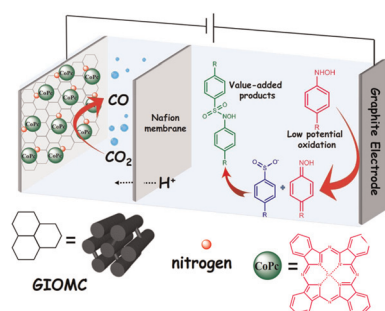
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A simple and convenient strategy for the oxidation of C(sp³)-H bonds based on γ -valerolactone

Anwei Wang, Jiayin Huang, Chunsheng Zhao, Yu Fan, Junfeng Qian, Qun Chen, Mingyang He* and Weiyou Zhou*



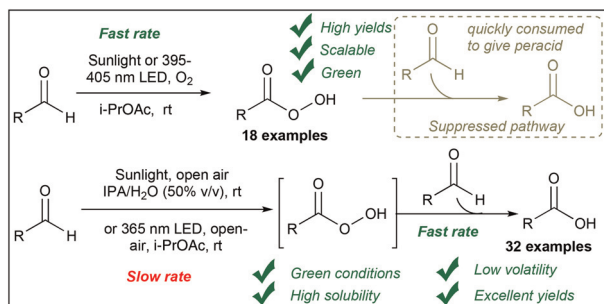
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Robust interaction of cobalt phthalocyanine and nitrogen-doped ordered mesoporous carbon for CO₂ reduction paired with the electro-oxidative synthesis of sulfonamide derivatives

Samin Barat-Abtahi, Faranak Jafari-Hafshejani, Fahimeh Varmaghani,* Babak Karimi* and Hamzeh H. Veisi

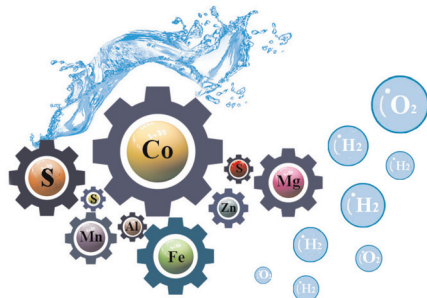
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Light-induced autoxidation of aldehydes to peracids and carboxylic acids

Mohamed S. H. Salem, Carla Dubois, Yuya Takamura, Atsuhito Kitajima, Takuma Kawai, Shinobu Takizawa* and Masayuki Kirihaara*

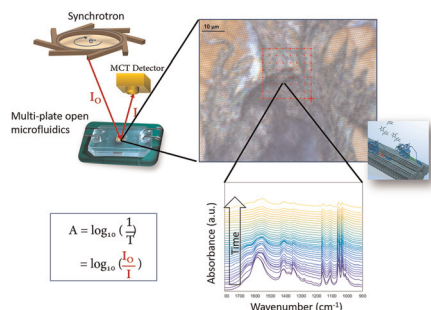
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A novel high-entropy sulfide (ZnCoMnFeAlMg)₉S₈ as a low potential and long life electrocatalyst for overall water splitting in experiments and DFT analysis

Shun Li, Likai Tong, Zhijian Peng, Bo Zhang and Xiuli Fu*

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Spatiotemporal dynamics of cellulose during enzymatic hydrolysis studied by infrared spectromicroscopy

Tina Jeoh,* Jennifer Danger Nill, Wujun Zhao, Sankar Raju Narayanasamy, Liang Chen and Hoi-Ying N. Holman*

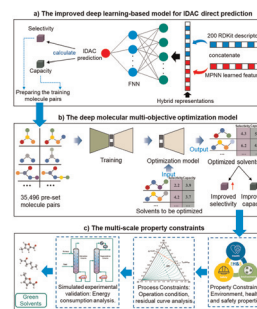


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Multi-objective optimization strategy for green solvent design via a deep generative model learned from pre-set molecule pairs

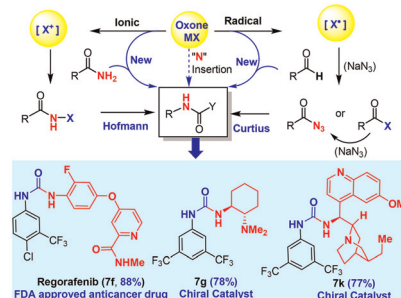
Jun Zhang, Qin Wang,* Huaqiang Wen,
Vincent Gerbaud, Saimeng Jin and Weifeng Shen*



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Unified and green oxidation of amides and aldehydes for the Hofmann and Curtius rearrangements

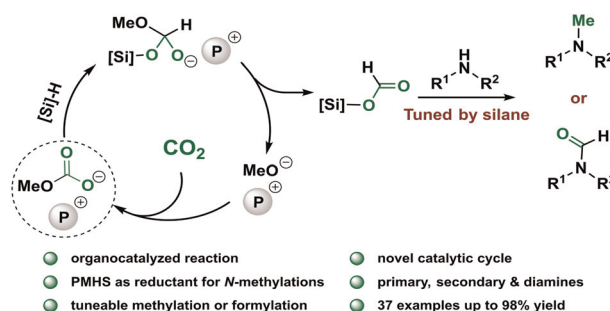
Liyan Song,* Yufei Meng, Tongchao Zhao, Lifang Liu,
Xiaohong Pan, Binbin Huang, Hongliang Yao, Ran Lin*
and Rongbiao Tong*



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Tuneable reduction of CO₂ – organocatalyzed selective formylation and methylation of amines

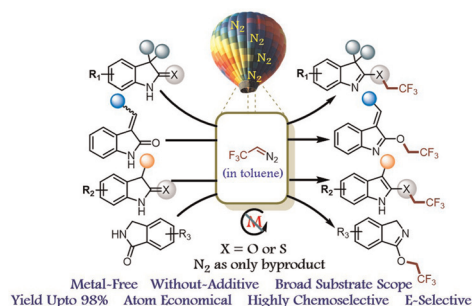
Changyue Ren, Constanza Terazzi and Thomas Werner*



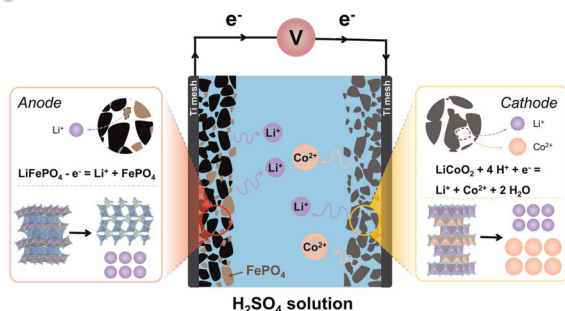
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Metal- and additive-free TfOH catalyzed chemoselective O- and S-trifluoroethylation of oxindoles, isoindolines and thio-oxindoles

Manisha Lamba, Prasoon Raj Singh, Shubham Bhatt and
Avijit Goswami*



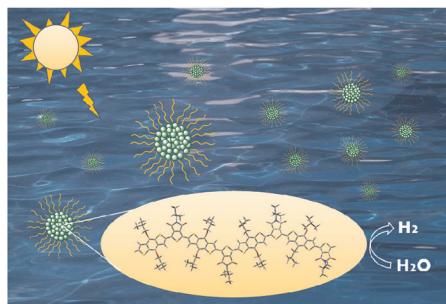
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Co-recovery of spent LiCoO_2 and LiFePO_4 by paired electrolysis

Jingjing Zhao, Fengyin Zhou, Hongya Wang, Xin Qu, Danfeng Wang, Zhiyu Zheng, Yuqi Cai, Shuaibo Gao,* Dihua Wang and Huayi Yin*

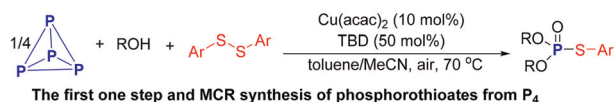
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Green and sustainable synthesis of TPD-based donor-acceptor-type conjugated polymer photocatalysts for hydrogen production under visible light

Menghan Chang, Xinjuan Zhang, Lin Wang, Di Wang, Qiang Zhang* and Yan Lu*

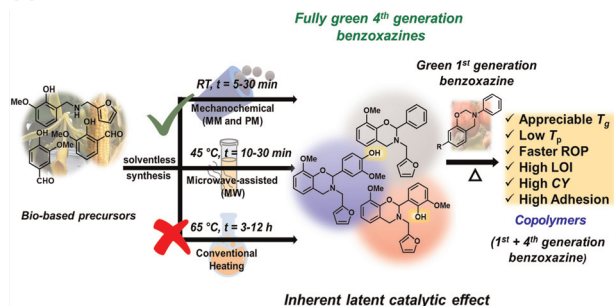
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Three-component coupling reaction of white phosphorus, alcohols and diaryl disulfides: a chlorine-free avenue for accessing phosphorothioates

Yinwei Cao, Mengpei Bai, Junwei Huang, Fushan Chen,* Yan Liu, Guo Tang* and Yufen Zhao

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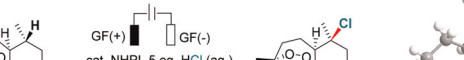
The mechanochemical synthesis of environmentally benign fully biobased 4th generation benzoxazines and their polymers: mechanistic insights into the catalytic activity of latent catalysts

Vaishaly Duhan, Shivani Yadav, Christophe Len and Bimlesh Lochab*



MFI zeolite with confined adjustable synergistic Cu sites for the hydrogenation of levulinic acid

Electrochemical chlorination of least hindered tertiary and benzylic C(sp³)-H bonds



- Scaled-up to 100 grams
- Hydrochloric acid as Cl-source
- High site selectivity
- Suitable for late-stage functionalization of complex molecules

Visible light-driven highly atom-economical divergent synthesis of substituted fluorenols and cyclopropylcarbaldehydes

[illegible]

Efficient nickel-catalysed telomerisation on glycerol carbonate: a new linker route for lignin functionalisation

**Homogeneous Catalysis
Applied on Lignin**

Previous Work

This Work

Glycerol Based - « Linker »

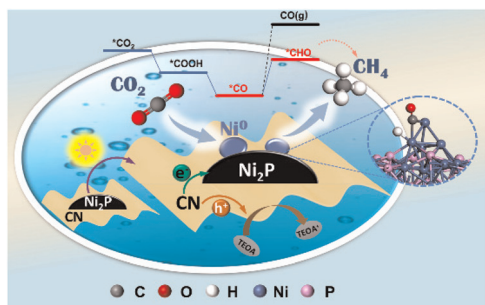
Catalyst removed

R =

-awaited + -Unexpected

PAPERS

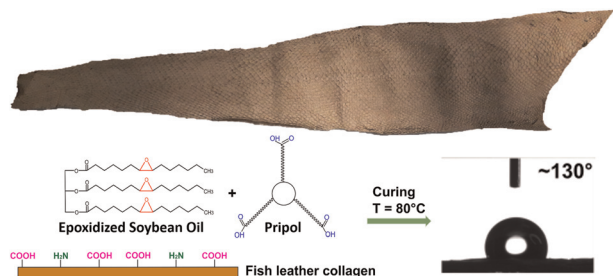
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The synergy of *in situ*-generated Ni⁰ and Ni₂P to enhance CO adsorption and protonation for selective CH₄ production from photocatalytic CO₂ reduction

Xuemei Liu, Chaonan Cui, Shuoshuo Wei, Jinyu Han, Xinli Zhu, Qingfeng Ge* and Hua Wang*

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Hydrophobic and water resistant fish leather: a fully sustainable combination of discarded biomass and by-products of the food industry

Marta Fadda,* Arkadiusz Zych, Riccardo Carzino, Athanassia Athanassiou and Giovanni Perotto*

