

# Green Chemistry

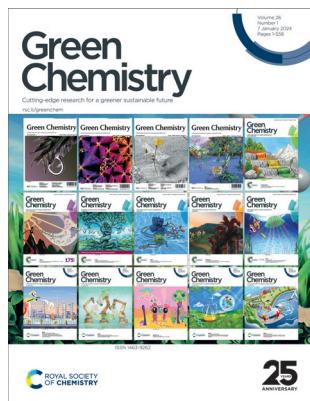
Cutting-edge research for a greener sustainable future

rsc.li/greenchem

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Celebrating 25 years of covers on Green Chemistry



### Inside cover

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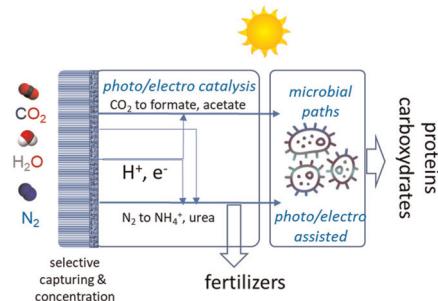
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### Making chemicals from the air: the new frontier for hybrid electrosyntheses in artificial tree-like devices

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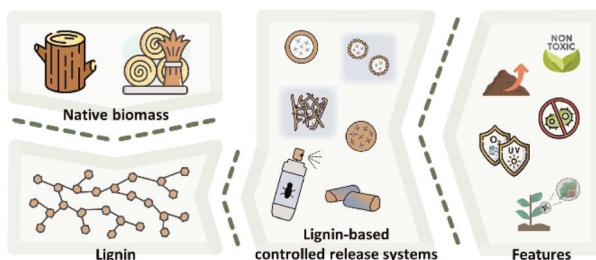


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### High-value utilization of lignin: construction of an intelligent release system for targeting the delivery of pesticides

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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# RSC Sustainability

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Fundamental questions  
Elemental answers

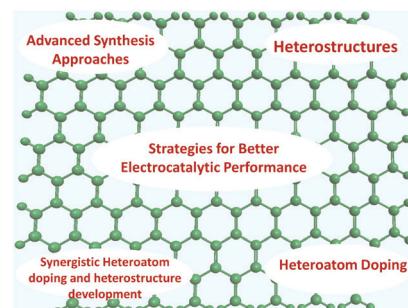
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**Recent advances in nitrogen-doped graphene-based heterostructures and composites: mechanism and active sites for electrochemical ORR and HER**

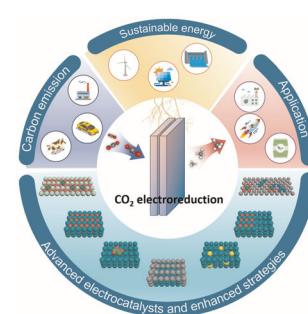
Reena Saini, Farha Naaz, Ali H. Bashal, Ashiq Hussain Pandit and Umar Farooq\*



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**Status and challenges for CO<sub>2</sub> electroreduction to CH<sub>4</sub>: advanced catalysts and enhanced strategies**

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

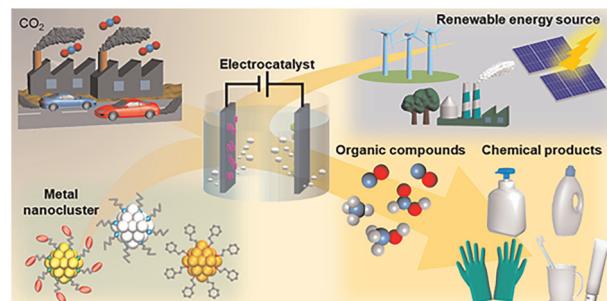


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**Atomically precise metal nanoclusters as catalysts for electrocatalytic CO<sub>2</sub> reduction**

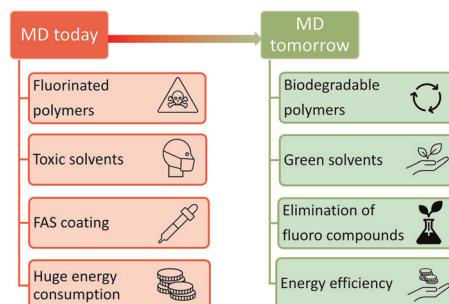
Tokuhisa Kawakami,\* Tomoshige Okada, Daisuke Hirayama and Yuichi Negishi\*



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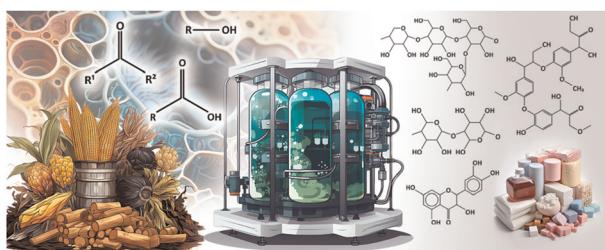
**How to make membrane distillation greener: a review of environmentally friendly and sustainable aspects**

Emilia Gontarek-Castro\* and Roberto Castro-Muñoz



## TUTORIAL REVIEWS

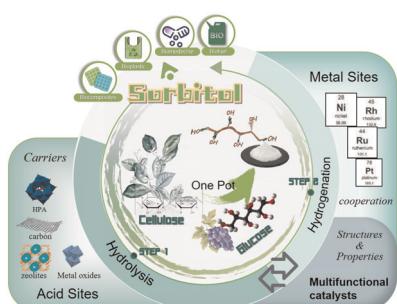
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## Organosolv biorefinery: resource-based process optimisation, pilot technology scale-up and economics

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

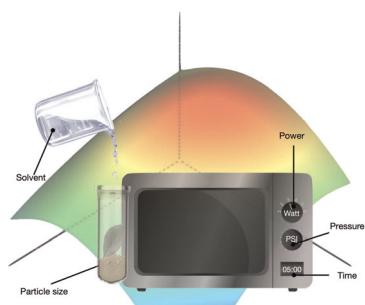
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## Combining DoE and MASE: a winning strategy for the isolation of natural bioactive compounds from plant materials

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  $\text{CuBr}_2$  as catalyst
- ◆ 100% atom-economical
- ◆ valuable organosilanes

Unexpected stereoselective  $\text{CuBr}_2$ -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\*

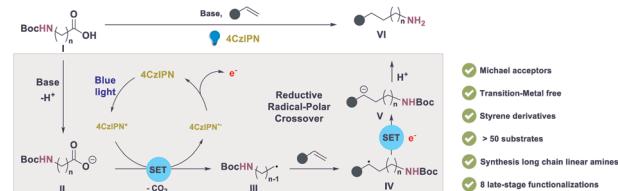


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## Selective synthesis of functionalized linear aliphatic primary amines *via* decarboxylative radical-polar crossover

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

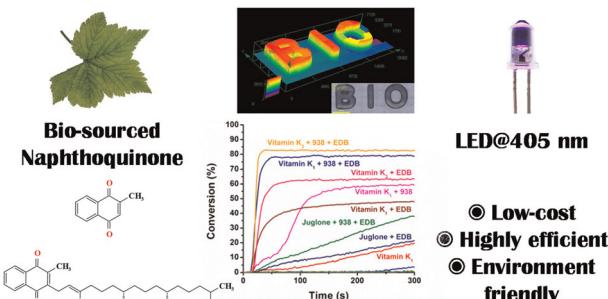


- ✓ Michael acceptors
- ✓ Transition-Metal free
- ✓ Styrene derivatives
- ✓ > 50 substrates
- ✓ Synthesis long chain linear amines
- ✓ 8 late-stage functionalizations

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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

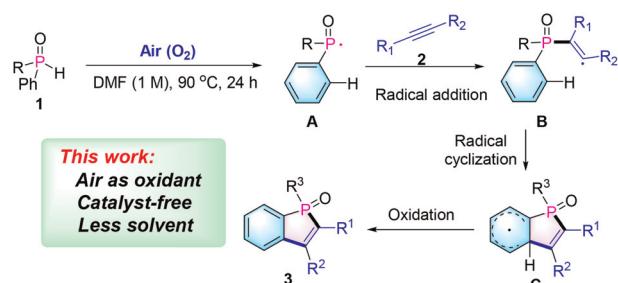
Juho Antti Sirviö,\* Idamaria Romakkaniemi, Juha Ahola, Svitlana Filonenko, Juha P. Heiskanen and Ari Ämmälä



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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

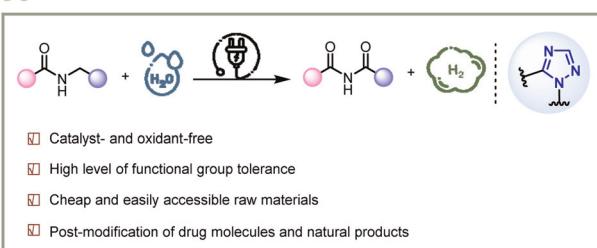
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**Photocatalytic synthesis of 2,3-diamines from anilines and DIPEA via C–N bond cleavage and C–C bond formation**

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

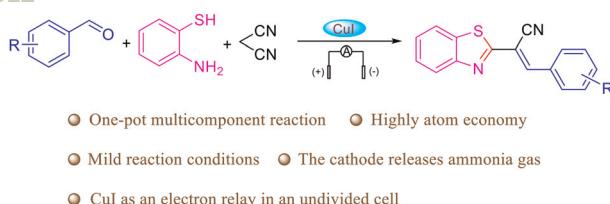
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**Sustainable electrocatalytic oxidation of N-alkylamides to acyclic imides using H<sub>2</sub>O**

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

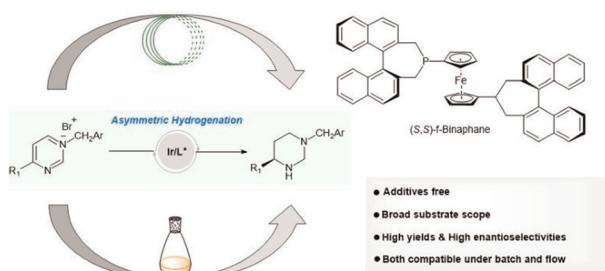
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**Cu-Catalyzed, electron-relayed three-component synthesis of 2-alkenylbenzothiazoles with cathodic ammonia evolution**

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

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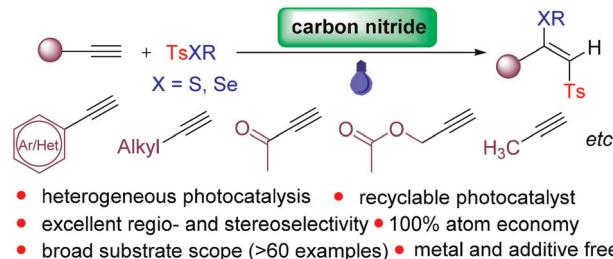


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**Visible-light-driven graphitic carbon nitride-catalyzed ATRA of alkynes: highly regio- and stereoselective synthesis of (*E*)- $\beta$ -functionalized vinylsulfones**

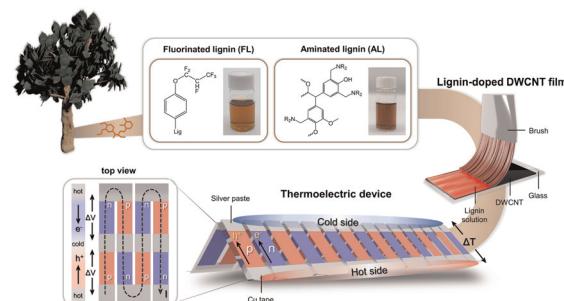
Shu-Li Xie, Jian-Zhong Yan, Meng-Jun Xie, Xuan Li, Fan Zhou, Mei-Qiong Zheng, Xue-Lin Wang, Junhao Feng, Yao Zhang, Ya-Nan Duan, Yong-Dong Niu,\* Dong Li\* and Hai-Dong Xia\*



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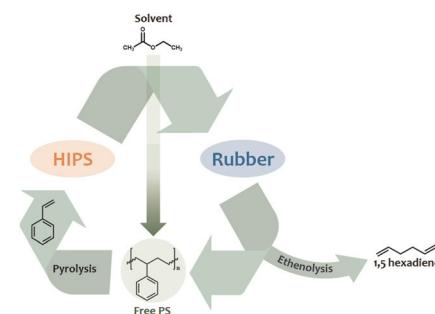
Yooheyon Choi, Ngoc Tuan Tran, Doojoon Jang, Minju Park, Chun-Jae Yoo, Jin Young Kim, Hyunjoo Lee\* and Heesuk Kim\*



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

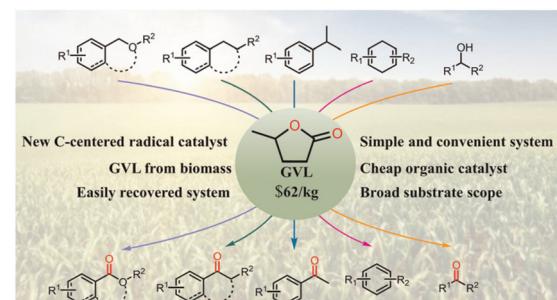
Nikolaos S. Giakoumakis, Christophe Vos, Kwinten Janssens, Jelle Vekeman, Mats Denayer, Frank De Proft, Carlos Marquez\* and Dirk De Vos\*



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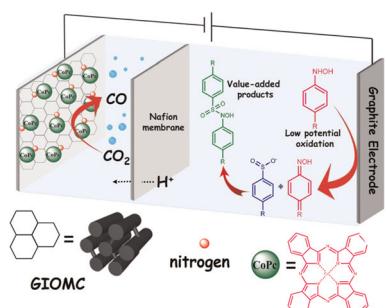
**A simple and convenient strategy for the oxidation of C(sp<sup>3</sup>)–H bonds based on  $\gamma$ -valerolactone**

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



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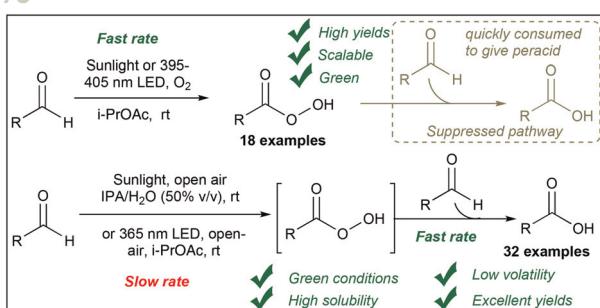
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**Robust interaction of cobalt phthalocyanine and nitrogen-doped ordered mesoporous carbon for CO<sub>2</sub> reduction paired with the electro-oxidative synthesis of sulfonamide derivatives**

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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 Kirihara\*

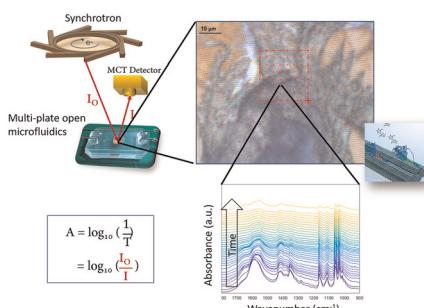
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**A novel high-entropy sulfide (ZnCoMnFeAlMg)<sub>9</sub>S<sub>8</sub> as a low potential and long life electrocatalyst for overall water splitting in experiments and DFT analysis**

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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\*

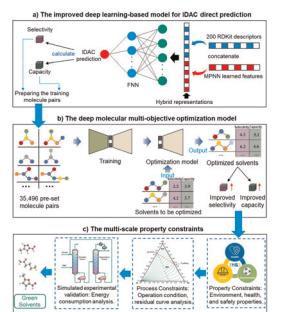


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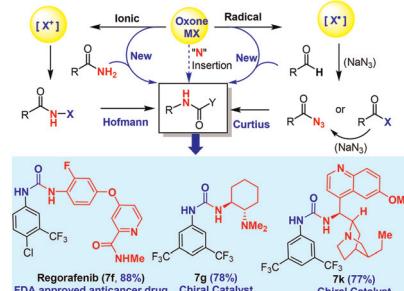
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Vincent Gerbaud, Saimeng Jin and Weifeng Shen\*



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

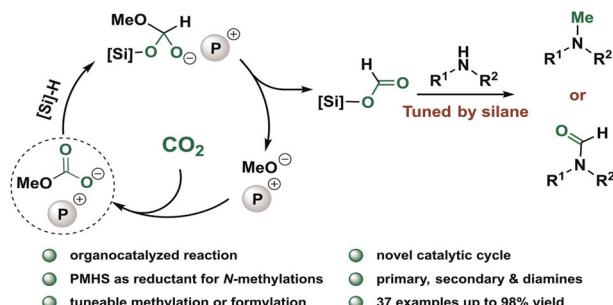
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## Tunable reduction of CO<sub>2</sub> – organocatalyzed selective formylation and methylation of amines

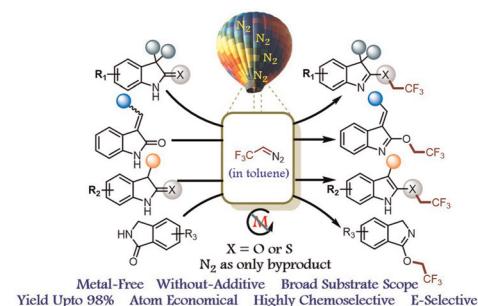
Changyue Ren, Constanza Terazzi and Thomas Werner\*



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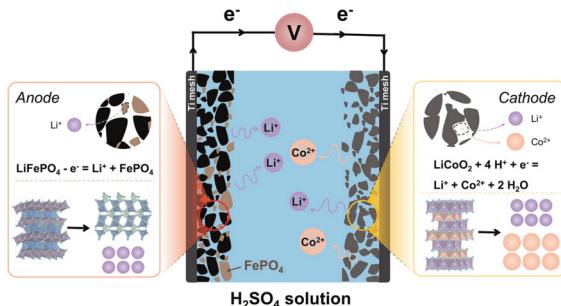
## Metal- and additive-free TfOH catalyzed chemoselective O- and S-trifluoroethylation of oxindoles, isoindolines and thio-oxindoles

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



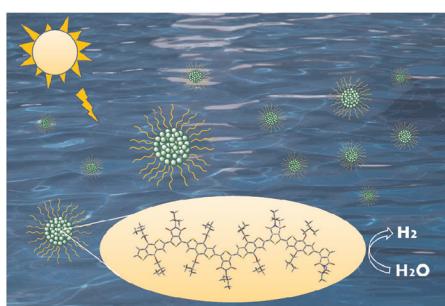
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Co-recovery of spent  $\text{LiCoO}_2$  and  $\text{LiFePO}_4$  by paired electrolysis

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

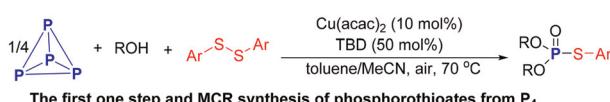
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## Green and sustainable synthesis of TPD-based donor-acceptor-type conjugated polymer photocatalysts for hydrogen production under visible light

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

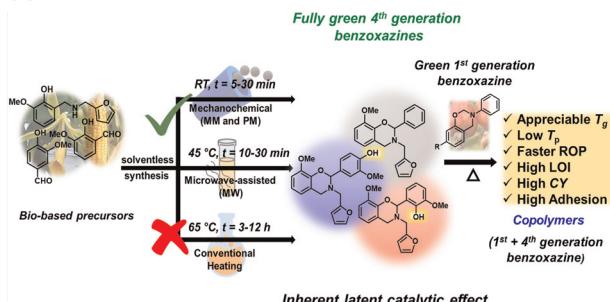
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## Three-component coupling reaction of white phosphorus, alcohols and diaryl disulfides: a chlorine-free avenue for accessing phosphorothioates

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 4<sup>th</sup> generation benzoxazines and their polymers: mechanistic insights into the catalytic activity of latent catalysts

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

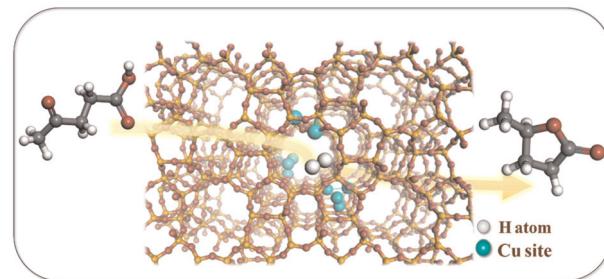


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**MFI zeolite with confined adjustable synergistic Cu sites for the hydrogenation of levulinic acid**

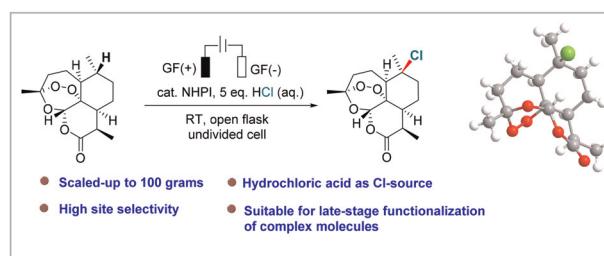
Wanying Liang, Guangyue Xu,\* Xiang Zhang, Huiyong Chen and Yao Fu\*



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**Electrochemical chlorination of least hindered tertiary and benzylic C(sp<sup>3</sup>)-H bonds**

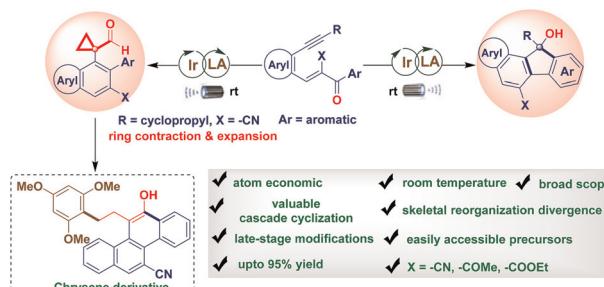
Jianyou Zhao, Jiatai Zhang, Pengkai Fang, Jintao Wu, Fan Wang and Zhong-Quan Liu\*



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

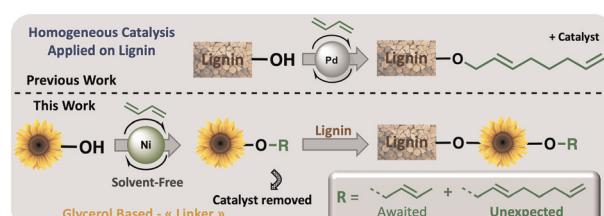
Babasaheb Sopan Gore, Lin-Wei Pan, Jun-Hao Lin, Yi-Chi Luo and Jeh-Jeng Wang\*



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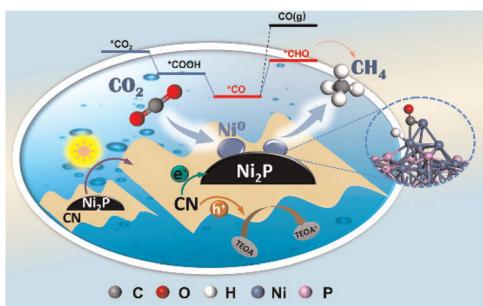
**Efficient nickel-catalysed telomerisation on glycerol carbonate: a new linker route for lignin functionalisation**

Tiphaine Richard, Walid Abdallah, Xavier Trivelli, Mathieu Sauthier and Clément Dumont\*



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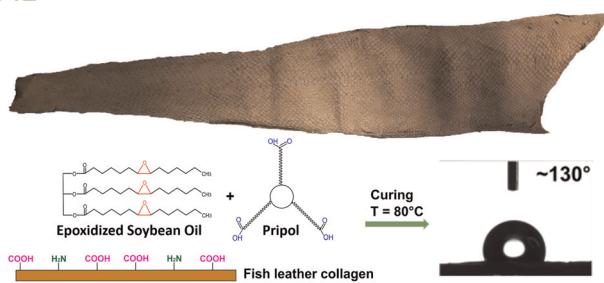
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**The synergy of *in situ*-generated  $\text{Ni}^0$  and  $\text{Ni}_2\text{P}$  to enhance CO adsorption and protonation for selective  $\text{CH}_4$  production from photocatalytic  $\text{CO}_2$  reduction**

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\*

