

# Green Chemistry

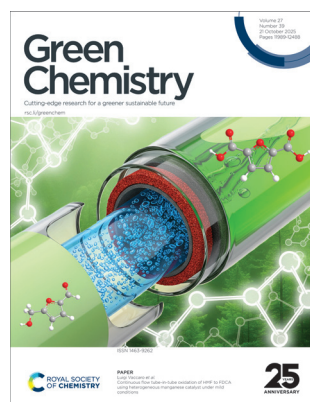
Cutting-edge research for a greener sustainable future

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## IN THIS ISSUE

ISSN 1463-9262 CODEN GRCHFJ 27(39) 11989–12488 (2025)



**Cover**  
See Luigi Vaccaro *et al.*,  
pp. 12166–12175.

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**Inside cover**  
See Jack W. E. Jeffries,  
Helen C. Hailes *et al.*,  
pp. 12176–12186.

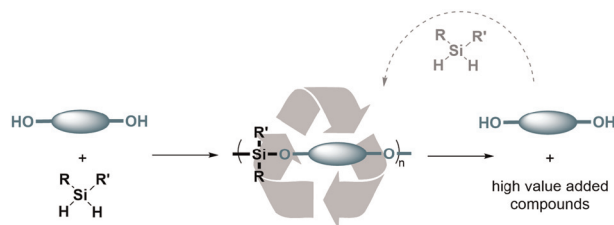
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Helen Hailes from  
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## TUTORIAL REVIEWS

12002

### Construction and deconstruction: recent advances in degradable silicon-based polymers

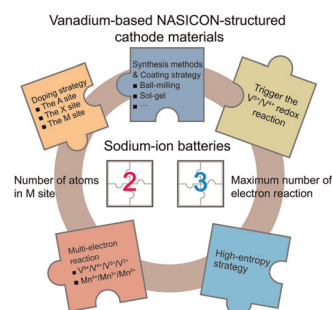
Xueying Liu, Jakhongir Bekmirzaev, Carine Robert, Régis M. Gauvin and Christophe M. Thomas\*



12029

### Recent advances in vanadium-based NASICON-structured cathode materials for sodium-ion batteries

Qianchen Wang,\* LiYao Lu, Zhonghao Lv, Yuhang Xin, Zimo Zhang, Yingshuai Wang and Hongcai Gao\*





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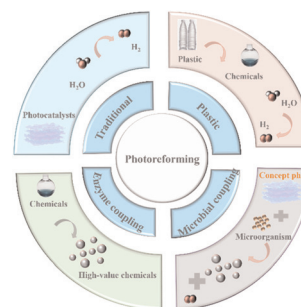


## TUTORIAL REVIEWS

12050

## Plastic photoreforming: catalytic production of hydrogen and valuable chemicals

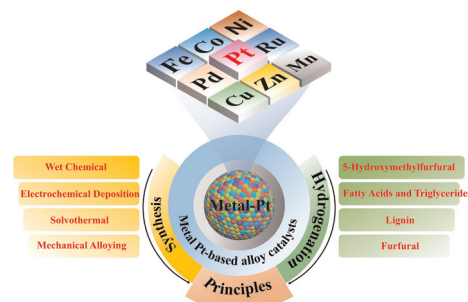
Heng Li, Yeqiong Huang, Yueyang Zhang, Haiyan Li, Chengcheng Shen, Dong Xia\* and Yanmei Zheng\*



12070

## Recent progress in Pt-based alloy catalysts: a comprehensive review on green synthesis and sustainable biomass hydrogenation applications

Yichen Nie, Misbah Uddin, Qingtao Wang, Xingyong Li,\* Na Liu, Senshen Yu, Phidsavard Keomeesay, Xuebing Zhao, Yubao Chen,\* Zhifeng Zheng and Shijie Liu



## PERSPECTIVES

12107

## A proposal of twelve principles for LCA of chemicals

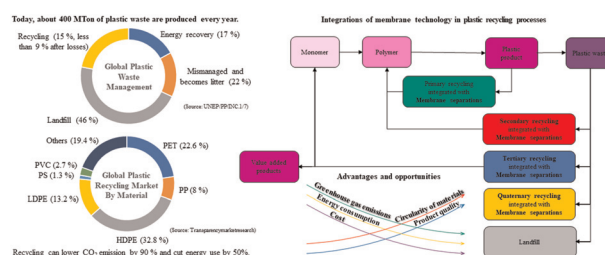
Daniele Cespi\*

- The twelve principles for LCA of chemicals
- 1 Cradle to gate
  - 2 Consequential if under control
  - 3 Avoid to neglect
  - 4 Data collection from the beginning
  - 5 Different scales
  - 6 Data quality analysis
  - 7 Multi-impact
  - 8 Hotspot
  - 9 Sensitivity
  - 10 Results transparency, reproducibility and benchmarking
  - 11 Combination with other tools
  - 12 Beyond environment

12115

## Unlocking the potential of plastic recycling processes with the integration of membrane technology: a focus on PET valorisation

Hamidreza Mahdavi,\* Laila Halim, Selina Giles, Xiaoheng Jin, Leonie van 't Hag,\* Zongli Xie,\* Matthew R. Hill\* and Benny D. Freeman\*



## 12151

Anisole								
MEK	D							
n-Butyl Acetate								
Cyclohexanone	E							
Chloroform								
Propylene Carbonate	F							
2,5-Dimethylfuran								P

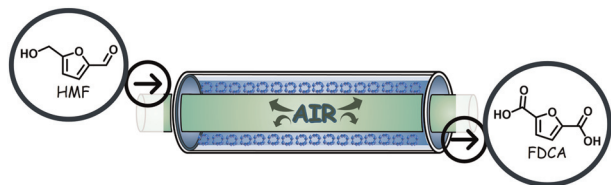
## Olga Clavilier, Darragh Foy and Fergal Byrne\*

$$R^1-CH=CH-CH_2OH + S_8 + \begin{array}{c} R^2 \\ \diagup \\ HN \\ \diagdown \\ R^3 \end{array} \xrightarrow{130^\circ C, 6 h} R^1-CH=CH-CH_2-N(R^2)(R^3)-S$$

- ## Synthesis of alkyl thioamides by three-component reactions of allyl alcohols, elemental sulfur and amines: elemental sulfur as a mild oxidant and a sulfur source

Jiyuan Wu, Yanyan Liao, Miaoyi Pan, Tangtang Song,  
Jian Zhang, Lai Li, Jianmei Lu\* and Xuefeng Jiang\*

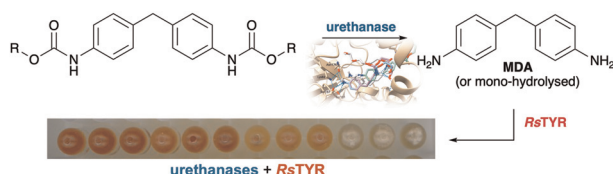
## 12166



### Continuous flow tube-in-tube oxidation of HMF to FDCA using heterogeneous manganese catalyst under mild conditions

Federica Valentini, Francesco Ferlin and Luigi Vaccaro\*

## 12176



# The discovery of new metagenomic urethanases utilising a novel colorimetric assay for applications in the biodegradation of polyurethanes

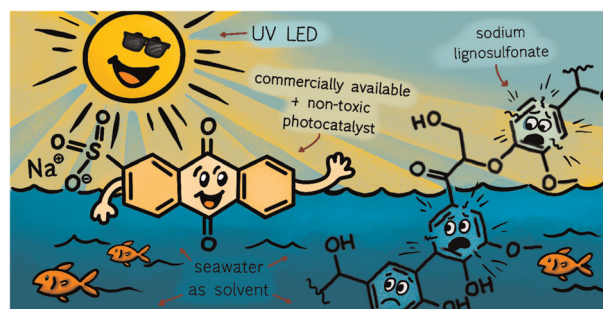
Silvia Anselmi, Yeke Ni, Alessia Tonoli, Jingyue Wu,  
Yu Wang, Luba Prout, Mark Miodownik, Jack  
W. E. Jeffries\* and Helen C. Hailes\*

## PAPERS

12187

### Swimming upstream – photocatalytic depolymerization of lignosulfonate in seawater

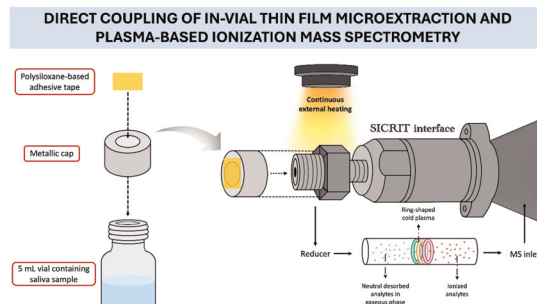
Nele Petersen, Silvia Carlotto, Björn B. Beele, Marcella Frauscher, Raphaela Süss, Pascal Olschowski, Girolamo Casella,\* Adam Slabon\* and Bruno V. M. Rodrigues\*



12201

### Integrating in-vial thin film microextraction using polysiloxane-based adhesive tapes with low-temperature plasma ionization mass spectrometry: A solvent-free approach for determining cocaine and methamphetamine in saliva samples

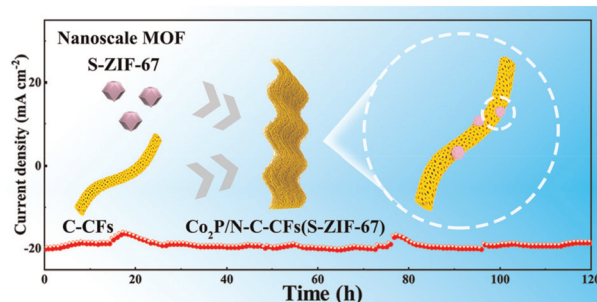
Carlos Calero-Cañuelo, Rafael Lucena\* and Soledad Cárdenas



12211

### Nanoscale MOF-derived vacancy-engineered Co<sub>2</sub>P/N-doped coal-based carbon fibers for boosting hydrogen evolution

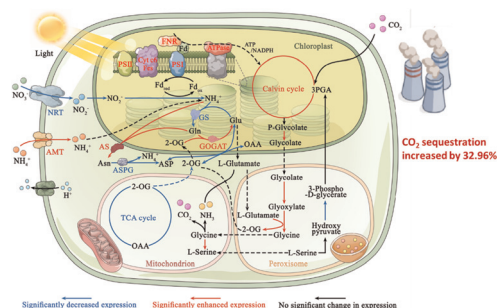
Mengran Lou, Ruiying Wang,\* Luxiang Wang, Yang Wang, Mei Wu, Shengjiao Wen, Xia Kong, Taotao Lv and Bo Ma



12222

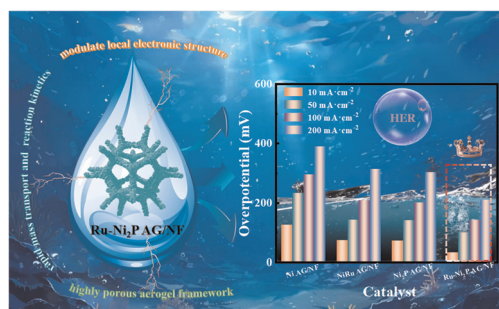
### Ammonium sulfate (a coking byproduct) downregulates the assimilatory nitrate pathway to save energy for carbon sequestration in *Nannochloropsis oceanica* at a stable pH using HEPES-NaOH

Ying Liu, Xiangjin Liang, Jun Lu, Yapeng Chen, Jun Liu, Baoying Wang, Ruixue Ma, Junchen Xu and Jun Cheng\*



## PAPERS

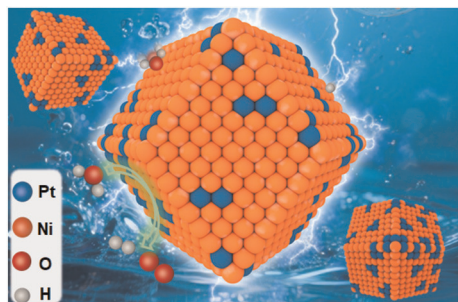
12237



### Tailoring the electronic structure of an Ni<sub>2</sub>P aerogel via ruthenium doping for energy-efficient hydrogen generation in anion-exchange membrane-based seawater electrolysis

Meitong Zhao, Junwei Yuan, Fan Yang,\* Hongchen Liu, Xinyang Sun, Yang Sun, Siyuan Sun, Jiahui Liu and Yongfeng Li\*

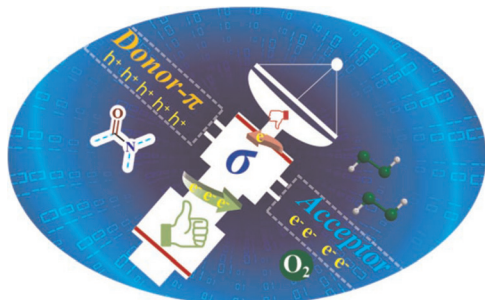
12250



### Phase-segregated PtNi<sub>5</sub> rhombic dodecahedra enable excellent electrocatalytic hydrogen evolution in the full pH range

Siyuan Lai, Wendan Jiang, Jingzhe Zhao, Jun Yang\* and Xiongwu Kang\*

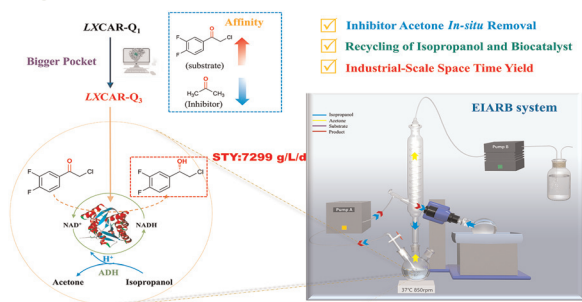
12259



### A donor- $\pi$ - $\sigma$ -acceptor strategy in porous polymers for suppression of carrier recombination: boosting photoredox in a Csp<sup>2</sup>-N radical cross-coupling reaction

Jinyang Lu, Lingjuan Zhang,\* Nan Zhang, Xueying Song, Qi Gao, Jincong Yuan and Xian-Ming Zhang\*

12270



### Breaking through acetone inhibition: integrated protein engineering and bioreactor design for sustainable chiral aryl alcohol synthesis

Feng Qian, Yaowu Wang, Zhe Wang, Hanyu Liu, Ying Zhang, Haimin Zhang and Pu Wang\*



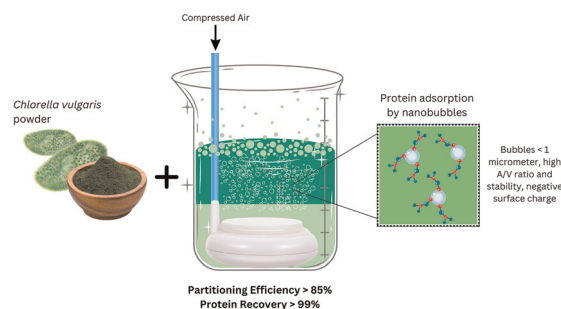


## PAPERS

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### Enhanced protein recovery from *Chlorella vulgaris* using micro-nanobubble-assisted liquid biphasic flotation

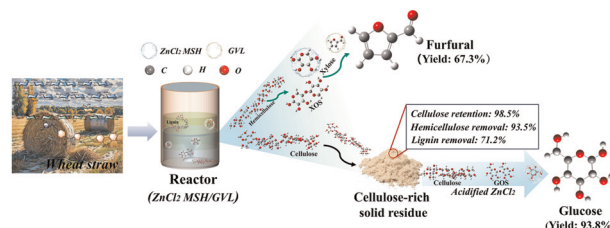
Wei Han Foo, Shir Reen Chia, Yu Xuan Lim and Kit Wayne Chew\*



12295

### Valorization of wheat straw to furfural and glucose via $\text{ZnCl}_2/\text{gamma}$ -valerolactone system

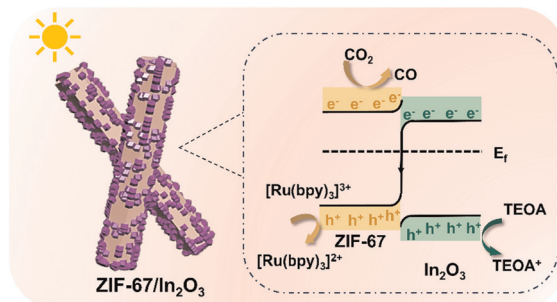
Yao Liu, Ruonan Zhu,\* Hui Zhang, Xingjie Wang, Lihong Zhao, Junli Ren\* and Wei Qi



12309

### Rational design of a Z-scheme ZIF-67/ $\text{In}_2\text{O}_3$ heterojunction with a built-in electric field and defects for photocatalytic $\text{CO}_2$ conversion

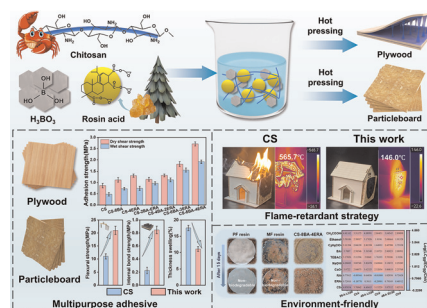
Chunxia Wang, Ling Ma, Yifeng Zeng, Yubo Zhang, Yanxin Sun, Xinchun Kang\* and Guoyong Huang\*



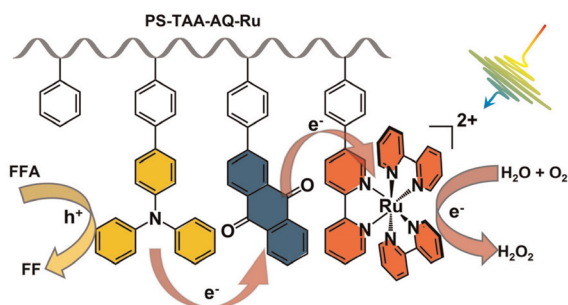
12319

### Nature-derived adhesives based on chitosan and rosin acid with high strength, flame retardancy, and environmental friendliness

Qi Huang, Zhaoshuang Li,\* Zhenyang Bao, Xu Xu, He Liu, Min Zhang, Yan Qing, Xingong Li and Yiqiang Wu\*



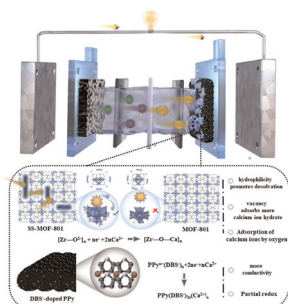
12333



### Ternary engineered linear polymers with a controllable cascade electron transfer pathway for efficient $\text{H}_2\text{O}_2$ photosynthesis coupled with biomass conversion

Xueling Song, Jiani Peng, Xin Li, Pengyan Zhao, Xiaoqin Zhao and Lei Wang\*

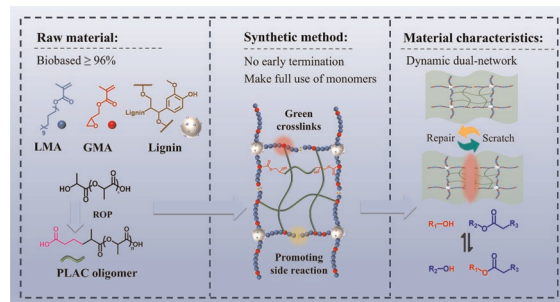
12341



### Defect-engineered MOF-801 as a redox-active intercalation battery-type capacitive deionization cathode: mechanistic insights into selective calcium ion removal

Shu Zhou, Dong Wang, Huangzhao Wei, Hongchao Ma and Guowen Wang\*

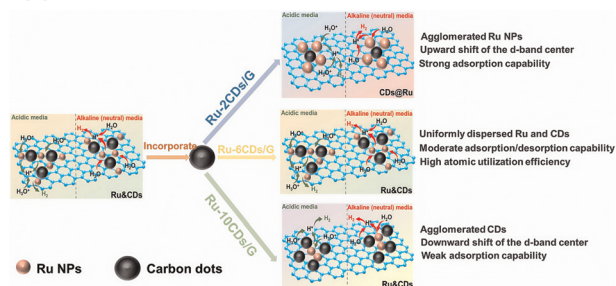
12353



### One-pot synthesis of lignin-derived fully bio-based dynamic dual-network polymers via synergistic side reactions and star-shaped architectural design

Quan Yan, Bailiang Xue,\* Xiaojie Xie, Wenliang Wang, Xiping Li, Xiaojun Shen, Xianzhi Meng and Wei Zhao

12364



### Carbon dot-driven spatial and electronic modulation of Ru on graphene for pH-universal hydrogen evolution reaction electrocatalysts

Liwu Qiang, Meng Bai, Zonghang Liu, Peipei Zhao, Shuai He, Man Zhao,\* Qinyun Yan, Wei Wen, Qilin Guo, Yanxia Zhang, He Xiao\* and Jianfeng Jia\*



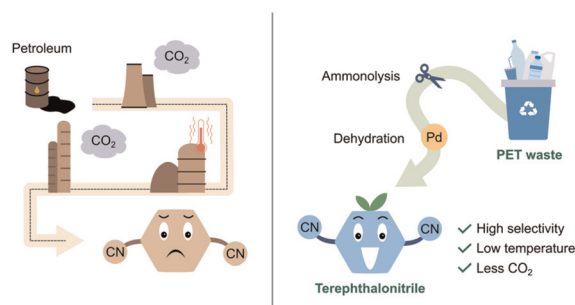


## PAPERS

12378

## Upcycling of poly(ethylene terephthalate) waste plastics to terephthalonitrile

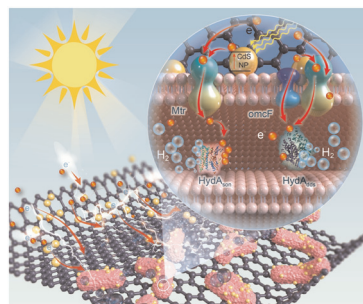
Phuc T. T. Nguyen, Jiong Cheng, Junyu Mi and Ning Yan\*



12389

Modular engineering a *Shewanella oneidensis*–CdS@rGO artificial photosynthetic biohybrid to accelerate photoelectron transfer and conversion for enhanced hydrogen production

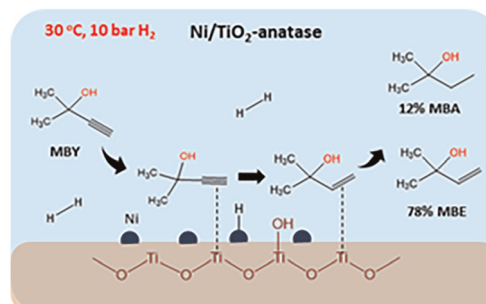
Wenliang Xu, Qijing Liu, Qinran Ding, Yan Zhang, Junqi Zhang, Chao Li, Huan Yu, Baocai Zhang, Jie Yang, Cheng Zhong, Wenyu Lu, Guosheng Xin, Hao Song\* and Feng Li\*



12403

Evaluation of Ni/TiO<sub>2</sub> catalysts in the semi-hydrogenation of alkynols under mild conditions in water

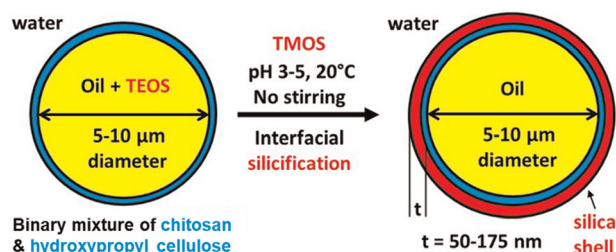
Ajay Tomer, Laurent Djakovitch and Noémie Perret\*



12421

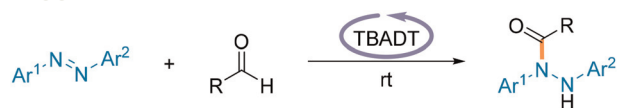
## Sustainable silica microcapsules

O. Norvilaite, C. Lindsay, M. J. Rymaruk, P. Taylor and S. P. Armes\*



## PAPERS

12438

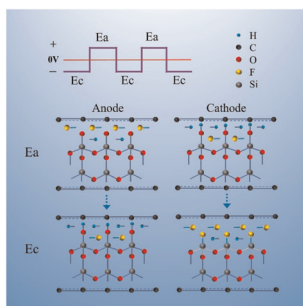


- readily available acylation reagent
- broad scope
- additive-free
- base-free
- waste-free
- controllable
- mild & efficient
- atom-economic

### Decatungstate-photocatalyzed hydroacylation of azobenzenes with aldehydes to access *N,N'*-diarylhydrazides

Jingya Yang,\* Bao Huang, Haifang Xu, Qi Dong, Xiaojun Liu, Kejing Huang and Hongyan Zhou\*

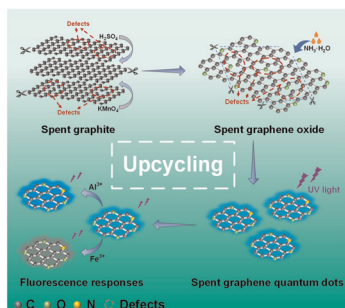
12446



### Sustainable high-purity graphite purification via pulsed electrolysis with reduced fluoride consumption

Xianglin Liao, Yin Zhao, Yuehua Liu, Yiming Feng, Jingyao Wang,\* Junhao Liu and Xuzhong Gong\*

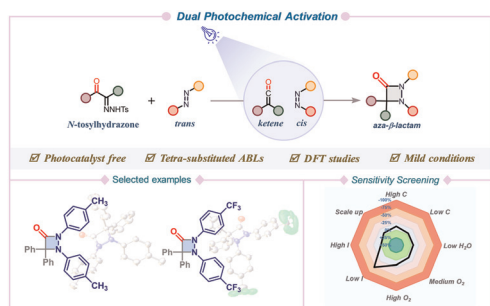
12460



### *In situ* conversion of graphite into graphene quantum dots (GQDs) towards upcycling of spent lithium-ion batteries

Aoli Liu, Zelong Dai, Danlin Ouyang, Binod Mahara, Lishan Yang and Xiangping Chen\*

12472



### Visible light-driven modular synthesis of aza-β-lactams via a dual photochemical cascade

Imtiaz Ahmed, Nikita Gupta, Plaban Jyoti Sarma, Shilpa Neog and Vijay Kumar Das\*



## CORRECTION

12483

**Correction: Hydrothermal liquefaction vs. fast/flash pyrolysis for biomass-to-biofuel conversion: new insights and comparative review of liquid biofuel yield, composition, and properties**

Farid Alizad Oghyanous and Cigdem Eskicioglu\*

