

# Green Chemistry

Cutting-edge research for a greener sustainable future

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## IN THIS ISSUE

ISSN 1463-9262 CODEN GRCHFJ 27(6) 1579–1860 (2025)



### Cover

See Benjamin Caudle *et al.*, pp. 1667–1678.

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### Inside cover

See Rocio Villa, Pedro Lozano *et al.*, pp. 1620–1651.

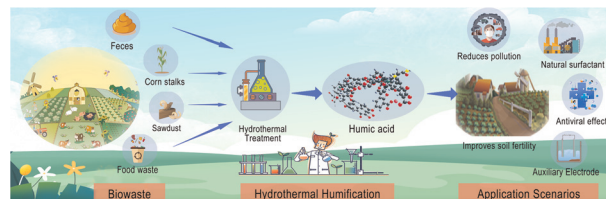
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## CRITICAL REVIEWS

1588

### Rapid humification of biomass *via* hydrothermal conversion: a comprehensive review

Yangjiuzhou Wang, Changbin Yuan, Kai Zhang, Jinyu Tong, Ningjie Ma, Mahmoud M. Ali, Yongdong Xu\* and Zhidan Liu\*



1604

### Advances in bio-based wearable flexible sensors

Ziwen Zhang, Baofang Feng, Jipeng Yan, Weidong Zhao\* and Jian Sun\*



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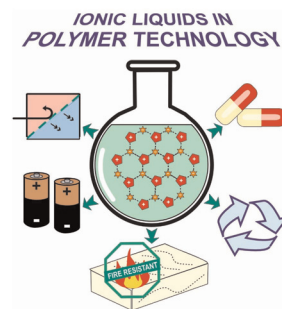
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## TUTORIAL REVIEW

1620

## Ionic liquids in polymer technology

Rebeca Salas, Rocio Villa,\* Francisco Velasco, Francisco G. Cirujano, Susana Nieto, Nuria Martin, Eduardo Garcia-Verdugo, Jairton Dupont and Pedro Lozano\*

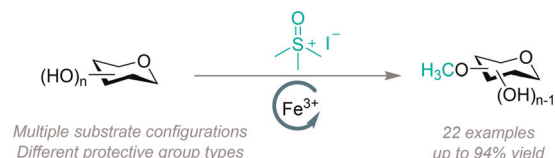


## COMMUNICATIONS

1652

## Trimethylsulfoxonium iodide: a green methylating agent for site-selective methylation of carbohydrates

Xiaorui Zhang, Jie Zhao, Qichang Yang, Zhangxuan Chen, Haifeng Wang, Shuang-Xi Gu and Jian Lv\*

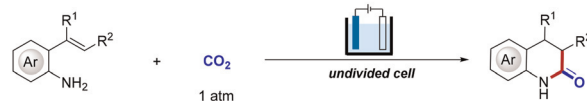


- |                                    |                          |
|------------------------------------|--------------------------|
| Green and user-friendlier reagents | Efficient catalysis      |
| Broad substrate scope              | Applicable for synthesis |

1658

Electrochemical lactamization with CO<sub>2</sub>

Ranran Zhang, Min Liu, Zhiwei Zhao and Youai Qiu\*

Electrochemical lactamization with CO<sub>2</sub>

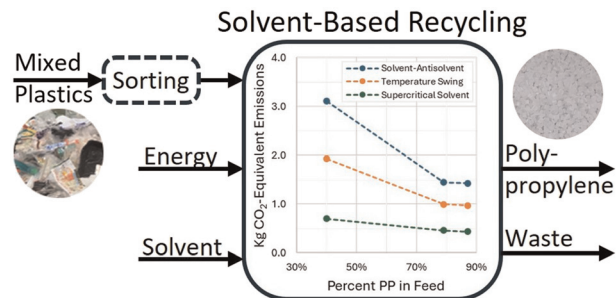
- Using CO<sub>2</sub> as a carbonyl source
- Transition Metal- and base-free process
- Broad substrates range and excellent functional group tolerance
- One pot synthesis

## PAPERS

1667

## Evaluation of three solvent-based recycling pathways for circular polypropylene

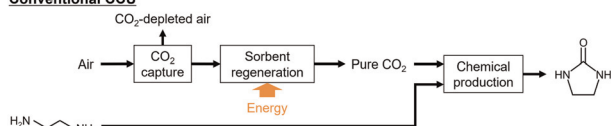
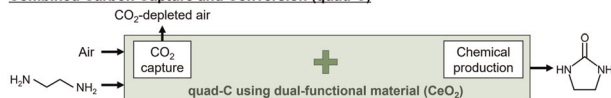
Benjamin Caudle,\* Thuy T. H. Nguyen and Sho Kataoka





## PAPERS

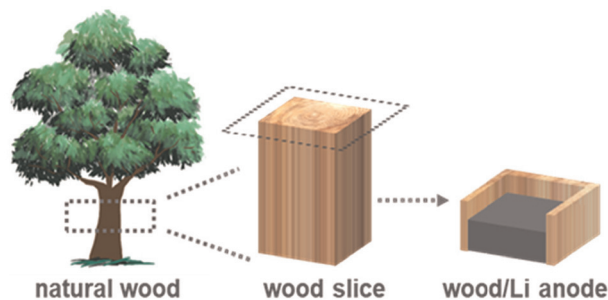
1679

**Conventional CCU****Combined Carbon Capture and Conversion (quad-C)**

### Energy and cost-saving potential of combined carbon capture and conversion: a pioneering design of a process intensification concept harnessing CeO<sub>2</sub> as a dual-functional material

Koki Yagihara, Jialing Ni, Anqing Wang, Hajime Ohno and Yasuhiro Fukushima\*

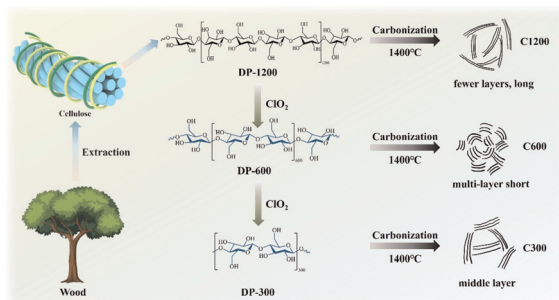
1696



### Natural wood as a lithium metal host

Wei-Jing Chen,\* Shang-Jie Yu, Qian Sun, Xin Shen, Peng Shi, Tong-Qi Yuan\* and Zhaoqing Lu\*

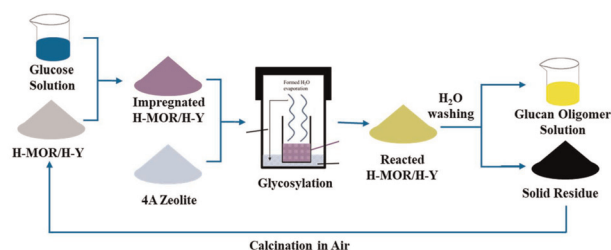
1703



### Facile fabrication of cellulose-derived hard carbon for high-rate performance sodium-ion batteries by regulating degrees of polymerization

Fengyi Luo, Conghua Yi,\* Dongjie Yang,\* Dezhe Fan, Weifeng Liu, Xueqing Qiu and Wenli Zhang

1714



### Confined synthesis of glucan oligomers from glucose in zeolites

Haotong Liang, Sheng Ye, Qiyu Liu,\* Wei Fan and Qiaozhi Ma\*

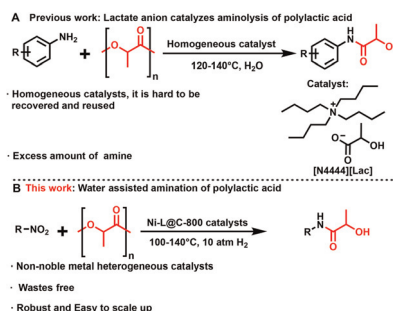


## PAPERS

1723

## Reductive amidation of polylactic acid with nitro compounds using nickel based nanocatalysts

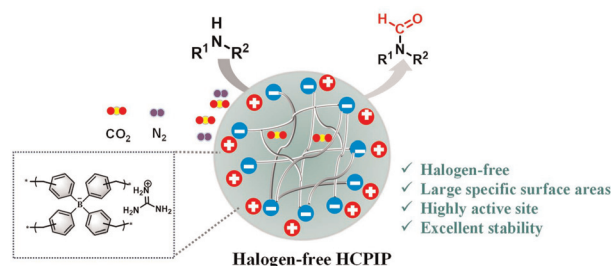
Jie Gao,\* Lan Zhang, Long Luo\* and Ning Wang\*



1729

Design of halogen-free hyper-crosslinked porous ionic polymers for efficient CO<sub>2</sub> capture and conversion

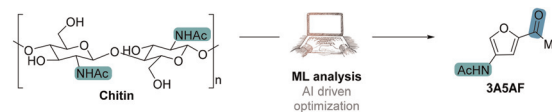
Xiaoqing Yang, Jinshan Zhao, Junfeng Zeng, Bihua Chen, Liang Tang, Jun Zhang, Akif Zeb, Zhiyong Li, Shiguo Zhang and Yan Zhang\*



1740

## Active learning assists chemical intuition identify a scalable conversion of chitin to 3-acetamido-5-acetylfuran

Juliana G. Pereira, João M. J. M. Ravasco, Latimah Bustillo, Inês S. Marques, Po-Yu Kao, Po-Yi Li, Yen-Chu Lin, Tiago Rodrigues,\* Vasco D. B. Bonifácio, Andreia F. Peixoto, Carlos A. M. Afonso\* and Rafael F. A. Gomes\*

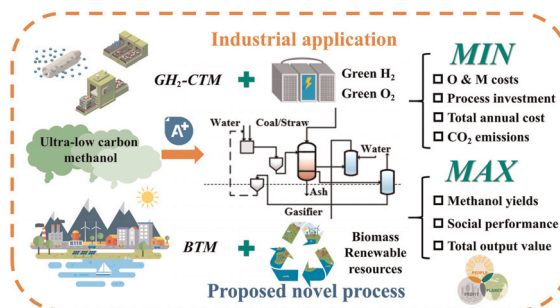


- important N-containing synthon obtained from waste biomass
- commercial ionic liquid solvent can be reused
- interesting scaffold for further chemical exploitation
- up to 72 % yield from NAG or 10 mg/g of shrimp shell

1747

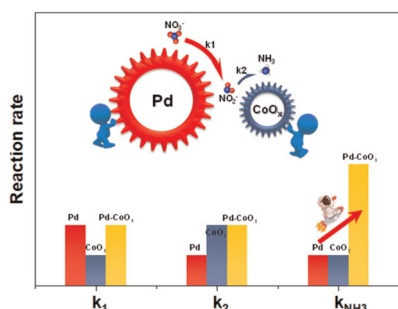
## Industrial ultra-low-carbon methanol synthesis routes: techno-economic analysis, life cycle environment assessment and multi-dimensional sustainability evaluation

Dongrui Zhang, Ruqiang Wang, Zhibo Zhang, Hao Yan, Xin Zhou,\* Hui Zhao\* and Chaohe Yang



## PAPERS

1763

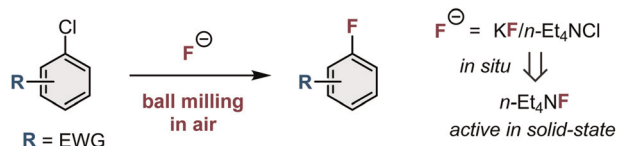


### Electrochemically co-deposited Pd-CoO<sub>x</sub> coating for efficient synergistic electrocatalytic reduction of nitrate to ammonia

Yan Wang, Yujia Zeng, Jiawei Xie, Chao Wang, Changan Zhou, Lei Song, Kui Ma and Hairong Yue\*

1771

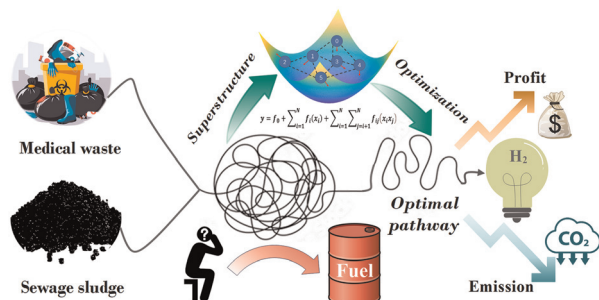
### Solid-state S<sub>N</sub>Ar fluorination using mechanochemistry



### Solid-state aromatic nucleophilic fluorination: a rapid, practical, and environmentally friendly route to N-heteroaryl fluorides

Koji Kubota,\* Tetsu Makino, Keisuke Kondo, Tamae Seo, Mingoo Jin and Hajime Ito\*

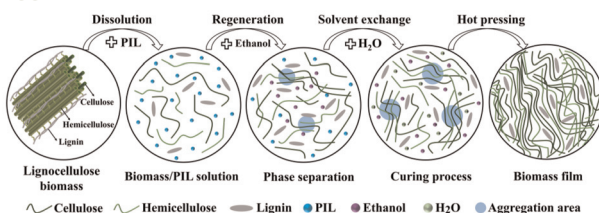
1777



### Turning sewage sludge and medical waste into energy: sustainable process synthesis via surrogate-based superstructure optimization

Jianzhao Zhou, Jingzheng Ren\* and Chang He

1789



### Direct dissolution of lignocellulosic biomass by malonic acid-DBU protonic ionic liquid and preparation of high-performance all-biomass films

Long Zhang, Boxiang Zhan, Shangzhong Zhang, Haiyuan Ji, Shen Peng, Minghui Fan and Lifeng Yan\*

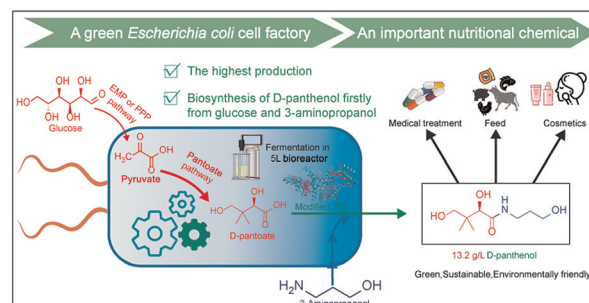


## PAPERS

1806

### Metabolic engineering of *Escherichia coli* for the production of D-pantenol from 3-aminopropanol and glucose

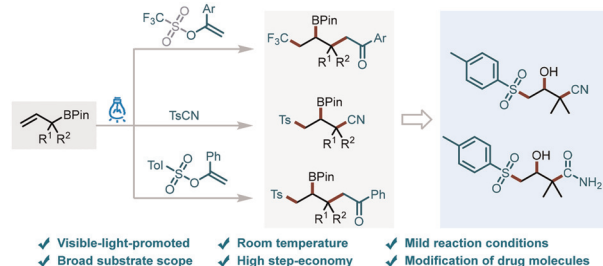
Junping Zhou, Zheng Zhang, Xinyuan Xin, Yinan Xue, Yihong Wang, Xueyun Feng, Bo Zhang, Man Zhao, Zhiqiang Liu\* and Yuguo Zheng



1820

### Visible-light-induced 1,3-difunctionalization of allylboronic esters enabled by a 1,2-boron shift

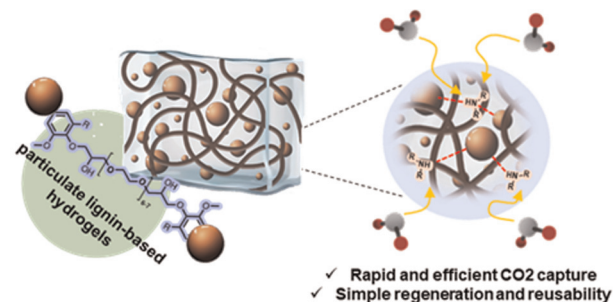
Panjie Xiang, Kai Sun,\* Anzai Shi, Jiangzhen An, Xiaolan Chen, Lingbo Qu and Bing Yu\*



1828

### Monolithic, hybrid and particulate lignin-based hydrogels for sustainable CO<sub>2</sub> capture

Adrian Moreno,\* Javier Delgado-Lijarcio, Juan C. Ronda, Marina Galià and Gerard Lligadas\*



1838

### Microwave-assisted ethanol dehydration to ethylene over biochar-based catalyst at low temperature

Li Yang, Bonan Liu,\* Yingying Zhao, Zijian Zhang, Hanyu Wu, Minyi He, Chao Tang, Jun Zhao,\* Yu Fan and Wangjing Ma\*

