

# Green Chemistry

Cutting-edge research for a greener sustainable future

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## IN THIS ISSUE

ISSN 1463-9262 CODEN GRCHFJ 25(11) 4141–4580 (2023)



**Cover**  
See Oliver Y. Gutiérrez *et al.*,  
pp. 4222–4233.

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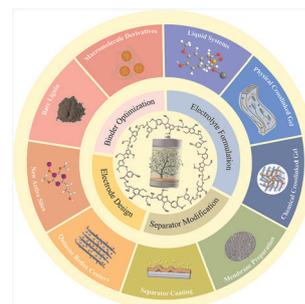
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## CRITICAL REVIEW

4154

### Renewable lignin and its macromolecule derivatives: an emerging platform toward sustainable electrochemical energy storage

Xueru Yang, Yufei Zhang, Minghui Ye, Yongchao Tang, Zhipeng Wen, Xiaoqing Liu\* and Cheng Chao Li\*

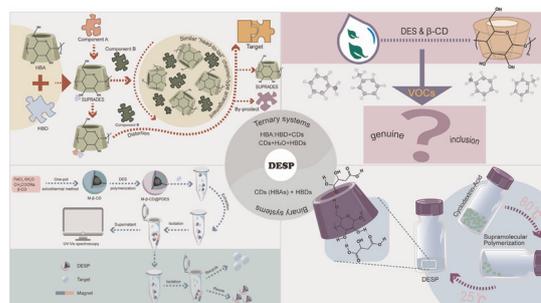


## TUTORIAL REVIEWS

4180

### Green materials with promising applications: cyclodextrin-based deep eutectic supramolecular polymers

Jingyu Zhang, Liping Yao, Shang Li, Shiqi Li, Yongsong Wu, Zuguang Li\* and Hongdeng Qiu\*



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Green Chemistry electronic:  
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# Green Chemistry

Cutting-edge research for a greener sustainable future

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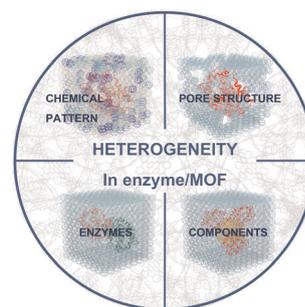


## TUTORIAL REVIEWS

4196

### Heterogeneity in enzyme/metal–organic framework composites for CO<sub>2</sub> transformation reactions

Ying Shu, Weibin Liang\* and Jun Huang\*

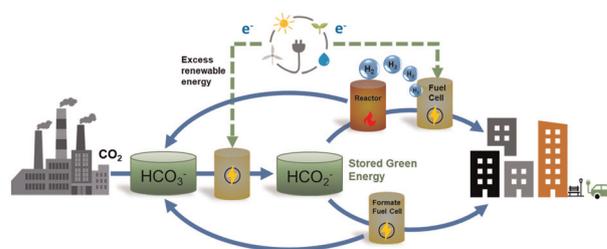


## PERSPECTIVE

4222

### Using earth abundant materials for long duration energy storage: electro-chemical and thermo-chemical cycling of bicarbonate/formate

Oliver Y. Gutiérrez,\* Katarzyna Grubel, Jotheeswari Kothandaraman, Juan A. Lopez-Ruiz, Kriston P. Brooks, Mark E. Bowden and Tom Autrey

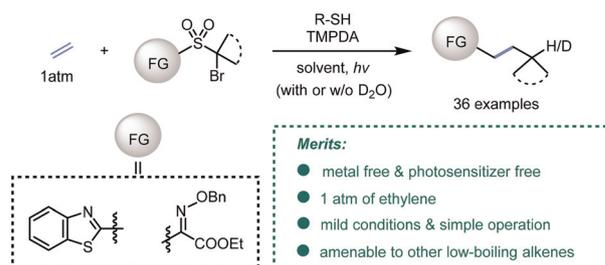


## COMMUNICATIONS

4234

### Metal-free radical-mediated alkylfunctionalization of ethylene and low-boiling-point alkenes

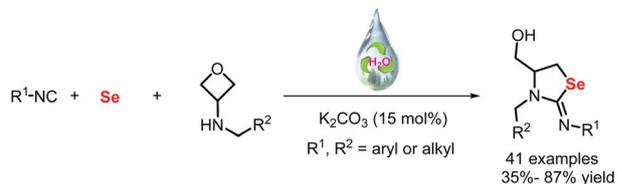
Xu Zhang, Xinxin Wu, Yasu Chen and Chen Zhu\*



4239

### A multicomponent reaction of isocyanides, selenium powder and 3-aminooxetanes in pure water: green and efficient synthesis of 1,3-selenazolines

Huan Liu, Zi-Lin Ye, Zhong-Jian Cai\* and Shun-Jun Ji\*

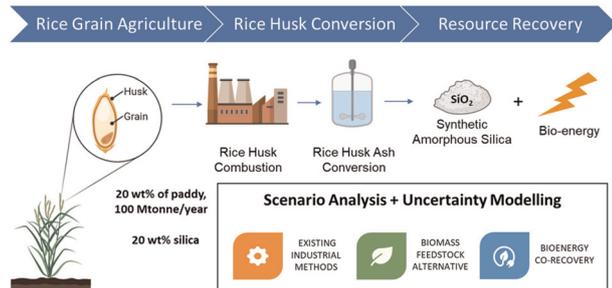


- selenium powder as selenium source
- high atom economy
- water as sole solvent
- simple and mild conditions



## PAPERS

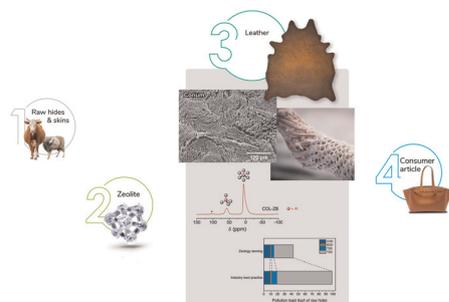
4244



### Synthetic amorphous silica: environmental impacts of current industry and the benefit of biomass-derived silica

Ethan Errington, Miao Guo\* and Jerry Y. Y. Heng\*

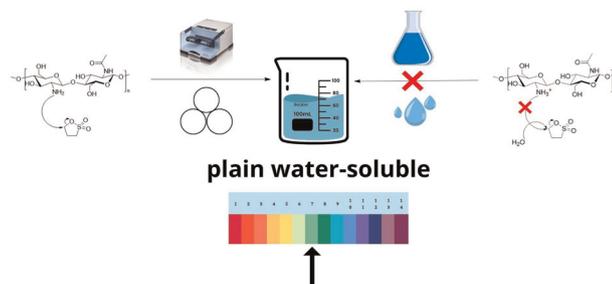
4260



### Zeolites as sustainable alternatives to traditional tanning chemistries

William R. Wise, Stefan J. Davis,\* Wouter E. Hendriksen, Dirick J. A. von Behr, Sujay Prabakar and Yi Zhang

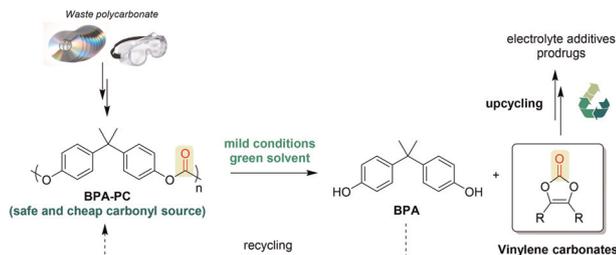
4271



### Green mechanochemical synthesis of water-soluble *N*-sulfonated chitosan

Casper Van Poucke,\* Aurèle Vandeputte, Sven Mangelinckx and Christian V. Stevens

4282



### Chemical upcycling of poly(bisphenol A carbonate) to vinylene carbonates through organocatalysis

Killian Onida, Mohamad Fayad, Sébastien Norsic, Olivier Boyron and Nicolas Duguet\*

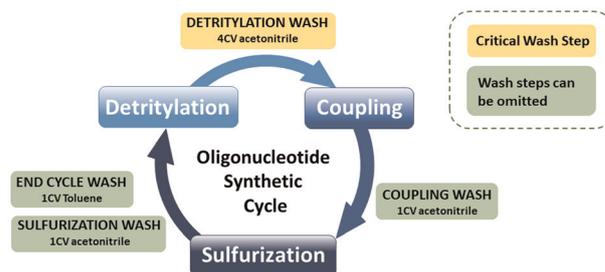


## PAPERS

4292

**Omission of column washing operations in the solid phase synthesis of oligonucleotides**

Li Xiao,\* Thomas Pickel, Zifan Li, Dominic Luciano, Jing Yang, David Cho, Sophia Mac, Xianglin Shi, George Bou-Assaf, Firoz Antia and Yannick Fillon



4302

**Electrochemical single-step *N*-acylation and *S*-cyclization synthesis of thiazolimide *via* radical process**

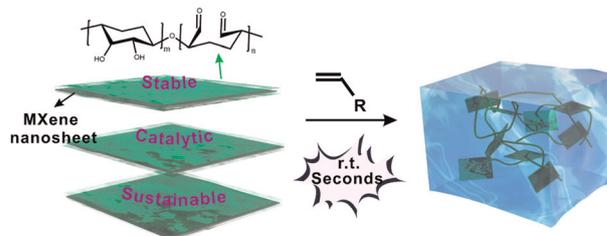
Yao Li, Jun Zhang, Mengyao She, Lang Liu, Zheng Yang, Ping Liu,\* Shengyong Zhang and Jianli Li\*



4309

**Long-term stable and catalytic 2D MXene nanosheets wrapped with dialdehyde xylan for ultrafast gelation**

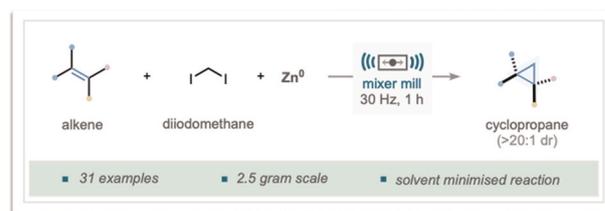
Nan Li, Lupeng Shao, Qiang Xia, Shujun Tan, Shuwen Zhao, XuPeng Li, Zhenhua Su, Xiang Hao\* and Feng Peng\*



4319

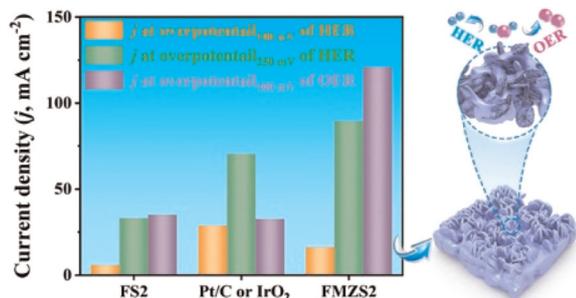
**Mechanochemical Simmons–Smith cyclopropanation *via* ball-milling-enabled activation of zinc(0)**

Lorenzo Pontini, Jamie A. Leitch\* and Duncan L. Browne\*



## PAPERS

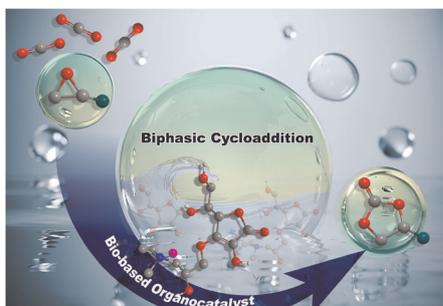
4326



### Compositionally modulated FeMn bimetallic skeletons for highly efficient overall water splitting

Licheng Huang, Ruiqi Yao, Zili Li, Jiabin He, Yingqi Li,\* Hongxiang Zong,\* Shuang Han,\* Jianshe Lian, Yang-Guang Li and Xiangdong Ding

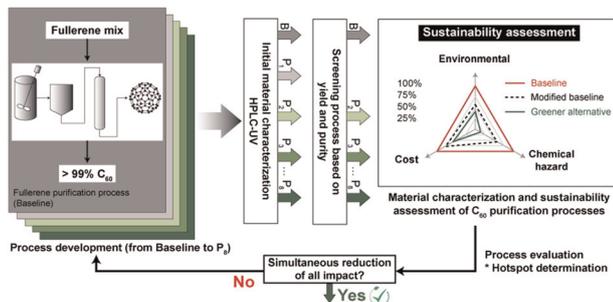
4336



### Cycloaddition of CO<sub>2</sub> to epoxides "around water": a strategy to apply and recycle efficient water-soluble bio-based organocatalysts in biphasic media

Tharinee Theerathanagorn, Anna Vidal-López, Aleix Comas-Vives, Albert Poater\* and Valerio D'Elia\*

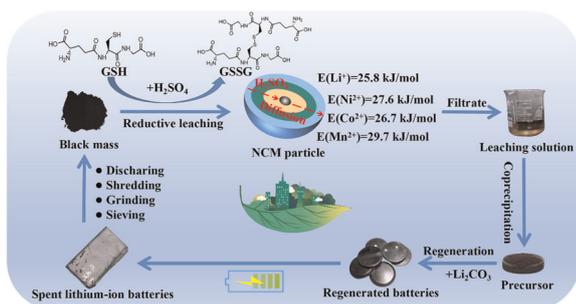
4350



### Environmental, cost, and chemical hazards of using alternative green solvents for fullerene (C<sub>60</sub>) purification

Seyed M. Heidari, Eunsang Lee, Ben Cecil and Annick Anctil\*

4362



### A green strategy for recycling cathode materials from spent lithium-ion batteries using glutathione

Kunhong Gu, Xingyuan Gu, Yongwei Wang, Wenqing Qin and Junwei Han\*

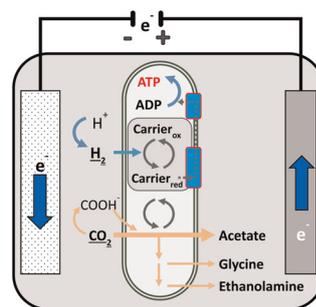


## PAPERS

4375

### Microbial electrosynthesis with *Clostridium ljungdahlii* benefits from hydrogen electron mediation and permits a greater variety of products

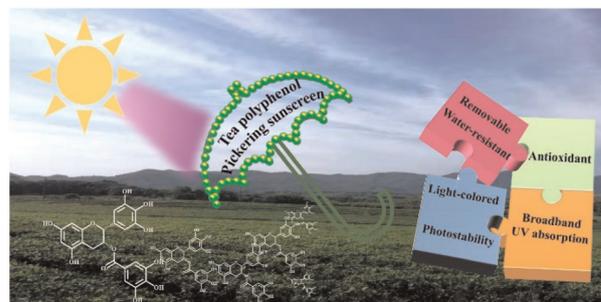
Santiago T. Boto, Bettina Bardl, Falk Harnisch and Miriam A. Rosenbaum\*



4387

### Polyphenolic condensation assembly enabled biocompatible, antioxidative, and light-colored tea sunscreen formulations with broadband UV protection

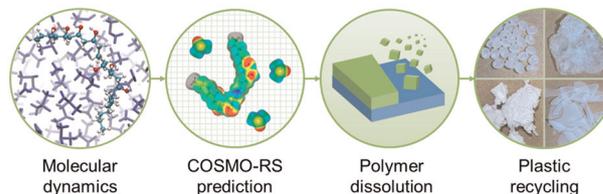
Qiulan Tong, Yue Xiao, Zeng Yi, Xiangyu Chen, Xian Jiang\* and Xudong Li\*



4402

### Large-scale computational polymer solubility predictions and applications to dissolution-based plastic recycling

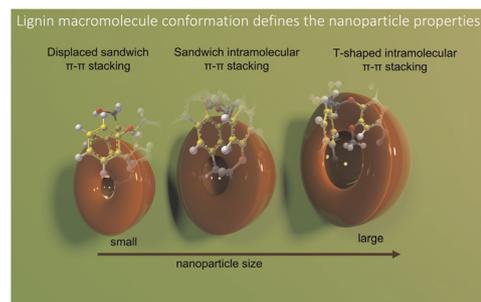
Panzheng Zhou, Jiuling Yu, Kevin L. Sánchez-Rivera, George W. Huber and Reid C. Van Lehn\*



4415

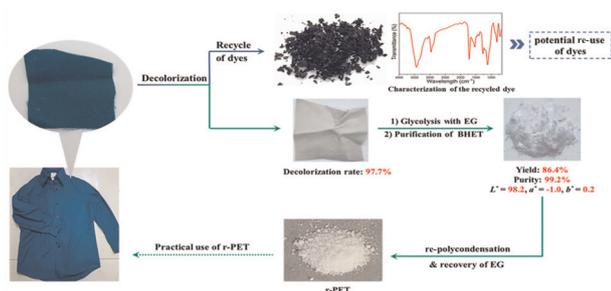
### Molecular understanding of the morphology and properties of lignin nanoparticles: unravelling the potential for tailored applications

Ievgen V. Pylypchuk, Maria Karlsson, Pär A. Lindén, Mikael E. Lindström, Thomas Elder, Olena Sevastyanova\* and Martin Lawoko\*



## PAPERS

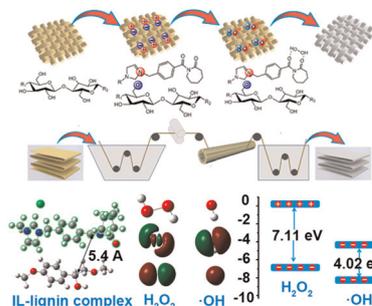
4429



### Closed-loop utilization of polyester in the textile industry

Zhuo Chen, Haiyu Sun, Weiqing Kong, Long Chen\* and Weiwei Zuo\*

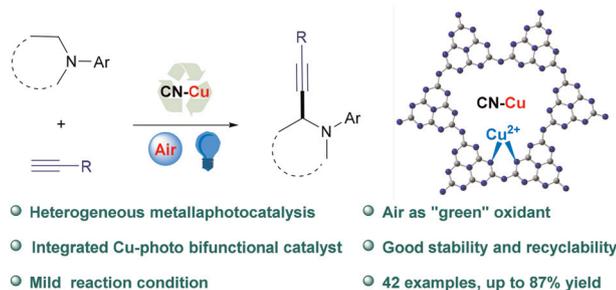
4438



### Efficient catalysis of $H_2O_2$ with ionic liquid molecules to generate hydroxyl radicals and application in green chemistry cotton processes

Kongliang Xie, Xiang Zhuang, Xiang Luo, Zeye Jing, Xiyu Song,\* Aiqin Hou and Aiqin Gao\*

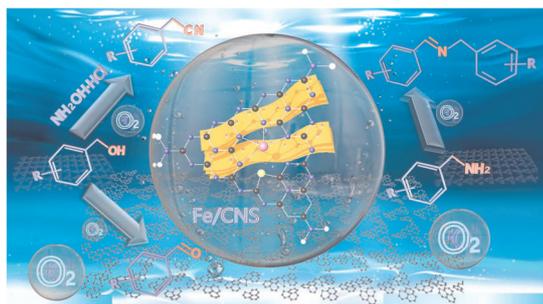
4446



### Copper-doped carbon nitride as a practical heterogeneous metallaphotocatalyst for aerobic oxidative cross-coupling of tertiary amines with terminal alkynes

Yilian Bai, Qian Yang, Yurong Tang,\* Xiao Dan, Wentao Wang\* and Yunfei Cai\*

4453



### Enzyme-mimicking single atoms enable selectivity control in visible-light-driven oxidation/ammoxidation to afford bio-based nitriles

Ye Meng, Jinshu Huang, Jie Li, Yumei Jian, Song Yang\* and Hu Li\*

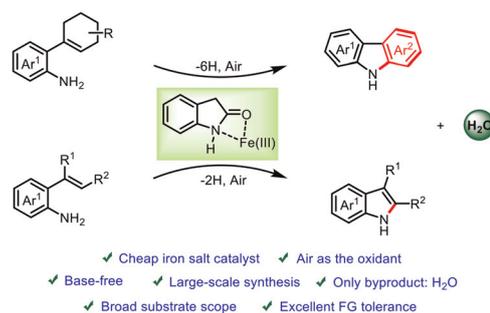


## PAPERS

4463

**Iron-catalyzed intramolecular C–H amination for the synthesis of N–H carbazoles and indoles**

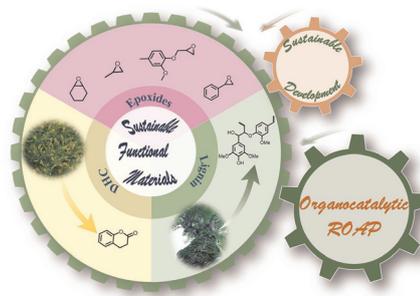
Zheng-Lin Wang, Yun-Hao Zhang, Jun-Yu Huang, Jian Zhou, Ya-Qin Yu, Dexin Feng\* and Da-Zhen Xu\*



4469

**Lignin-grafting alternative copolymer of 3,4-dihydrocoumarin and epoxides as an active and flexible ingredient in sunscreen**

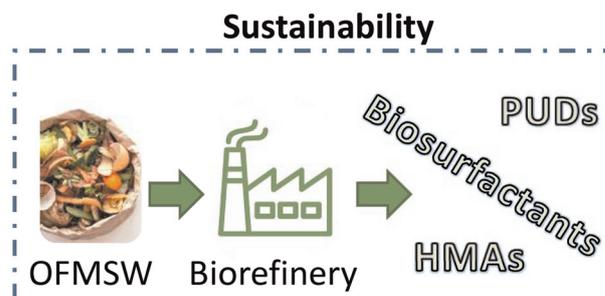
Pengcheng Liu, Yuanlong Guo, Gu Guo, Lei Dai, Gang Hu and Haibo Xie\*



4482

**Techno-economic evaluation and life cycle assessment for sustainable alternative biorefinery concepts using the organic fraction of municipal solid waste**

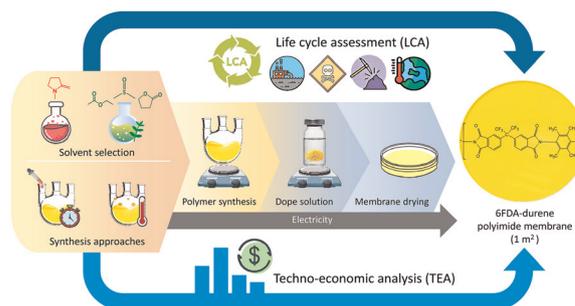
Sofia-Maria Ioannidou, José Pablo López-Gómez, Joachim Venus, Miguel Angel Valera, Vera Eßmann, Irantzu Alegria-Dallo, Ioannis K. Kookos, Apostolis Koutinas\* and Dimitrios Ladakis\*



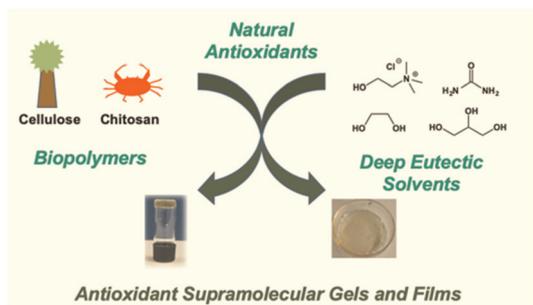
4501

**Are green solvents truly green? Integrating life cycle assessment and techno-economic analysis for sustainable membrane fabrication**

Seang Uyin Hong, Yida Wang, Leong Sing Soh and Wai Fen Yong\*



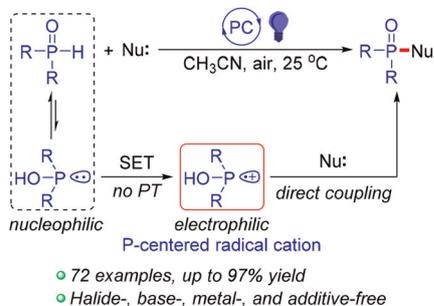
4513



### Polysaccharide-based supramolecular bicomponent eutectogels as sustainable antioxidant materials

Salvatore Marullo, Floriana Petta, Giulia Infurna, Nadka T. Dintcheva and Francesca D'Anna\*

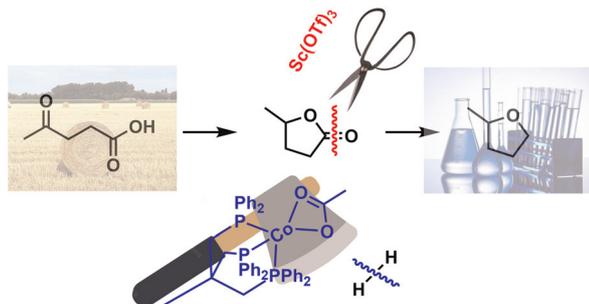
4528



### Visible light photocatalytic phosphorylation of heteroatom nucleophiles triggered by phosphorus-centered radical cations

Yuanting Huang, Jinyu Tang, Xi Zhao, Yanping Huo, Yang Gao, Xianwei Li and Qian Chen\*

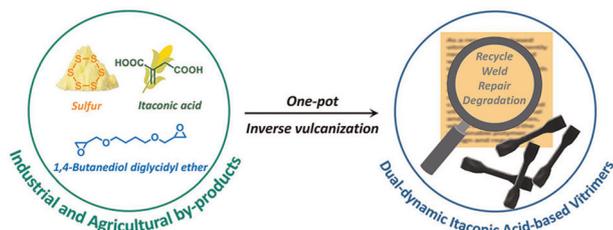
4536



### Catalytic hydrodeoxygenation of neat levulinic acid into 2-methyltetrahydrofuran using a cobalt phosphine complex and Sc(OTf)<sub>3</sub> co-catalytic system

Lijin Gan and Jin Deng\*

4544



### Comprehensive itaconic acid-based vitrimers via one-pot inverse vulcanization

Zhongkai Guo, Xuewei Jiao, Kailun Wei, Jianqiao Wu\* and Jun Hu\*

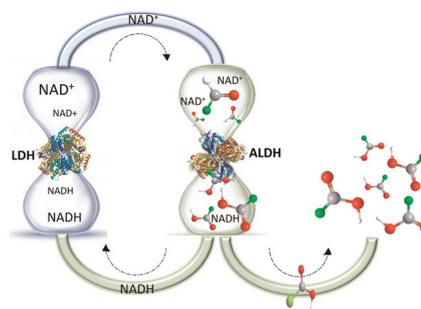


## PAPERS

4553

### Coupled immobilized bi-enzymatic flow reactor employing cofactor regeneration of $\text{NAD}^+$ using a thermophilic aldehyde dehydrogenase and lactate dehydrogenase

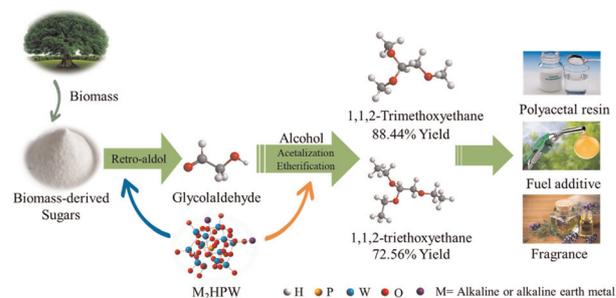
Kim Shortall, Simin Arshi, Simon Bendl, Xinxin Xiao, Serguei Belochapkin, Denise Demurtas, Tewfik Soulimane and Edmond Magner\*



4565

### Conversion of biomass-derived sugars to 1,1,2-trialkoxoethane via a [2 + 4] retro-aldol reaction over alkaline and alkaline earth metal salts of phosphotungstic acid

Tihang Liu, Jiangang Wang, Hongyou Cui\* and Jinghua Wang\*



## CORRECTION

4577

### Correction: Continuous flow solvent free organic synthesis involving solids (reactants/products) using a screw reactor

Brijesh M. Sharma, Ranjit S. Atapalkar and Amol A. Kulkarni\*

