

# Green Chemistry

Cutting-edge research for a greener sustainable future

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## IN THIS ISSUE

ISSN 1463-9262 CODEN GRCHFJ 25(18) 6917–7396 (2023)



### Cover

See Jianguo Liu,  
Longlong Ma *et al.*,  
pp. 7109–7125.

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### Inside cover

See Travis Williams,  
Steven Nutt *et al.*,  
pp. 7058–7061.

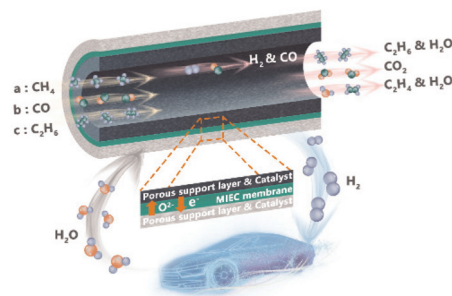
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7058.

## TUTORIAL REVIEWS

6930

### A review of water splitting via mixed ionic–electronic conducting (MIEC) membrane reactors

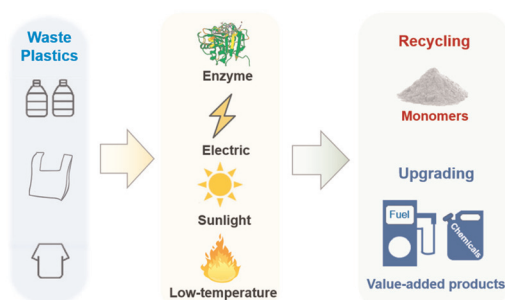
Bin Wang, Tao Li,\* Zhigang Wang, Mohd Hafiz  
Dzarfan Othman, Shaomin Liu\* and Rui Xiao\*



6949

### Recent advances in plastic recycling and upgrading under mild conditions

Shengbo Zhang, Mei Li, Zhenyang Zuo and  
Zhiqiang Niu\*



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# Green Chemistry

Cutting-edge research for a greener sustainable future

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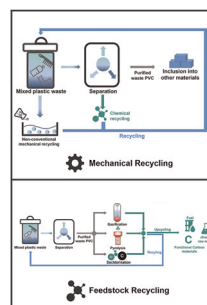


## TUTORIAL REVIEWS

6971

**An overview on the recycling of waste poly(vinyl chloride)**

Xinyao Jiang, Bing Zhu and Maiyong Zhu\*



7026

**Recent advancements in supramolecular macrocycles for two-dimensional membranes for separations**

Shi-Qi Cheng, Qian Lin, Shu-Lan Li, Ya-Xiao Guo, Xiao-Le Han,\* Yue Sun\* and Yi Liu\*

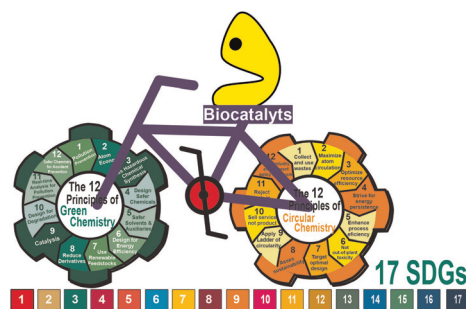


## PERSPECTIVE

7041

**From green to circular chemistry paved by biocatalysis**

Pedro Lozano\* and Eduardo García-Verdugo\*

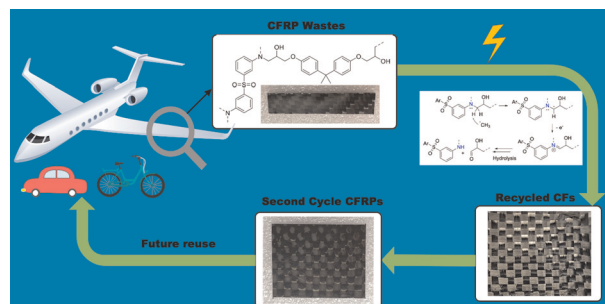


## COMMUNICATIONS

7058

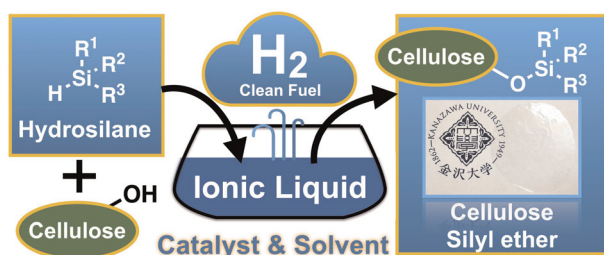
**A rapid electrochemical method to recycle carbon fiber composites using methyl radicals**

Zehan Yu, Y. Justin Lim, Travis Williams\* and Steven Nutt\*



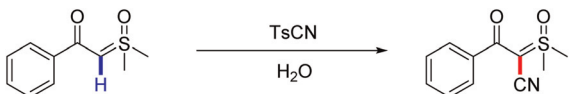
## COMMUNICATIONS

7062

**Dehydrogenative silylation of cellulose in ionic liquid**

Daisuke Hirose,\* Samuel Budi Wardhana Kusuma, Akina Yoshizawa, Naoki Wada and Kenji Takahashi\*

7068

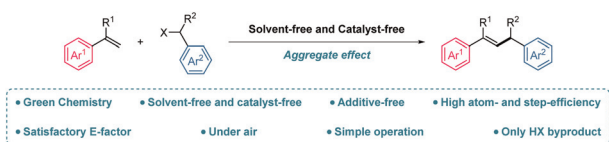


- metal- and additive-free
- reaction in water, air insensitive
- simple operation
- broad tolerance and excellent yield
- applicable to drug molecules

**Synthesis of  $\alpha$ -cyano- $\alpha'$ -carbonyl sulfoxonium ylides in water**

Qingyao Zhang, Cankun Luo, Ruizhi Lai, Zhiqian Lin, Pengfei Jia, Shuran Xu, Li Guo and Yong Wu\*

7073

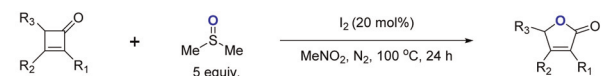


- Green Chemistry
- Solvent-free and catalyst-free
- Additive-free
- High atom- and step-efficiency
- Satisfactory E-factor
- Under air
- Simple operation
- Only HX byproduct

**Solvent-free and catalyst-free direct alkylation of alkenes**

Meng-Yao Li, Jiatong Li, Ao Gu, Xiao-Mei Nong, Shuyang Zhai, Zhu-Ying Yue, Chen-Guo Feng,\* Yingbin Liu\* and Guo-Qiang Lin

7079



- metal-free reaction conditions
- mild DMSO oxidant and O-source
- high regioselectivity

**Alternative method to Baeyer–Villiger oxidation of cyclobutenones using  $I_2$ /DMSO catalytic systems**

Yichen Sun, Zhibin Hu, Jing Peng, Qixue Qin\* and Ning Jiao\*

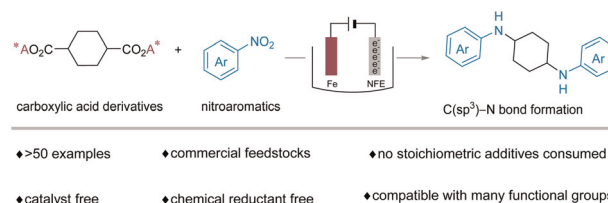


## COMMUNICATIONS

7084

**Catalyst-free electroreductive carboxylic acid–nitroarene coupling**

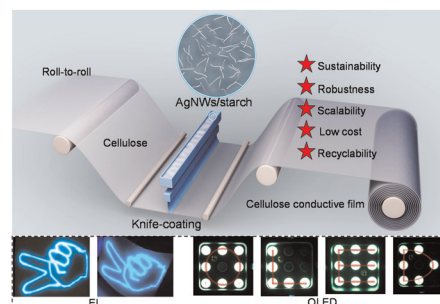
Qing Wang, Jia Xu, Zhimin Xu, Zhizhao Wang, Xiangzhang Tao, Shengyang Ni,\* Yi Pan and Yi Wang\*



7092

**Solution-processable robust, recyclable and sustainable cellulose conductor for photoelectric devices *via* a starch-gluing–Ag nanowires strategy**

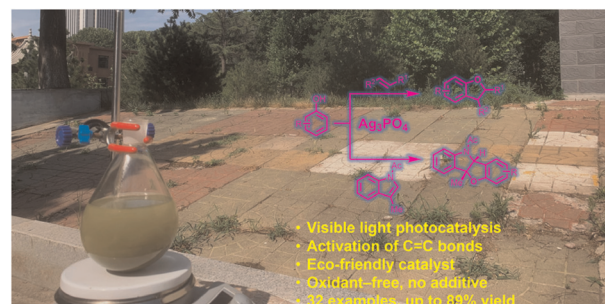
Jianguo Li, Tao Tao, Jiajun Jiang, Yiling Zheng, Anqi Li, Liang Chen, Zhiwei Lin, Liulian Huang, Xinhua Ouyang and Lihui Chen\*



7102

**Visible-light-driven [3 + 2] cyclization of phenols with indoles and olefins using recyclable Ag<sub>3</sub>PO<sub>4</sub> nanoparticles**

Lirong Guo, Guanjie Chen, Haibin Li, Chen-Ho Tung and Yifeng Wang\*

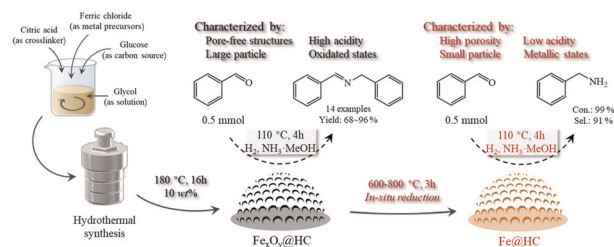


## PAPERS

7109

**Selectivity tunable iron nanoparticles from lignocellulosic components for the reductive amination of carbonyl compounds towards switchable products**

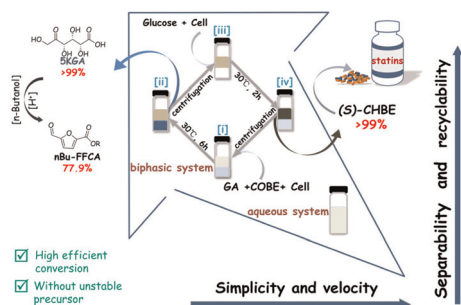
Xiuzheng Zhuang, Xiangqian Wei, Xiaohong Hu, Qi Zhang, Xinghua Zhang, Lungang Chen, Jianguo Liu\* and Longlong Ma\*





## PAPERS

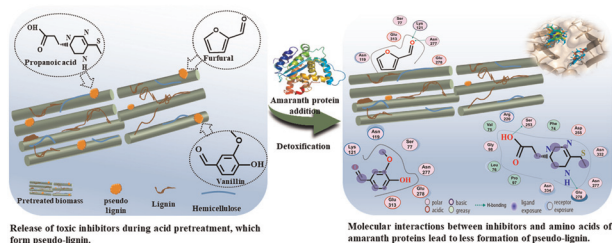
7126



### Chemo-enzymatic cascades producing 2,5-furandicarboxylic acid precursors via D-gluconate "barbell oxidation" and dehydration

Jiao Chen, Jiali Cai, Feng Sha, Wenjun Sun, Xilei Lyu, Yonghui Chang, Fei Cao,\* Lili Zhao,\* Hongli Wu\* and Pingkai Ouyang

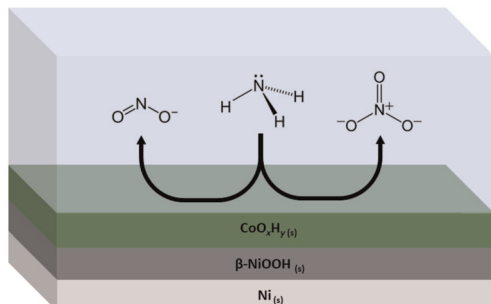
7141



### Non-catalytic proteins as promising detoxifiers in lignocellulosic biomass pretreatment: unveiling the mechanism for enhanced enzymatic hydrolysis

Meysam Madadi, Guojie Song, Vijai Kumar Gupta, Mortaza Aghbashlo, Chihe Sun, Fubao Sun\* and Meisam Tabatabaei\*

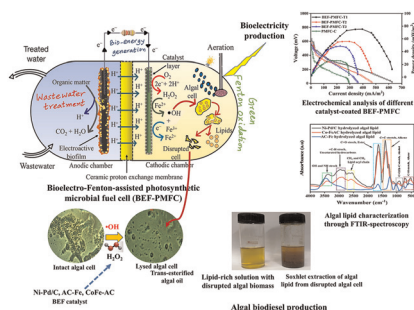
7157



### A CoO<sub>x</sub>H<sub>y</sub>/β-NiOOH electrocatalyst for robust ammonia oxidation to nitrite and nitrate

Sam Cohen, Sam Johnston, Cuong K. Nguyen, Tam D. Nguyen, Dijon A. Hoogeveen, Daniel Van Zeil, Sarbjit Giddey, Alexandr N. Simonov\* and Douglas R. MacFarlane\*

7166



### Efficient algal lipid extraction via a green bio-electro-Fenton process and its conversion into biofuel and bioelectricity with concurrent wastewater treatment in a photosynthetic microbial fuel cell

Swati Das, Rishabh Raj and Makarand M. Ghangrekar\*

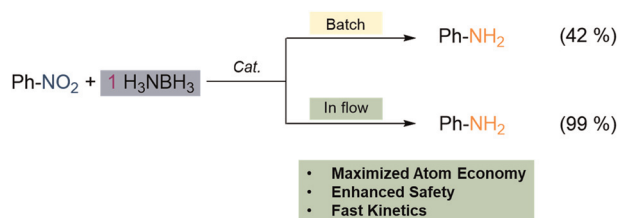


## PAPERS

7183

### Maximizing hydrogen utilization efficiency in tandem hydrogenation of nitroarenes with ammonia borane

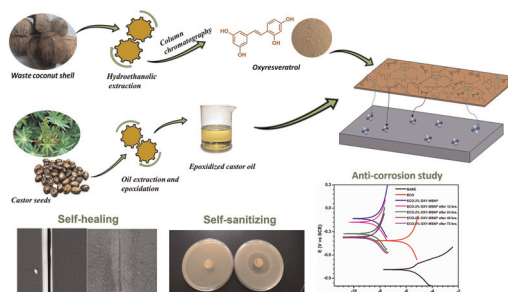
Mengqi Shen, Christoph Bendel, Hunter B. Vibbert, Pan Thi Khine, Jack R. Norton\* and Aaron J. Moment\*



7189

### Development of an oxyresveratrol incorporated bio-based smart nanocomposite coating with anti-corrosive, self-healing, and anti-microbial properties

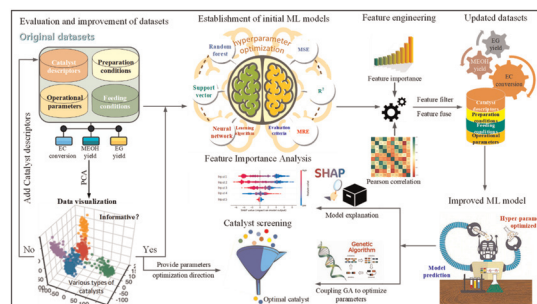
Rajimol P. R., Sarah Bill Ulaeto, Athira Raj V, Anoop Puthiyamadam, Sushanta Kumar Sahoo, Rajan T. P. D.,\* Radhakrishnan K. V. and Rajeev K. Sukumaran



7216

### Machine learning-aided catalyst screening and multi-objective optimization for the indirect CO<sub>2</sub> hydrogenation to methanol and ethylene glycol process

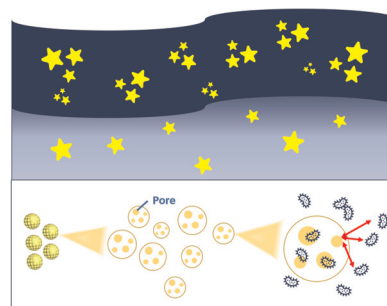
Qingchun Yang,\* Yingjie Fan, Jianlong Zhou, Lei Zhao, Yichun Dong, Jianhua Yu and Dawei Zhang\*



7234

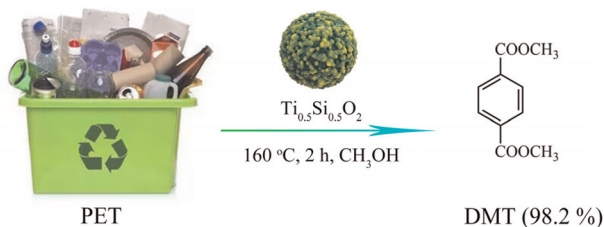
### Like stars falling down from the sky: resins effectively assist in and facilitate centrifugal separation and recycling of tiny microbial cells

Yang Lv, Taotao Yan, Shaonuo Zhou and Yong Xu\*



## PAPERS

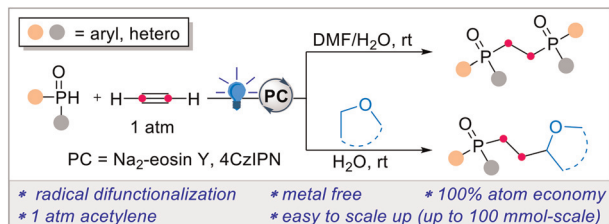
7243



### Upcycling of waste polyethylene terephthalate to dimethyl terephthalate over solid acids under mild conditions

Boyong Ye, Ruru Zhou, Zixin Zhong, Songlin Wang, Han Wang and Zhaoyin Hou\*

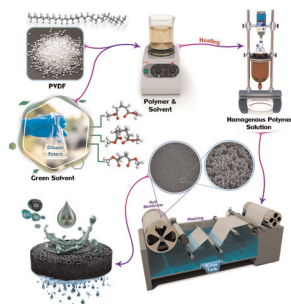
7253



### Photoinduced synthesis of C2-linked phosphine oxides via radical difunctionalization of acetylene

Kangkui Li, Jiazhen Deng, Xianyang Long and Shifa Zhu\*

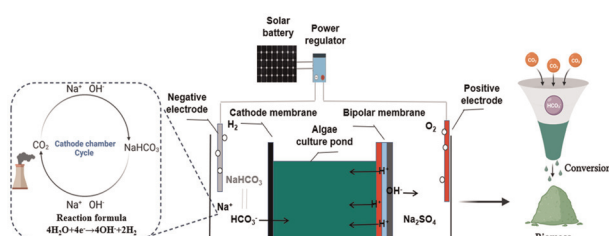
7259



### Dibasic esters as green solvents for PVDF membrane preparation

Norafiqah Ismail, Qiuyueming Zhou, Qian Wang, Zhaoliang Cui, Nils Skoglund and Naser Tavajohi\*

7273



### A novel system integrating electrolysis and ionic membranes (EIMs) enables artificial carbon concentration and alleviation of metal cation stress in microalgae cultivation

Yuyong Hou, Tong Han, Ranran Wu, Zhiyong Liu, Yanbo Ma, Zhile Guo, Nahui Hao, Weijie Wang, Xiang Ji, Zhiguang Zhu, Fangjian Chen\* and Lei Zhao\*



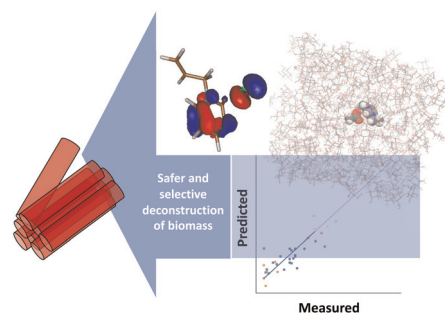


## PAPERS

7283

# Molecular simulations inform biomass dissolution in ionic liquids in pursuit of benign solvent-system design

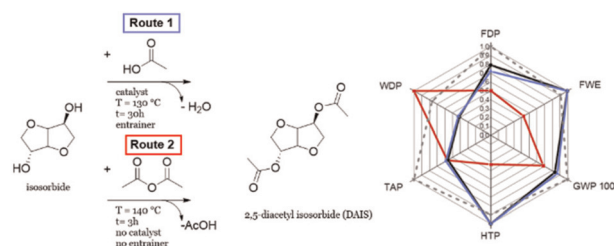
Preston Griffin and Jakub Kostal\*



7292

# Towards a greener synthesis of dianhydrohexitol esters

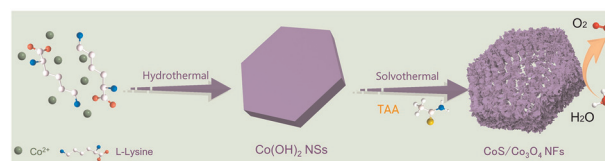
Katrin Städtke, Andreas W. Göpfert and Alexandra Inayat\*



7309

# L-Lysine-induced green synthesis of CoS/Co<sub>3</sub>O<sub>4</sub> nanoframes for efficient electrocatalytic oxygen evolution

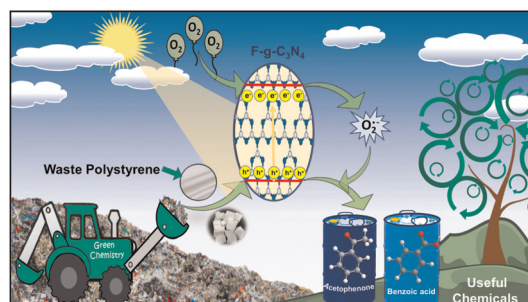
Jinrui Hu, Zhijuan Li,\* Dongsheng Zhao, Zheng Han, Xiangrui Wu, Jiayu Zhai, Zhenyuan Liu, Yawen Tang\* and Gengtao Fu\*



7318

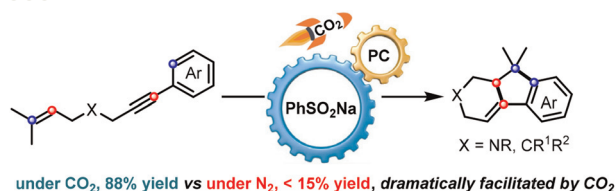
# Metal-free photocatalytic transformation of waste polystyrene into valuable chemicals: advancing sustainability through circular economy

Rajat Ghalta, Rajaram Bal and Rajendra Srivastava\*



## PAPERS

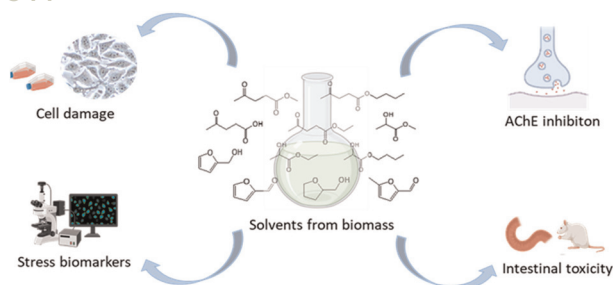
7335



### CO<sub>2</sub>-facilitated radical sequential (3 + 2) annulation of 1,6-enynes via cooperation of sulfinate catalysis and photocatalysis

Yuzhen Gao, Siqing Liu and Weiping Su\*

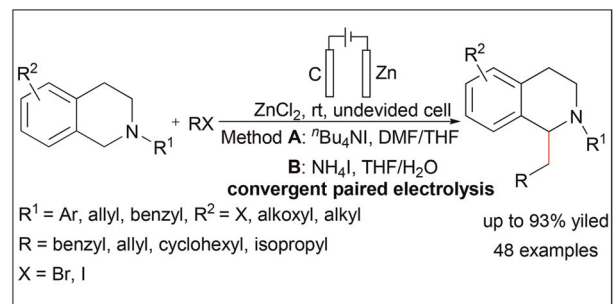
7344



### Evaluation of the toxicity profiles of three families of solvents from biomass: levulinate, lactate and furfural derivatives

Estefanía Zuriaga, Laura Lomba,\* Cristina B. García and Marta Sofia Valero

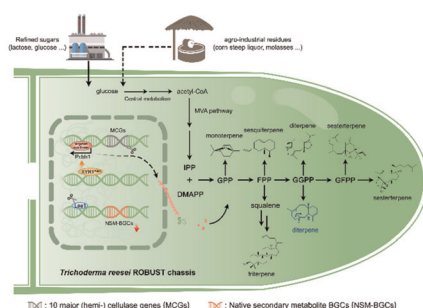
7356



### Zn-mediated electrochemical $\alpha$ -alkylation of amines with halogenated alkanes through convergent paired electrolysis

Xiaoyu Zhan, Hongyu Liu, Rui Liu, Yanmin Huang\* and Yungui Peng\*

7362



### Repurposing the cellulase workhorse *Trichoderma reesei* as a ROBUST chassis for efficient terpene production

Meili Xiao, Yinmei Wang, Yan Wang, Xing Yan, Zhihua Zhu, Ernuo Tian, Chengshuai Yang, Erdong Ma, Gen Zou,\* Zhihua Zhou\* and Pingping Wang\*

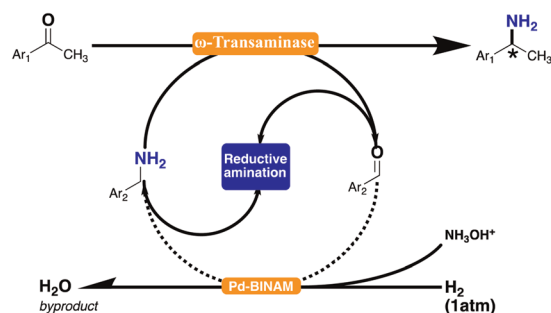


## PAPERS

7372

### Palladium nanocatalyst assisted *in situ* regeneration of amino donor in a one-enzyme cascade

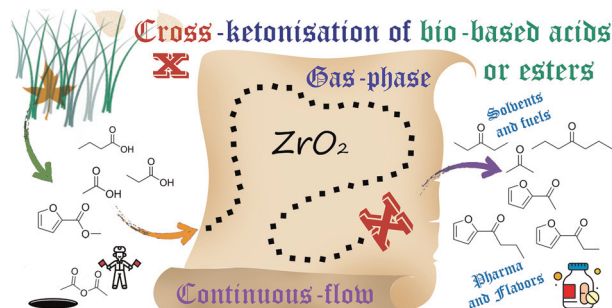
Ruke Wang, Xuan Tang, Xinchun Jv, Yaxu Liu and Bo Wang\*



7381

### An innovative catalytic pathway for the synthesis of acyl furans: the cross-ketonization of methyl 2-furoate with carboxylic acids

Jacopo De Maron, Davide Cesari, Sabra Banu Rameesdeen, Tommaso Tabanelli,\* Andrea Fasolini, Francesco Basile and Fabrizio Cavani



## CORRECTION

7393

### Correction: Non-catalytic proteins as promising detoxifiers in lignocellulosic biomass pretreatment: unveiling the mechanism for enhanced enzymatic hydrolysis

Meysam Madadi, Guojie Song, Vijai Kumar Gupta, Mortaza Aghbashlo, Chihe Sun, Fubao Sun\* and Meisam Tabatabaei\*

