

Green Chemistry

Cutting-edge research for a greener sustainable future

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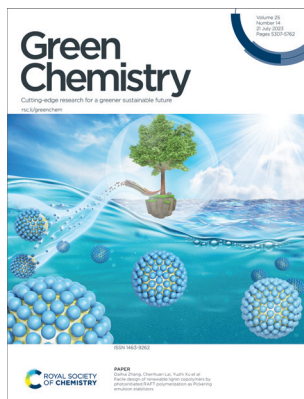
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Cover

See James A. Dumesic *et al.*, pp. 5416–5427.

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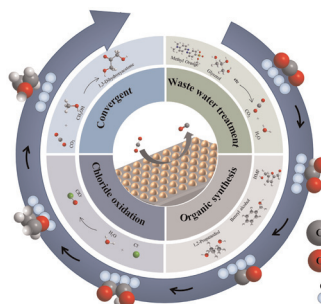
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CRITICAL REVIEW

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The design of alternative anodic reactions paired with electrochemical CO₂ reduction

Honglei Chen, Chenglong Ding, Caitao Kang, Jiahong Zeng, Yao Li, Yanming Li, Yuanli Li, Changli Li* and Jingfu He*

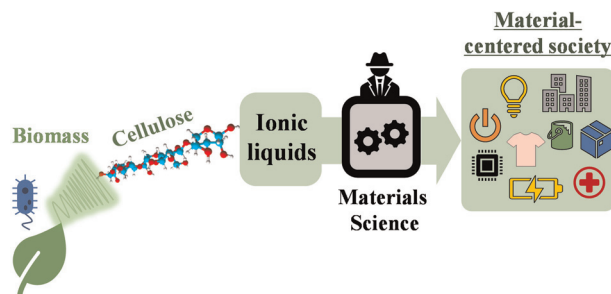


TUTORIAL REVIEW

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Cellulose processing in ionic liquids from a materials science perspective: turning a versatile biopolymer into the cornerstone of our sustainable future

László Szabó,* Romain Milotskyi, Gyanendra Sharma and Kenji Takahashi*



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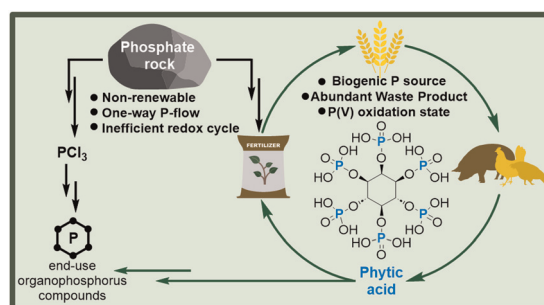


PERSPECTIVE

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Phosphorus sustainability: a case for phytic acid as a biorenewable platform

Emma K. Davison,* Jessica C. Neville and Jonathan Sperry*

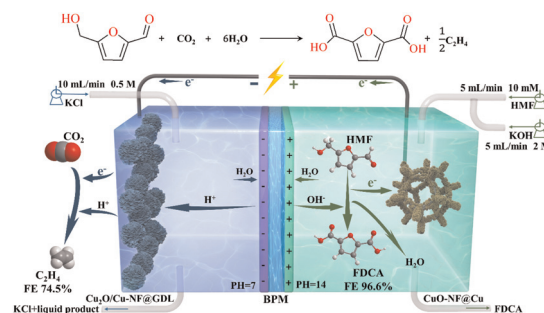


COMMUNICATION

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High efficiency coupled electrocatalytic CO₂ reduction to C₂H₄ with 5-hydroxymethylfurfural oxidation over Cu-based nanoflower electrocatalysts

Zonghang Zhang, Shan Liu, Zhao Wu,* Xiaoyan Chen, Jingui Wang, Yuji Gao, Shuai Wang, Furong Tao and Guangqiang Lv*

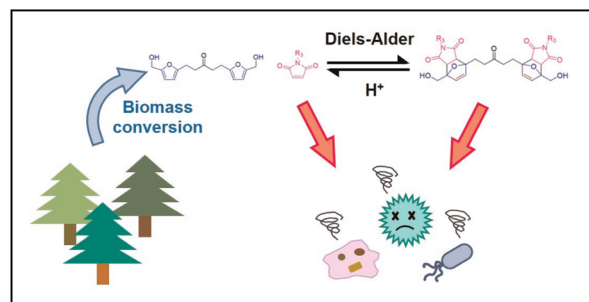


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Controlling the toxicity of biomass-derived difunctional molecules as potential pharmaceutical ingredients for specific activity toward microorganisms and mammalian cells

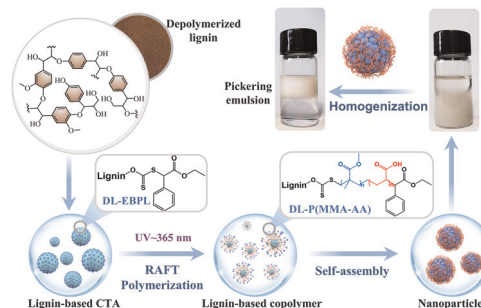
Hochan Chang, Douglas H. Chang, Alexios G. Stamoulis, George W. Huber, David M. Lynn, Sean P. Palecek and James A. Dumesic*



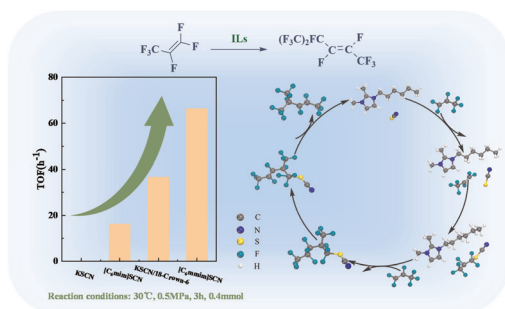
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Facile design of renewable lignin copolymers by photoinitiated RAFT polymerization as Pickering emulsion stabilizers

Jingyi Liu, Xiaoyu Shi, Lin Ma, Daihui Zhang,* Chenhuan Lai,* Chunpeng Wang, Mi Li, Arthur J. Ragauskas, Fuxiang Chu and Yuzhi Xu*



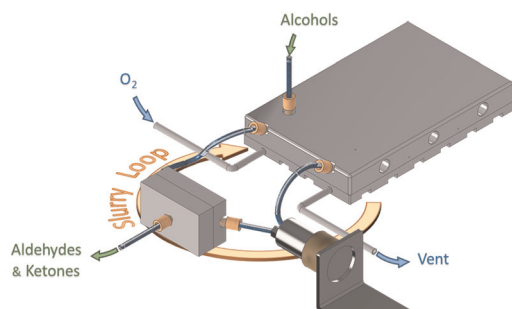
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Efficient dimerization of perfluoroolefin with strong nucleophilic ionic liquid catalysts by adjusting the interaction of anions and cations

Shiqi Huang, Xianglei Meng,* Yanzhao Gao, Minmin Liu, Junjie Zhang, Yu Zhou, Yuting Song* and Yanyan Diao*

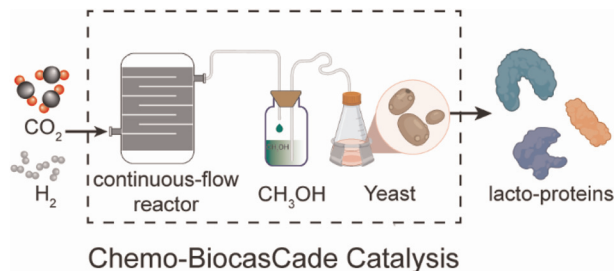
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Aerobic oxidation of alcohols using a slurry loop membrane reactor

Baldassarre Venezia and Asterios Gavrilidis*

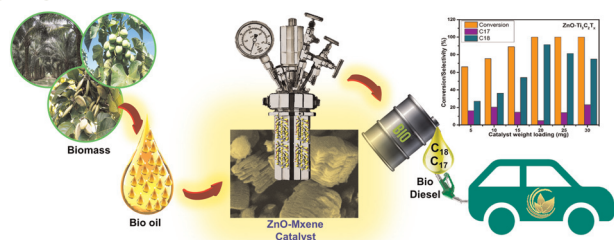
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Cascaded *de novo* biosynthesis of lacto-proteins from CO₂ by engineered *Pichia pastoris*

Xueqin Lv, Shixiu Cui, Jie Chen, Lingrui Wang, Yanfeng Liu, Jianghua Li, Guocheng Du, Xiaohao Liu,* Jian Chen, Rodrigo Ledesma-Amaro and Long Liu*

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On the reduction of CO₂ footprint via selective hydrodeoxygenation by ZnO–Ti₃C₂T_x catalyst under solvent-free conditions

Bhagirath Saini, R. Krishnapriya, Meena Yadav, Rahul Singhal and Rakesh K. Sharma*

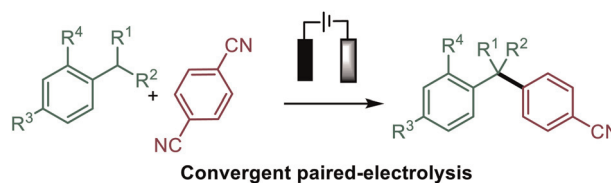


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Benzylic C–H arylation with dicyanoarenes via convergent paired electrolysis

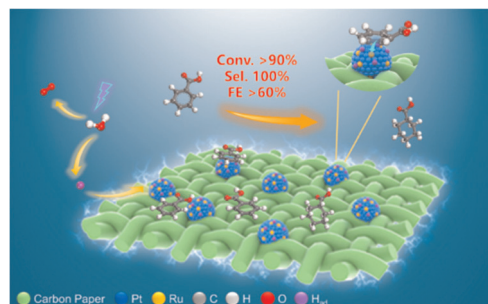
Shanyu Tang and Guillaume Vincent*



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Electrocatalysis as an efficient alternative to thermal catalysis over PtRu bimetallic catalysts for hydrogenation of benzoic acid derivatives

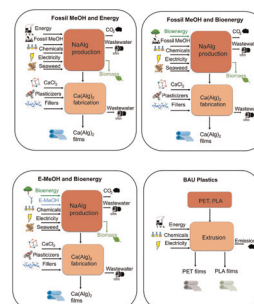
Yan Du, Xiao Chen,* Weilin Shen, Huibin Liu, Min Fang, Jinxuan Liu and Changhai Liang*



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The environmental impact and economic feasibility assessment of composite calcium alginate bioplastics derived from *Sargassum*

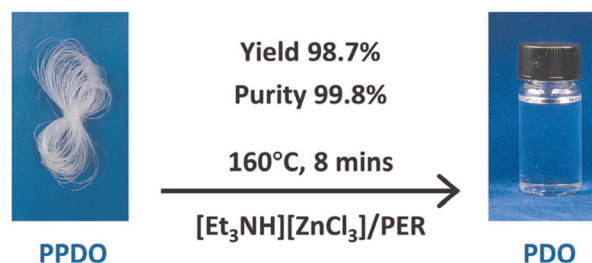
Akeem Mohammed, Keeran Ward,* Koon-Yang Lee* and Valerie Dupont



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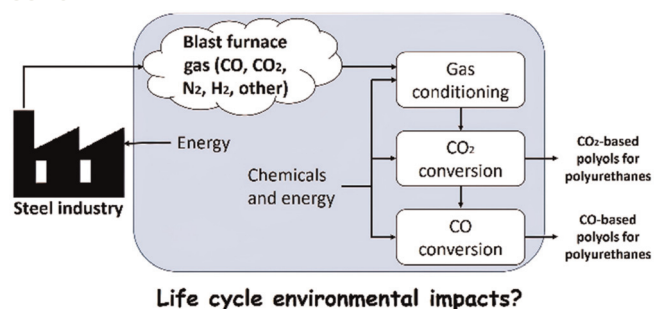
Ultrafast and selective recycling of poly(*p*-dioxanone) to monomers by using Brønsted–Lewis acidic ionic liquids as solvents/catalysts

Wei Zhang, Guo-Qiang Tian,* Gang Wu, Si-Chong Chen* and Yu-Zhong Wang



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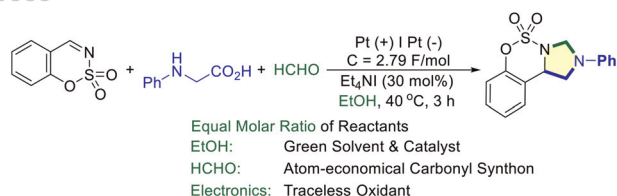
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Ex-ante life cycle assessment of polyols using carbon captured from industrial process gas

Natalya Tsoy,* Bernhard Steubing and Jeroen B. Guinée

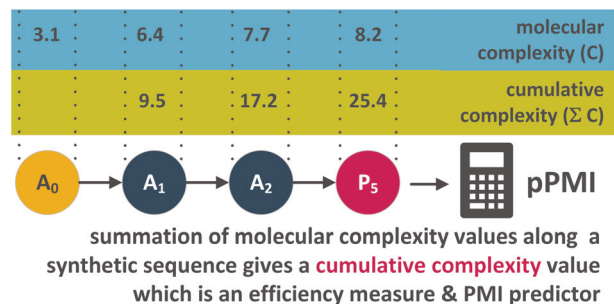
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EtOH-catalyzed electrosynthesis of imidazolidine-fused sulfamidates from *N*-sulfonyl ketimines, *N*-arylglycines and formaldehyde

Yu-Han Lu, Si-Yu Mu, Hong-Xia Li, Jun Jiang, Chao Wu, Min-Hang Zhou, Wen-Tao Ouyang and Wei-Min He*

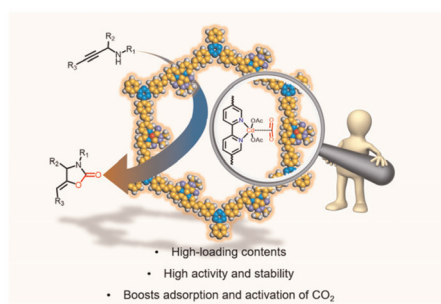
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Cumulative complexity meta-metrics as an efficiency measure and predictor of process mass intensity (PMI) during synthetic route design

Lucrezia Angelini, Charlotte E. Coomber, Gareth P. Howell,* George Karageorgis and Brian A. Taylor

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Covalent organic frameworks embedding single cadmium sites for efficient carboxylative cyclization of CO₂ with propargylic amines

Yize Zhang, Hangshuai Li, Xingyue He, Aiqing Wang,* Guoyi Bai* and Xingwang Lan*

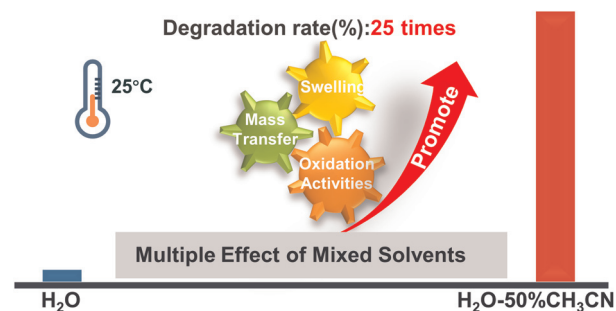


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Multiple promotion effect of mixed solvents on the oxidative degradation of thermosetting polymers

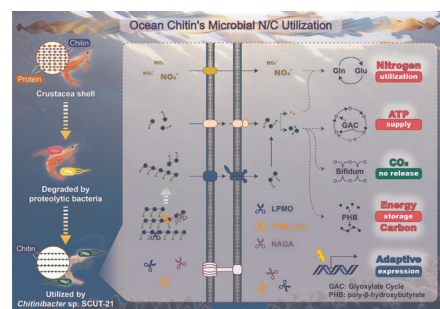
Yuwei Long, Zhishan Su, Lan Bai, Xu Zhao, Wenli An, Xuehui Liu, Shimei Xu* and Yu-Zhong Wang*



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The chitin utilization mechanisms of a new *Chitinibacter* sp. isolate SCUT-21

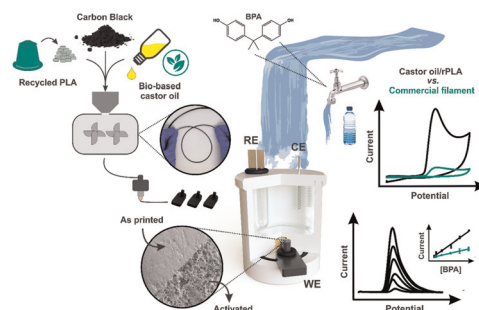
Zhen-Dong Yang, Ming-Shu Zhang, De-Lin Lu, Zhi-Wei Li, He-Hua Mao, Lei Wu, Jia-Rui Zhang, Jing-Tao Ni, Jun-Jin Deng* and Xiao-Chun Luo*



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Utilising bio-based plasticiser castor oil and recycled PLA for the production of conductive additive manufacturing feedstock and detection of bisphenol A

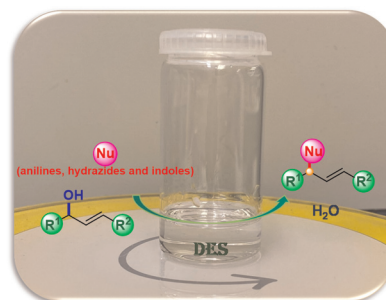
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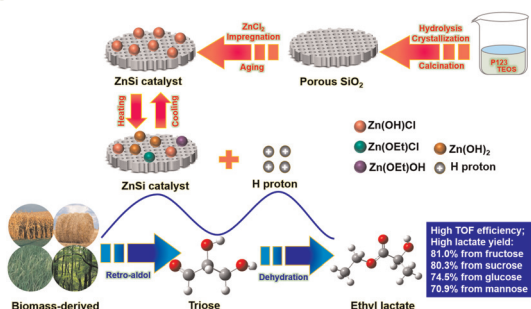
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Alkylation of amines with allylic alcohols and deep eutectic solvents as metal-free and green promoters

Stephany Zárate-Roldán, M. Concepción Gimeno* and Raquel P. Herrera*



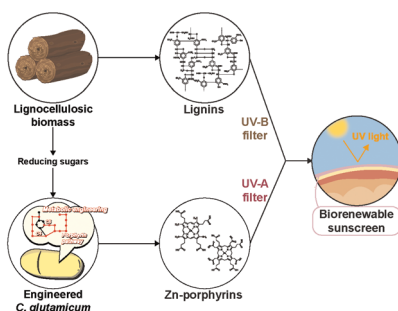
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Temperature-responsive Zn-based catalysts for efficient catalytic conversion of biomass-derived carbohydrates to ethyl lactate

Jiangang Wang, Jinghua Wang, Yifan Liu, Tihang Liu, Zhaobin Pang, Hongyou Cui,* Yuan Zhang and Feng Song

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Biobased sunscreen fabrication using Zn-porphyrins from engineered *Corynebacterium glutamicum*

Young Jin Ko, Jeong-Joo Oh and Sung Ok Han*

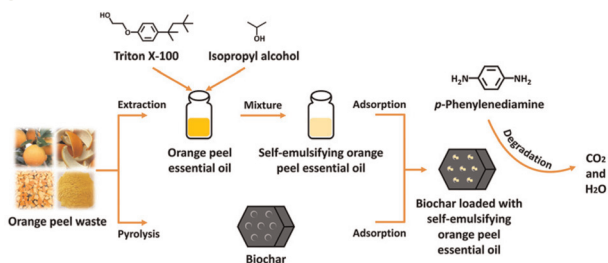
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Sequential extraction of hemicelluloses by subcritical water improves saccharification of hybrid aspen wood grown in greenhouse and field conditions

Pramod Sivan, Emilia Heinonen, Madhavi Latha Gandla, Amparo Jiménez-Quero, Hüsamettin Deniz Özeren, Leif J. Jönsson, Ewa J. Mellerowicz and Francisco Vilaplana*

5647



Reactive oxygen species induced by plant essential oil for effective degradation of *p*-phenylenediamine

Huixian Xu, Yanjun Li, Qin Li, Dandan Yang, Ting Li, Saimeng Jin,* Liandi Zhou,* Qihui Zhang* and James H. Clark



A phosphine free, inorganic base free, one-pot tandem Mizoroki–Heck olefination/direct arylation/hydrogenation sequence, to give multicyclic alkylated heteroarenes

One pot Heck/Direct Arylation/Hydrogenation sequence

• Three mechanistically distinct Pd-catalysed reactions

• Green metric calculations • 3 distinct scaffolds • Mechanistic studies

Structural features of lignin–hemicellulose–pectin (LHP) orchestrate a tailored enzyme cocktail for potential applications in bark biorefineries

The diagram illustrates the production of pulp and bioenergy from bark. The process starts with 'bark' on the right, which is pretreated using chemistry. This leads to a central 'tailored microbial consortium' (blue oval) containing pectinase and hemicellulase. The consortium breaks down pectin and hemicellulose into 'hemicellulose' and 'pectin' (dashed boxes). These are then processed into 'lignin' and 'bark' (solid boxes). The 'bark' is then cooked to produce 'pulp' (solid box) and 'energy' (dashed box). The 'pulp' is then processed in a 'biorefinery' (solid box) to produce 'energy' (dashed box). The 'energy' is then used in a 'tradition' (solid box) to produce 'energy' (dashed box). The 'energy' is then used in a 'tradition' (solid box) to produce 'energy' (dashed box).

Diluted aqueous ionic liquid assists the acidic oxidative hydrolysis of water-soluble recalcitrant polysaccharide xanthan through structural deterioration

The diagram illustrates the extraction of humins from lignin using a highly diluted ionic liquid. On the left, a network of green polymer chains represents 'Brown humins'. This network is stabilized by 'H-bonds' (indicated by dashed lines), contains 'Free radicals' (black dots), and is associated with 'Xanthan' (green wavy lines) and 'H⁺' ions (black dots). A large green arrow labeled 'Highly diluted ionic liquid' and 'Green & Economic' points to the right. On the right, the resulting 'Humins' are shown as a more dispersed network. A legend identifies the components: red stars for 'H-bonds', red stars for 'Accessibility', red dots for 'Free radicals', and red stars for 'Humins'. The network also includes 'Xanthan' (green wavy lines) and '[Bmim]⁺' ions (blue dots).

Catalyst-free racemic and H₂O/CPA-catalyzed asymmetric regio-reversed domino processes of triketone enones with azlactones

Regio-reversed domino processes

Reaction scheme showing the regio-reversed domino process:

Starting material **1** (an enone derivative) reacts with starting material **2** (a cyclic carbamate derivative) in the presence of a catalyst (PG = COAr¹) to yield product **3** (an α-selective product) and product **4** (a β-selective product).

The reaction is catalyzed by PG = COAr¹ and is regio-reversed, yielding α-selective **3** and β-selective **4**.

Reaction conditions: catalyst-free, H₂O/CPA.

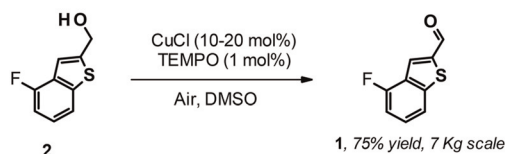
Products: α-selective **3** (obtained) and β-selective **4** (not observed).

Key features of the reaction:

- revised regioselectivity
- catalyst-free
- catalytic asymmetric
- bicyclic furfurans
- vicinal quaternary carbons

PAPERS

5698

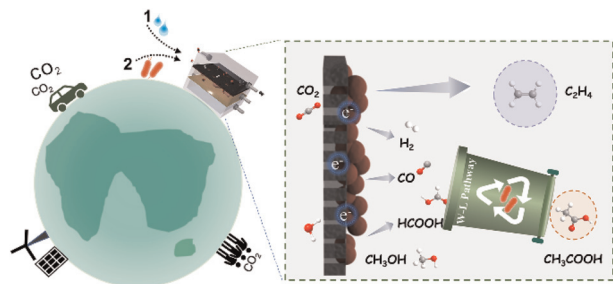
2nd generation process

- Eco-friendly catalytic system ■ Air as terminal oxidant ■ Simple, safe Protocol
- Pilot scale implementation ■ Green metrics improvement (PMI, RME, EMY)

Development and pilot scale implementation of safe aerobic Cu/TEMPO oxidation in a batch reactor

Sylvain Lemaitre, Anne-Lise Romain, François Bariere, Anthony Craquelin, Chloé Copin* and Alexandre Jean*

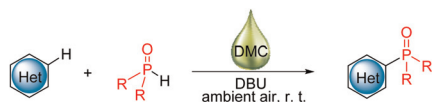
5712



A novel tandem reactor design based on nano-Cu electrocatalysts and microbial biocatalysts for converting CO₂ into ethylene and acetate

Juan Liu, Xiaoxiao Guo, Zhaoyuan Lyu, Rong-Bin Song, Pengyu Zhou, Shichao Ding, Yang Zhou, Li-Ping Jiang, Yuehe Lin* and Wenlei Zhu*

5721



N-heterocycles scope:
1,2,4-triazine-3,5(2H, 4H)-diones
Quinoxalin-2(1H)-ones
Quinoxalines,
Pyrazinones

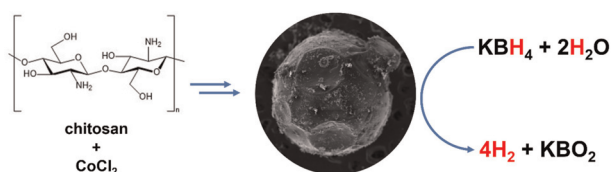
42 Examples yields up to 98%

- ✓ Scaled-up to grams
- ✓ ambient air as green oxidant
- ✓ Mild and simple conditions, easy operation
- ⊘ metal catalyst or Photocatalyst

Metal-free direct C–H phosphonation of N-heterocycles with diphenylphosphine oxides under mild conditions

Zhao-Nan Cai, Ya-Ping Han, Yuecheng Zhang, Hong-Yu Zhang,* Jiquan Zhao* and Shang-Dong Yang

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From shrimp balls to hydrogen bubbles: borohydride hydrolysis catalysed by flexible cobalt chitosan spheres

Frances Pope, Jeffrey Jonk, Millie Fowler, Petrus C. M. Laan, Norbert J. Geels, Larissa Drangai, Vitaly Gitis and Gadi Rothenberg*

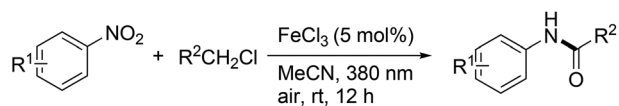


PAPERS

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Visible-light-induced iron-catalyzed synthesis of *N*-aryl amides from nitroarenes and chloroalkanes

Qun-Liang Zhang, Wenxin Liu, Yirong Zhou* and Fang-Lin Zhang*

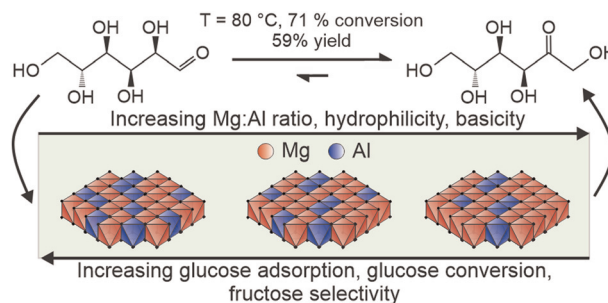


- reductant and photocatalyst free
- nontoxic sustainable iron catalyst
- good functional group tolerance
- high step economy
- mild conditions
- simple manipulation

5741

Structure–activity relationships of LDH catalysts for the glucose-to-fructose isomerisation in ethanol

Krisztina Karádi, Thanh-Truc Nguyen, Adél Anna Ádám, Kornélia Baán, András Sápi, Ákos Kukovecz, Zoltán Kónya, Pál Sipos,* István Pálinkó and Gábor Varga*



COMMENT

5756

Comment on "Catalyst- and additive-free sunlight-induced autoxidation of aldehydes to carboxylic acids" by H. Shi, J. Li, T. Wang, M. Rudolph and A. S. K. Hashmi, *Green Chem.*, 2022, 24, 5835

Alain Favre-Réguillon* and Laurent Vanoye

