

## Front Cover

### Biomass-enhanced Janus sponge-like hydrogel with salt resistance and high strength for efficient solar desalination

Aqiang Chu, Meng Yang, Juanli Chen, Jinmin Zhao, Jing Fang, Zhensheng Yang, Hao Li\*

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### Perspective

#### Perspectives on aqueous organic redox flow batteries

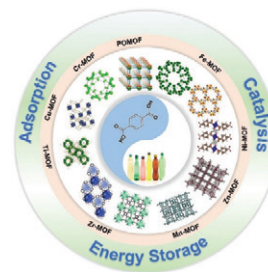
Fulong Zhu, Qiliang Chen, Yongzhu Fu\* ..... 1641

### Short review

#### MOF synthesis using waste PET for applications of adsorption, catalysis and energy storage

Hongmei Li<sup>1</sup>, Jinming Lei<sup>1</sup>, Liying Zhu<sup>1</sup>, Yanling Yao\*, Yuanhua Li, Tianhao Li\*, Chuntian Qiu\*... 1650

“Waste-to-MOFs” model that chemical recycle of waste plastic to synthesize MOFs as functional materials offers one of sustainable strategies to relieve the plastic pollution. Here, recent achievements on *in-situ* and *ex-situ* utilization of waste polyethylene terephthalate for synthesis of value-added 1,4-benzenedicarboxylic acid-based MOFs are reviewed according to typical applications of adsorption, catalysis and energy storage.

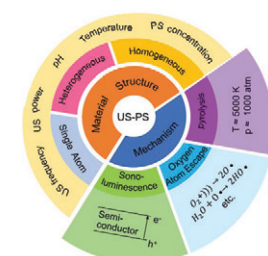


### Review articles

#### Ultrasonic enhancement of persulfate oxidation system governs emerging pollutants decontamination

Yanpan Li, Yanbo Zhou, Yi Zhou\* ..... 1666

The ultrasound-assisted persulfate oxidation process generates sulfate radicals and cavitation effects, enhancing the degradation of emerging contaminants. This review explores Fenton-like systems, categorized as homogeneous, heterogeneous, and single-atom, and discusses the impacts of environmental factors. Future research prospects are also addressed.



## CO<sub>2</sub> mineralization by typical industrial solid wastes for preparing ultrafine CaCO<sub>3</sub>: A review

Run Xu<sup>1</sup>, Fuxia Zhu<sup>1</sup>, Liang Zou, Shuqing Wang, Yanfang Liu, Jili Hou, Chenghao Li, Kuntong Song, Lingzhao Kong\*, Longpeng Cui\*, Zhiqiang Wang\*..... 1679

This review summarizes the research progress on the preparation of ultrafine CaCO<sub>3</sub> by CO<sub>2</sub> mineralization using industrial solid wastes. Meanwhile, the economic analysis of the mineral carbonation are evaluated. Furthermore, the challenges and future work of the controllable synthesis of CaCO<sub>3</sub> by carbonation of these wastes are proposed

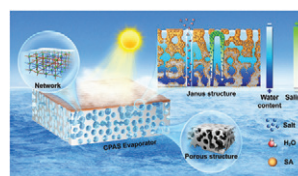


### Research papers

#### Biomass-enhanced Janus sponge-like hydrogel with salt resistance and high strength for efficient solar desalination

Aqiang Chu, Meng Yang, Juanli Chen, Jinmin Zhao, Jing Fang, Zhensheng Yang, Hao Li\*..... 1698

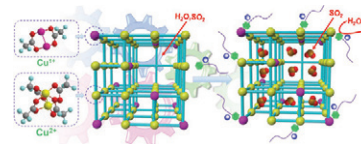
A Janus sponge-like hydrogel solar evaporator (CPAS) with high efficiency, high salt resistance and good mechanical properties was constructed by introducing agar (AG) and hydrophobic fumed nano-silica (SA) into the polyvinyl alcohol (PVA) hydrogel backbone and by foaming cross-linking process.



#### Highly defective HKUST-1 with excellent stability and SO<sub>2</sub> uptake: The hydrophobic armor effect of functionalized ionic liquids

Ping Liu<sup>1</sup>, Kaixing Cai<sup>1</sup>, Keliang Wang, Tianxiang Zhao\*, Duan-Jian Tao\*..... 1711

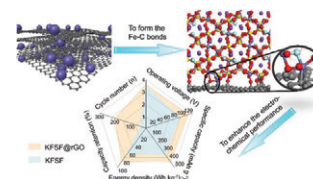
The coordination of Cu was altered by mechanochemistry, resulting in a partial conversion of Cu<sup>II</sup> to Cu<sup>I</sup> in HKUST-1. Ionic liquids as hydrophobic armor can shield this defective HKUST-1, and remarkably improve their water stability and SO<sub>2</sub> adsorption performance.



#### Interface defect induced upgrade of K-storage properties in KFeSO<sub>4</sub>F cathode: From lowered Fe-3d orbital energy level to advanced potassium-ion batteries

Yan Liu<sup>1</sup>, Zhen-Yi Gu<sup>1</sup>, Yong-Li Heng, Jin-Zhi Guo\*, Miao Du, Hao-Jie Liang, Jia-Lin Yang, Kai-Yang Zhang, Kai Li\*, Xing-Long Wu \*..... 1724

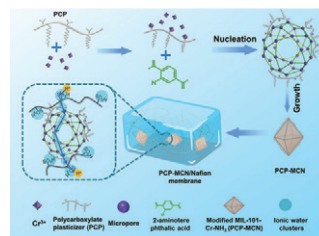
A strategy of bridging Fe–C bonds through the defective site in KFeSO<sub>4</sub>F@reduced graphene oxide composites is proposed. The mean working voltage is elevated by adjusting the electronic structure of Fe 3d orbital through the Fe–C bonds. The Fe–C bonds also work in promoting the migration ability of K ions and increasing the electronic conductivity of KFeSO<sub>4</sub>F, leading to better electrochemical performance.



## Outstanding proton conductivity over wide temperature and humidity ranges and enhanced mechanical, thermal stabilities for surface-modified MIL-101-Cr-NH<sub>2</sub>/Nafion composite membranes

Xu Li, Dongwei Zhang, Si Chen, Yingzhao Geng, Yong Liu, Libing Qian, Xi Chen, Jingjing Li, Pengfei Fang, Chunqing He\* ..... 1734

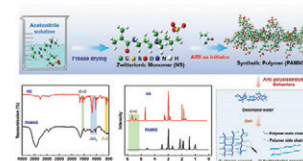
Polycarboxylate plasticizer modified MIL-101-Cr-NH<sub>2</sub> (PCP-MCN) nanoparticles significantly enhance proton conductivity and mechanical properties of Nafion composite membranes. At 98 °C and 100% RH, proton conductivity doubles compared to pristine Nafion. These composite membranes also exhibit improved water uptake, making them promising for fuel cell applications.



## A salt-induced tackifying polymer for enhancing oil recovery in high salinity reservoirs: Synthesis, evaluation, and mechanism

Yining Wu, Peihan Li, Bin Yan\*, Xiaohan Li, Yongping Huang, Juncong Yuan, Xiang Feng\*, Caili Dai ..... 1747

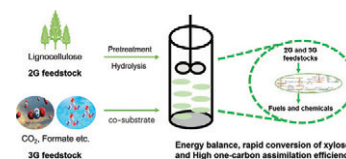
A novel polymer (PAMNS) with salt-induced tackifying property was synthesized by using the anti-polyelectrolyte behaviors of zwitterionic monomer (NS). Additionally, the performance and application prospects of PAMNS in high-salt reservoirs were systematically studied.



## The transition from 2G to 3G-feedstocks enabled efficient production of fuels and chemicals

Kai Wang, Changsheng Su, Haoran Bi, Changwei Zhang, Di Cai, Yanhui Liu, Meng Wang, Biqiang Chen, Jens Nielsen, Zihe Liu\*, Tianwei Tan\* ..... 1759

Herein, a yeast platform has been established that is capable of simultaneously utilizing 2G and 3G feedstocks. Specifically, the utilization of CO<sub>2</sub> and formate enhances the conversion of xylose, and the production of bulk and value-added chemicals.



## Solar-assisted two-stage catalytic membrane reactor for coupling CO<sub>2</sub> splitting with methane oxidation reaction

Jinkun Tan, Zhenbin Gu, Zhengkun Liu, Pei Wang, Reinout Meijboom, Guangru Zhang\*, Wanqin Jin\* ..... 1771

A novel two-stage catalytic membrane reactor, which couples solar-irradiation, was constructed based on an oxygen-permeable perovskite asymmetric membrane (100% selectivity to O<sub>2</sub>). The catalytic membrane reactor enables highly efficient concurrent CO<sub>2</sub> splitting and methane oxidation reactions, offering an innovative strategy for the reduction of CO<sub>2</sub> emissions.

