

## Front Cover

**Facet effects on bimetallic ZnSn hydroxide microcrystals for selective electrochemical CO<sub>2</sub> reduction**

*Liu Han, Cheng-wei Wang, Shan-shan Luo, Ying-tang Zhou\*, Bing Li\*, Ming Liu\**

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### Viewpoint

**Accelerating the practical application of MOFs for hydrogen storage—from performance-driven to application-oriented**

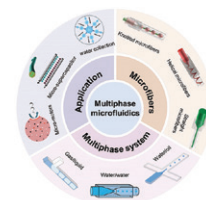
Yifan Wang, Jinghui Wu, Yidi Gao, Keqing Li, Chi Wang, Xiaochun Cui, Mingxin Huo, Xianze Wang \* ..... 1193

### Review articles

**Micro-nano-fabrication of green functional materials by multiphase microfluidics for environmental and energy applications**

Cheng Qi, Tao Zhou, Xingjiang Wu, Kailang Liu, Lei Li, Zhuo Chen\*, Zhou Liu, Jianhong Xu\*, Tiantian Kong \* ..... 1199

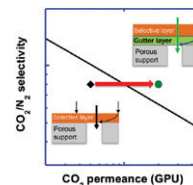
This review presents the recent progress on microfluidic fabrications of green micro-/nano-functional materials applied in the fields of environmental remediation and energy storage, and explains fundamental mechanisms of different multiphase flow regimes in various channel configurations.



**Indispensable gutter layers in thin-film composite membranes for carbon capture**

Gengyi Zhang, Haiqing Lin\* ..... 1220

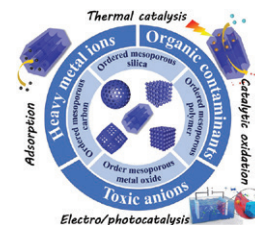
This is the first report aiming to provide a comprehensive and critical review of state-of-the-art gutter layer materials and their design and modification to enable TFC membranes with superior separation performance.



**Ordered mesoporous materials for water pollution treatment: Adsorption and catalysis**

Peng Zhang, Mingming He, Wei Teng\*, Fukuan Li, Xinyuan Qiu, Kexun Li\*, Hao Wang ..... 1239

This work overviews the ordered mesoporous materials as adsorbents/catalysts and their modifications in water pollution treatment from the past decade. These contributions demonstrate a deep understanding of the synergistic effect between the incorporated framework and homogeneous active centers.

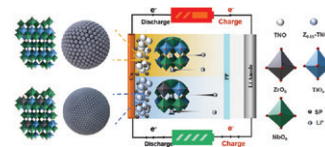


## Research papers

### Homovalent doping: An efficient strategy of the enhanced $\text{TiNb}_2\text{O}_7$ anode for lithium-ion batteries

Xiaohe Jin<sup>1</sup>, Yirui Deng<sup>1</sup>, Han Tian<sup>1</sup>, Miaomiao Zhou, Wenhao Tang, Huiyou Dong, Xinquan Zhang, Ruiping Liu\*..... 1257

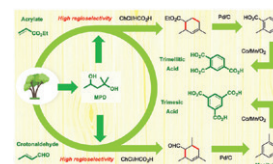
The doping of  $\text{Zr}^{4+}$  ions into  $\text{TiNb}_2\text{O}_7$  can enlarge the lattice structure, refine and homogenize the grains, improve the electrical conductivity, and accelerate the ion diffusion kinetics, and finally enhance the cycle and rate performance.



### Biomass-based production of trimellitic and trimesic acids

Lin Yuan, Yancheng Hu\*, Guangyi Li, Fenghan Han, Aiqin Wang, Yu Cong, Tao Zhang, Feng Wang\*, Ning Li\*..... 1267

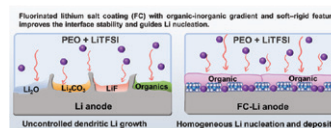
The manufacture of industrial chemicals with renewable biomass feedstock holds potential to aid the world in pursuing a carbon-neutral society. Trimellitic and trimesic acids are key chemicals in industry that are conventionally made by the oxidation of petroleum-derived trimethylbenzene. To reduce the reliance on the limited oil source, we develop a potential sustainable process for the production of trimellitic acid (60% overall yield) and trimesic acid (54% overall yield) with biomass-based 2-methyl-2,4-pentandiol, acrylate and crotonaldehyde as starting materials.



### Armoring lithium metal anode with soft-rigid gradient interphase toward high-capacity and long-life all-solid-state battery

Rui Zhang, Biao Chen, Yuhan Ma, Yue Li, Junwei Sha, Liying Ma, Chunsheng Shi\*, Naiqin Zhao.... 1279

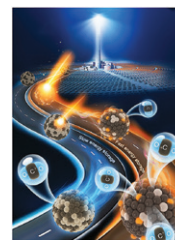
Fluorinated lithium salt coating (FC) with organic-inorganic gradient and soft-rigid feature improves the interface stability of Li anode/polymer electrolytes. FC layer can redistribute the Li ions and serve as nucleation sites, guiding homogeneous deposition.



### Rapid and stable calcium-looping solar thermochemical energy storage via co-doping binary sulfate and Al-Mn-Fe oxides

Changjian Yuan, Xianglei Liu\*, Xinrui Wang, Chao Song, Hangbin Zheng, Cheng Tian, Ke Gao, Nan Sun, Zhixing Jiang, Yimin Xuan, Yulong Ding..... 1290

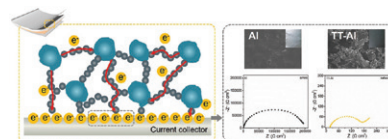
This work successfully realized high power density and highly stable solar thermochemical energy storage/release by synergistically accelerating energy storage/release via binary sulfate and promoting cycle stability, mechanical strength, and solar absorptance via Al–Mn–Fe oxides.



## Current collectors' effects on the electrochemical performance of $\text{LiNi}_{0.6}\text{Co}_{0.2}\text{Mn}_{0.2}\text{O}_2$ suspension electrodes for lithium slurry battery

Linshan Peng, Yufei Ren, Zhaoqiang Yin, Zhitong Wang, Xiangkun Wu\*, Lan Zhang\* ..... 1306

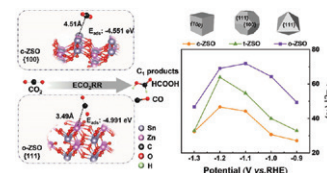
By comparing the six current collectors (CCs), it was found that the electrical resistance that can be ignored in LIBs and coin cells makes up a large proportion of the impedance in the slurry pouch cells. And the contact between KB and CC greatly affects the electron transportation.



## Facet effects on bimetallic ZnSn hydroxide microcrystals for selective electrochemical $\text{CO}_2$ reduction

Liu Han, Cheng-wei Wang, Shan-shan Luo, Ying-tang Zhou\*, Bing Li\*, Ming Liu\* ..... 1314

We prepared 3MCs of  $\text{ZnSn}(\text{OH})_6$  (ZSO) with controlled exposed facets, i.e. c-ZSO with  $\{100\}$ , o-ZSO with  $\{111\}$  and t-ZSO with both  $\{100\}$  and  $\{111\}$ , and investigated the crystal facet effects on  $\text{eCO}_2\text{RR}$ .



## Tailoring Ni based catalysts by indium for the dehydrogenative coupling of ethanol into ethyl acetate

Ming Yin, Jifeng Pang\*, Jin Guo, Xianquan Li, Yujia Zhao, Pengfei Wu, Mingyuan Zheng\* ..... 1321

Indium (In) was selected to tailor Ni based catalysts for the dehydrogenative coupling of ethanol into ethyl acetate. Over the novel  $\text{NiZnAlInOx}$  catalyst, ethyl acetate selectivity reached 90.1% at 46.2% ethanol conversion in the 370 h time on stream.

