



## Front Cover

### Dual-selective silver recovery strategy by simultaneous adsorption-reduction boosted by in-situ magnetic field

Jianran Ren, Zhiliang Zhu\*, Yanling Qiu, Fei Yu, Tao Zhou, Jie Ma\*, Jianfu Zhao

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### Viewpoint

#### CCUS: A Panacea or a Placebo in the Fight Against Climate Change?

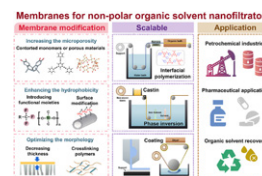
Yuxin Zhao..... 239

### Review Articles

#### Organic solvent nanofiltration membranes for separation in non-polar solvent system

Shuyun Gu, Siyao Li\*, Zhi Xu\*..... 244

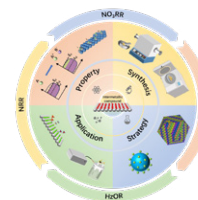
This review comprehensively summarizes various types of organic solvent nanofiltration membranes and preparation strategies suitable for non-polar systems. Additionally, it provides detailed large-scale membrane fabrication techniques and the applications of organic solvent nanofiltration membranes in chemical, petrochemical and pharmaceutical industry.



#### Intermetallic compounds for nitrogen electrochemistry

Haohong Wei, Cheng Tang, Yanyun Wang, Yongcheng Feng, Huancong Shi, Mingjin Cui, Huakun Liu, Shixue Dou, Laiquan Li\* ..... 268

Electrochemical nitrogen transformation techniques represent a burgeoning avenue for rectifying nitrogen pollutants remediation and synthesizing value-added nitrogenous products. Intermetallic compounds, featuring unique geometric, electronic and functional properties, have emerged as promising candidates.



#### Advances in enhancing hydrodeoxygenation selectivity of lignin-derived oxygenates: From synthetic strategies to fundamental techniques

Xinru Wu, Hongwei Zhang, Cejun Hu\*, Xiaojun Bao, Pei Yuan\*..... 292

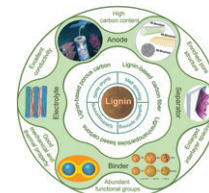
This paper provides a summary of catalyst design strategies aimed at modulating hydrodeoxygenation selectivity. It also explores techniques used to elucidate the mechanisms of action at active sites and capture intermediates, illustrating the intricate relationship between catalytic systems and deoxygenation selectivity.



## Research progress of lignin-derived materials in lithium/sodium ion batteries

Jingke Zhang, Hengxue Xiang, Zhiwei Cao, Shichao Wang\*, Meifang Zhu..... 322

A comprehensive overview on the application of lignin-derived materials with various dimensions in lithium/sodium ion batteries based on the relationships between the chemical/physical structure of lignin and the properties of lignin-derived materials.

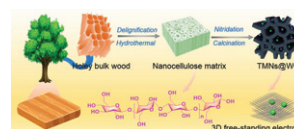


## Research papers

### Armoring hydrophilic wood-structured ultrathick electrode with bimetallic nitride enables high energy-density supercapacitor

Nannan Ming, Jikun Xu\*, Jingfang Lei, Cankun Hu, Kaifu Huo\*..... 345

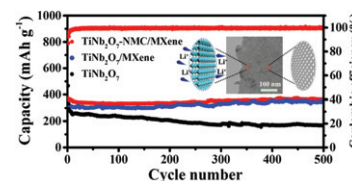
Assisted by the artificially punched microarray holes, the rationally-designed self-supporting wood ultrathick electrodes that encompass nanostructured bimetallic nitrides are fabricated to offset the limited areal capacitance and energy density of traditional slurry-casting carbons.



### Spatially confined synthesis of $\text{TiNb}_2\text{O}_7$ quantum dots onto mesoporous carbon and $\text{Ti}_3\text{C}_2\text{T}_x$ MXene for boosting lithium storage

Daoguang Sun<sup>1</sup>, Cheng Tang<sup>1</sup>, Haitao Li, Xinlin Zhang, Guanxia Zhu, Zhen-Dong Huang\*, Aijun Du\*, Haijiao Zhang\*..... 358

A ternary  $\text{TiNb}_2\text{O}_7$ -NMC/MXene composite has been developed by a triblock copolymer-directed solvothermal assembly route, where ultrasmall  $\text{TiNb}_2\text{O}_7$  quantum dots are spatially confined into N-doped mesoporous carbon and  $\text{Ti}_3\text{C}_2\text{T}_x$  MXene nanosheets. The resulting  $\text{TiNb}_2\text{O}_7$ -NMC/MXene anode shows an excellent electrochemical lithium storage capability.



### CO hydrogenation conversion driven by micro-environments of active sites over iron carbide catalysts

Nan Song, Xingxing Li, Ebtihal Abograin, Wenya Chen, Junbo Cao, Jing Zhang, De Chen, Xuezhi Duan\*, Xingguo Zhou ..... 367

The regulation of the active site micro-environments on the CO hydrogenation conversion process was elucidated by DFT calculations. Two main structural factors, namely the electronic properties and the geometrical effects, were found to have an integrated effect on the mechanism of CO hydrogenation conversion over iron carbide catalysts mixed with multiple active phases.

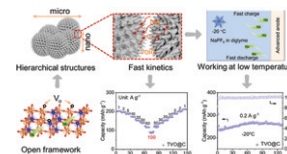


## Novel titanium vanadate with superior Na<sup>+</sup> transport kinetics for rapid charging and low-temperature sodium ion batteries

Dan Lv, Liehao Wei, Cheng Wang, Mingyue Wang, Zhongchao Bai, Yameng Fan, Dongdong Wang\*, Nana Wang\*, Jian Yang\*.....

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The opened ion channel and the oxygen vacancies with in TVO@C facilitate the Na<sup>+</sup> diffusion kinetics, leading to an ultrahigh rate of 100 A g<sup>-1</sup> and stable working at low temperature of -20 °C.

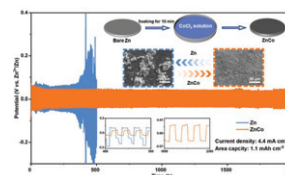


## Construction of an artificial zinc alloy layer toward stable zinc-metal anode

Long Jiang<sup>1</sup>, Yizhao Chai<sup>1</sup>, Dongdong Ji, Liwei Li, Le Li, Bingan Lu, Dongmin Li\*, Jiang Zhou\*.....

382

The desirable zinc alloy layers (i.e., ZnCo and ZnFe alloy) are constructed on the zinc surface by chemical conversion strategy. The zincophilic alloy layers serve as a multifunctional layer that inhibits water-induced side reactions and accelerates electrode kinetics, ensuring low voltage hysteresis and excellent electrochemical performance.

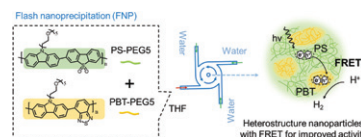


## Energy transfer enhanced photocatalytic hydrogen evolution in organic heterostructure nanoparticles via flash nanoprecipitation processing

Miaojie Yu, Weiwei Zhang\*, Xueyan Liu, Guohui Zhao, Jun Du, Yongzhen Wu, Wei-Hong Zhu\*.....

390

A binary nanophotocatalyst is fabricated using two hydrophilic polymers PS-PEG5 (PS) and PBT-PEG5 (PBT) via facile flash nanoprecipitation (FNP) processing. The well-matched spectrum and intimate blend of PS/PBT within the confined nano-space enable an efficient Förster resonance energy transfer (FRET), which prolong the so called “effective exciton diffusion length”, thereby giving rise to the boosted photocatalytic performance.

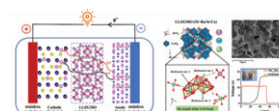


## Preparation and performance of highly-conductive dual-doped Li<sub>7</sub>La<sub>3</sub>Zr<sub>2</sub>O<sub>12</sub> solid electrolytes for thermal batteries

Wei Li, Shu Zhang, Xinya Bu, Jing Luo, Yi Zhang, Mengyu Yan, Ting Quan\*, Yanli Zhu\*.....

399

LLZGBO SEs have been prepared to improve the ionic conductivity and high-current discharging ability of thermal batteries in this work.

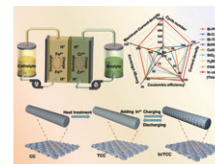


## Insights into novel indium catalyst to kW scale low cost, high cycle stability of iron-chromium redox flow battery

Yingchun Niu<sup>1</sup>, Yiping Liu<sup>1</sup>, Tianhang Zhou<sup>1</sup>, Chao Guo, Guangfu Wu, Wenjie Lv, Ali Heydari, Bo Peng, Chunming Xu, Quan Xu\*.....

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Schematic diagram of the ICRFBs and the fabrication of the electrode.

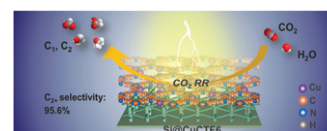


## Triazine-COF@Silicon nanowire mimicking plant leaf to enhance photoelectrocatalytic CO<sub>2</sub> reduction to C<sub>2+</sub> chemicals

Wenrui Wan<sup>1</sup>, Fanhua Meng<sup>1</sup>, Si Chen, Jianhua Wang, Chunyan Liu, Yan Wei, Chenpu He, Li Fan, Qiaolan Zhang\*, Weichun Ye\*, Huanwang Jing\*.....

422

This novel heterojunction of Si@CuCTF6 exhibits remarkable performance in photoelectrocatalytic CO<sub>2</sub> reduction and achieves 95.6% selectivity of C<sub>2+</sub> products, benefiting from the synergistic effect of N atom on the triazine ring and Cu–N coordination environment.



## Dual-selective silver recovery strategy by simultaneous adsorption-reduction boosted by in-situ magnetic field

Jianran Ren, Zhiliang Zhu\*, Yanling Qiu, Fei Yu, Tao Zhou, Jie Ma\*, Jianfu Zhao .....

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Here, self-propelled magnetic enhanced capture hydrogel was prepared, which achieved high selectivity ( $K_d = 23.31 \text{ mL g}^{-1}$ ) in the acidic range, and exhibited ultrahigh silver recovery capacity ( $1604.8 \text{ mg g}^{-1}$ ). The recovered silver crystals could be directly physically exfoliated, without acid/base additions.

