



Front Cover

Mechanism of Brønsted-acid-promoted self-photosensitized [2+2] cycloaddition for synthesis of high-performance bio-spiral fuel

Ying Chen¹, Yumei Shu¹, Minhua Ai*, Wenbiao Chen, Chengwen Liu, Songyi Zhang, Shaojie Wang, Haopeng Shi, Ji-Jun Zou, Lun Pan*

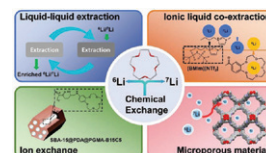
CONTENTS

Review articles

Research progress on lithium isotopes separation by chemical exchange with crown ethers decorated materials

Yi Fang¹, Rui Ha¹, Jun Sun, Xue Liu*, XiangDong Ding*, WeiQun Shi*..... 441

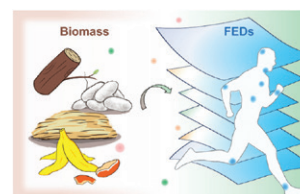
This review summarizes the recent research progress of lithium isotopes separation systems with crown ethers decorated materials, and spotlighting the advancement in lithium isotopes separation materials design.



Transformation of discarded biomass into value-added flexible electronic materials

Sijia Bao, Xuenan Yang, Ziqi Yu, Yuanbo Shi, Yuan Lu*..... 452

This work summarized various strategies for converting discarded biomass into value-added electronic materials and integrating functional components into flexible electronic devices. It also discussed the challenges in biomass transformation and the prospects for technological improvement and application extension in the future.



Microfluidic reactors for paired electrosynthesis: Fundamentals, applications and future prospects

Hao Xue, Zhi-Hao Zhao*, Menglei Yuan*, Guangjin Zhang*..... 471

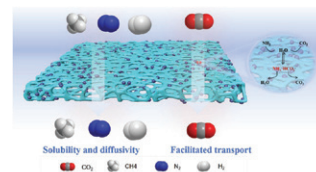
In this review, we demonstrate a simplified nomenclature system of paired electrosynthesis and elaborate the microfluidic reactor equipment, integral fundamentals and research methodology as well as various applications to provide new insights into correlation paired electrosynthesis and industrial implementation.



Facilitated transport membranes in post-combustion carbon capture: Recent advancements in polymer materials and challenges towards practical application

Zihan Wang, Zhien Zhang*, Mohamad Reza Soltanian, Ruizhi Pang* 500

This review paper examines facilitated transport membranes for post-combustion carbon capture, focusing on the latest polymer materials, principles, and challenges, including carrier saturation, temperature effects, and water influence over the past five years.

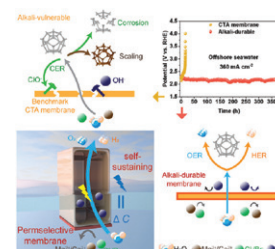


Research papers

Self-sustaining alkaline seawater electrolysis via forward osmosis membranes

Ke Shi, Hongyi Wan*, Keyu Wang, Fumohan Fang, Shiyi Li, Yixing Wang, Linfeng Lei, Linzhou Zhuang*, Zhi Xu* 518

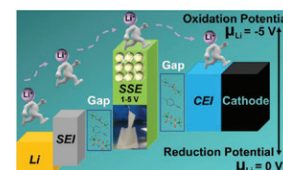
The alkali-durable forward osmosis membrane is successfully incorporated with the bifunctional nonprecious metal electrocatalysts to enable the self-sustaining direct seawater splitting, which could sustain a current density of 360 mA cm^{-2} at the cell voltage of 2.10 V and 2.15 V for over 360 h in the synthetic seawater and real offshore seawater, respectively.



Interfacial modulation of nano $\text{Li}_7\text{La}_3\text{Zr}_2\text{O}_{12}$ composite electrolytes prepared by solvent-free method

Qigao Han, Yaqing Guo, Fuhe Wang, Xuechun Lou, Fengqian Wang, Jun Zhong, Jinqiao Du, Jie Tian, Weixin Zhang, Shun Tang*, Shijie Cheng, Yuancheng Cao* 528

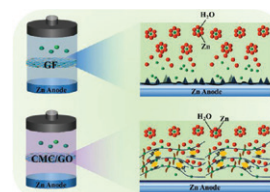
The formulation of solid-state batteries incorporated the enhancement of ionic conduction and interfacial modulation, thereby providing the valuable insights for optimizing the solvent-free method and performance of solid-state batteries.



Designing carboxymethyl cellulose based hydrogel electrolyte membranes enhanced by inorganic nanoparticle toward stable zinc anode

Xiangye Li, Yuan Li, Yu Jiang, Dahui Wang, Fen Ran* 537

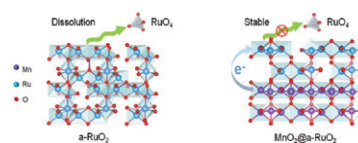
A strategy of nanoparticles doped hydrogel is proposed for constructing carboxymethyl cellulose/graphite oxide hybrid hydrogel electrolyte membranes with exceptional ionic conductivity, anti-swelling property, and simultaneously addressing the dendrites and parasitic reaction.



Stabilization of active ultrathin amorphous ruthenium oxide via constructing electronically interacted heterostructure for acidic water oxidation

Xiangxiang Pan¹, Huidong Qian¹, Jiansheng Xu, Haifeng Wang, Han-Don Um, Chao Lin*, Xiaopeng Li*, Wei Luo* 551

An ultrathin amorphous RuO_x-coated catalyst was developed using a MnO₂ nanorod array to create a heterogeneous interface. This structure leverages strong electronic interactions at the interface, inhibiting Ru site overoxidation and dissolution, resulting in a durable amorphous phase electrocatalyst.

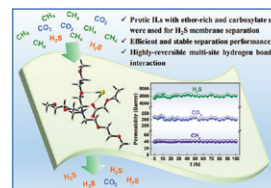


Constructing ether-rich and carboxylate hydrogen bonding sites in protic ionic liquids for efficient and simultaneous membrane separation of H₂S and CO₂ from CH₄

Ping Zhang, Xingyun Ma, Zhuoheng Tu*, Xiaomin Zhang, Xingbang Hu, Youting Wu*.....

560

The protic ILs having ether-rich and carboxylate sites were introduced into Pebax matrix for membrane separation of H₂S and CO₂ from CH₄. Owing to the highly reversible multi-site hydrogen bonding interaction between ECPIs and H₂S, efficient and stable separation performance was achieved.

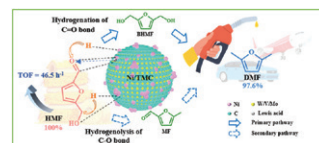


Selective hydrogenation of 5-hydroxymethylfurfural triggered by a high Lewis acidic Ni-based transition metal carbide catalyst

Rulu Huang, Jianchun Jiang*, Jie Liang, Shanyong Wang, Yuwei Chen, Xianhai Zeng*, Kui Wang*.....

573

A high Lewis acidic Ni-based transition metal carbide catalyst has been successfully constructed for selective hydrogenation of HMF to DMF.

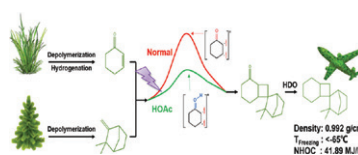


Mechanism of Brønsted-acid-promoted self-photosensitized [2+2] cycloaddition for synthesis of high-performance bio-spiral fuel

Ying Chen¹, Yumei Shu¹, Minhua Ai*, Wenbiao Chen, Chengwen Liu, Songyi Zhang, Shaojie Wang, Haopeng Shi, Ji-Jun Zou, Lun Pan*.....

585

Brønsted-acid-promoted self-photosensitized [2 + 2] cycloaddition has been developed to obtain the new bio-spiral fuel. This bio-spiral fuel has high density of 0.992 g cm⁻³ and high volumetric NHOC of 41.89 MJ L⁻¹, which is a promising high-energy-density fuel for application.

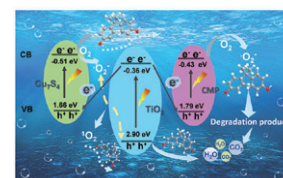


TiO₂-Cu₇S₄ modified with a carbazole-based conjugated porous polymer for adsorption and photocatalytic degradation of bisphenol A

Wanjun Xu, Xunxun Li, Dongyun Chen*, Najun Li, Qingfeng Xu, Hua Li, Jianmei Lu*.....

598

In this study, a novel dual S scheme heterojunction Cu₇S₄-TiO₂-conjugated polymer with a donor-acceptor structure is developed and evaluated, which can rapidly synergistically adsorb and photocatalytic degrade bisphenol A.



Improving electrochemical performance of silicon anode through building “soft-hard” double-layer coating

Xiao Zhu*, Weibo Feng, Yiman Huang.....

609

“Soft-hard” double-layer coating strategy has been proposed for ball-milled silicon anodes and provides improved electrochemical performance.

