

Front Cover

Regulating WO_x coordination environment improves proton transfer for catalytic amine regeneration in CO_2 capture

Zanbu Geng, Yang Yang, Wenqing Xu*, Yixi Wang, Yiren Li, Chaoqun Li, Juan Liu, Tingyu Zhu

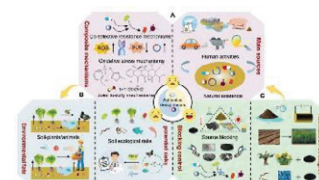
CONTENTS

Review articles

Antibiotics-heavy metals combined pollution in agricultural soils: Sources, fate, risks, and countermeasures

Yuanxiang Shu, Donghao Li, Tong Xie, Ke Zhao, Lu Zhou, Fengxiang Li* 869

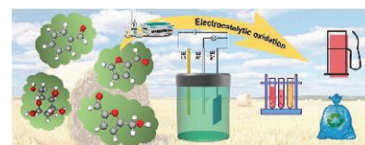
This review systematically discussed the main sources, composite mechanisms, environmental fate, potential risks, blocking control, and attenuation strategies of antibiotic-HMs combined pollution in agricultural soils, with a view to providing a theoretical basis and decision-making reference for future in-depth research.



Recent advances on the electrocatalytic oxidation of biomass-derived aldehydes

Zhikeng Zheng¹, Ke Li¹, Lu Lin, Zhiwei Jiang, Yuchen Wang, Kai Yan* 898

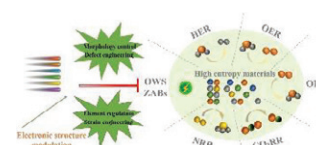
This review covers recent advances in the electrocatalytic oxidation of biomass-derived aldehydes such as 5-hydroxymethylfurfural, furfural and so on. It details oxidation mechanisms and classic studies, elucidating challenges and future prospects in electrocatalytic oxidation system design, theory and applications.



Electronic structure modulation of high entropy materials for advanced electrocatalysis

Luoluo Qi, Jingqi Guan* 917

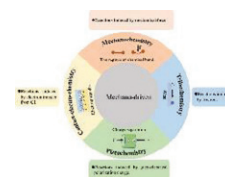
This review puts emphasis on the strategies for modulating electronic structure of high-entropy materials to strengthen the electrocatalytic reaction kinetics, resulting in their superior properties in the applications for energy conversion (HER, OER, ORR, CO_2RR , NRR) and energy storage (OWS and ZABs).



Mechano-driven chemical reactions

Shaoxin Li, Jiajin Liu, Zhong Lin Wang*, Di Wei* 937

Mechano-driven chemical reactions across various physical mechanisms, including mechanochemistry, tribochemistry, piezochemistry, and contact electrification (CE) chemistry.

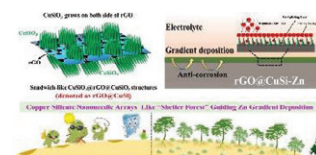


Research papers

Copper silicate nanoneedle arrays on reduced graphene oxide like “shelter forest” guiding Zn gradient deposition

Na Gao, Yang Wang, Zhanming Gao, Tianming Lv, Mengyu Rong, Xueying Dong, Dongzhi Chen*, Changgong Meng, Yifu Zhang* 967

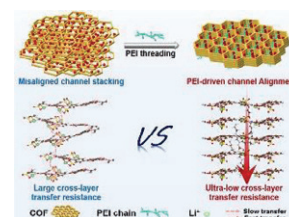
Inspired by the sand control and afforestation in the Gobi Beach in Northwest China, herein, we propose a “protective forest”-like material rGO@CuSi to act as a coating on the zinc metal surface to guide the zinc gradient deposition. This study provides ideas for accelerating the commercialization of AZIBs through interfacial engineering such as conservation forestry.



Lamellar COF solid-state electrolytes for robust ambient-temperature lithium-ion transfer enhanced by PEI-driven channel alignment

Yafang Zhang¹, Xinji Zhang¹, Jiajia Huang, Zhirong Yang*, Shiyue Zhou, Chenye Wang, Wenjia Wu, Jingtao Wang* 982

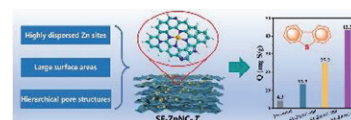
A thin lamellar polymer-threaded ionic COF (PEI@TpPa-SO₃Li) composite electrolyte was designed by assembling lithium sulfonated COF (TpPa-SO₃Li) nanosheets and then threading them with polyethyleneimine (PEI) chains, where the pore channel was orderly aligned through electrostatic interaction between -NH₂/-NH- and -SO₃Li groups, constructing continuous and aligned transfer pathways and enabling fast lithium-ion transport and high cell performances at 30 °C.



Solvent-free synthesis of highly dispersed zinc-doped porous carbons as efficient dibenzothiophene adsorbents

Ping Lu¹, Zhenhua Sun¹, Xinrong Ke, Changshen Ye*, Zhixian Huang*, Ting Qiu 994

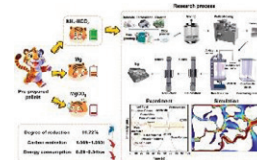
The carbon adsorbents are synthesized through the carbonization of zinc gluconate and urea without solvents, characterized by highly dispersed zinc sites, large surface areas and hierarchical structures, exhibiting excellent dibenzothiophene adsorption performance.



Study on the effect of controlled disproportionation pore-forming and relative vacuum mechanism on the reduction rate of continuous magnesium smelting process

Jing-zhong Xu, Ting-an Zhang*, Yan Liu, Zhihe Dou, Yishan Liu, Baiao Feng, Hongxuan Liu..... 1002

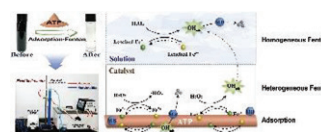
Pore-forming (NH_4HCO_3) pelletizing process can successfully reduce the energy consumption and carbon emissions. It is of great significance to promote the industrial progress and energy saving and emission reduction of magnesium and its alloys.



Coupling adsorption and in-situ Fenton-like oxidation by iron-containing low-grade attapulgite clay towards organic pollutant removal: From batch experiment to continuous operation

Chao Jiang¹, Xiaoli Liu¹, Xingpeng Wang, Qihui Wang, Huiyu Li*, Weiliang Tian*, Saeed Ahmed, Yongjun Feng*..... 1015

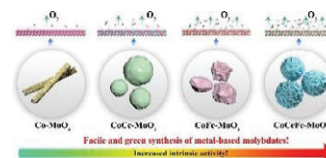
Coupling adsorption and in-situ Fenton-like oxidation by iron-containing low-grade attapulgite (ATP) from powder to polysulfone/ATP pellets towards organic pollutant removal: From batch experiments to continuous operation.



Eco-friendly and facile nanomanufacturing of amorphous Co-Ce-Fe trimetallic molybdates composites for accelerated anodic oxygen evolution in alkaline water electrolysis: Evaluation of active sites performance

Jiejie Feng, Liling Wei*, Huayi Li*, Jianquan Shen*..... 1027

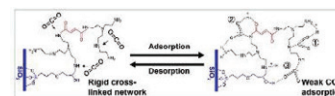
A series of metal-based molybdates have been prepared by a one-step and green method. With the synergistic effect of Co, Ce and Fe, the amorphous $\text{Co}_2\text{CeFe}_2\text{-MoO}_4$ exhibits the highest intrinsic activity and favorable stability.



Dual-bonded polyethyleneimine network with electron-withdrawing groups at α , β -sites for ultra-stable and low-energy CO_2 capture in harsh environments

Tong Zhou, Yunxia Wen, Zhinan Wu, Shuailong Song, Bohong Wu, Hongwei Guo, Huanhao Chen, Xin Feng, Liwen Mu, Xiaohua Lu, Tuo Ji*, Jiahua Zhu*..... 1039

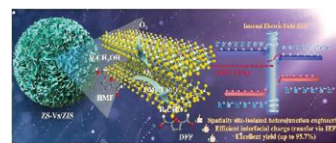
Novel electron-extracted amine sorbents, designed via a dual-bond strategy, reduce CO_2 binding energy (1.39 GJ t^{-1} regeneration) while maintaining capacity. Adjacent oxygen groups inhibit urea formation, enhancing oxidative/water stability (90% capacity retention after 100 cycles in harsh conditions). DFT/FT-IR insights enable energy-efficient, durable CO_2 capture across diverse environments.



Cooperative α -C-H activation enabled quantitative and partial photooxidation of biomass-derived 5-hydroxymethylfurfural

Jie Li, Ye Meng, Yu Wen, Yinyin He, Putla Sudarsanam*, Song Yang, Hu Li*..... 1050

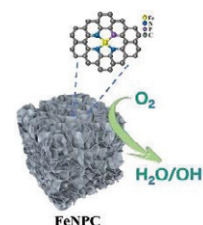
A spatially site-isolated heterojunction (ZnS-Vs/ZnIn₂S₄) is constructed to realize enhanced α -C-H activation for photooxidative upgrading of 5-hydroxymethylfurfural (HMF) to 2,5-furandiformaldehyde (DFF) via the synergistic effect of ligand-to-metal charge transfer (LMCT) and shallow trap states (STS).



Biomass-derived single atom catalysts with phosphorus-coordinated Fe-N₃P configuration for efficient oxygen reduction reaction

Peng-Peng Guo, Abrar Qadir, Chao Xu, Kun-Zu Yang, Yong-Zhi Su, Xin Liu, Ping-Jie Wei, Qinggang He*, Jin-Gang Liu*..... 1064

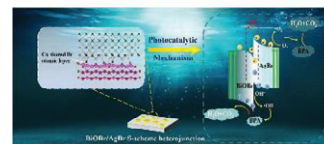
A facile and cost-effective method for the preparation of a biomass carboxymethylcellulose (CMC) derived electrocatalyst FeNPC with N, P-coordinated Fe-N₃P configuration for efficient oxygen reduction reaction (ORR) was demonstrated; FeNPC displayed superior performance to commercial Pt/C catalyst in Zinc-air batteries.



Boosting charge transfer of BiOBr/AgBr S-scheme heterojunctions via interface Br atom co-sharing for enhanced visible-light photocatalytic activity

Junhao Ma, Liang Xu, Zhaoyi Yin, Zhifeng Li, Zhiguo Song, Jianbei Qiu, Yongjin Li*..... 1073

The S-scheme BiOBr/AgBr heterojunction with co-sharing Br atoms had been successfully designed, the synergistic effects of the S-scheme heterojunctions and atomic-level interfacial channels result in enhancing the separation and utilization efficiency of photoinduced carriers, and enhancing the photocatalytic.



Regulating WO_x coordination environment improves proton transfer for catalytic amine regeneration in CO₂ capture

Zanbu Geng, Yang Yang, Wenqing Xu*, Yixi Wang, Yiren Li, Chaoqun Li, Juan Liu, Tingyu Zhu..... 1085

W-based catalysts regulate acidic site intensity and distribution to minimize regeneration energy in amine-based CO₂ capture. The synergistic interaction between Brønsted and Lewis acid sites played a critical role. Precise regulation of acid site achieved a 47% reduction energy consumption, elucidating the synergistic interplay between acidic sites.

