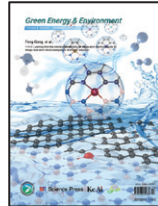




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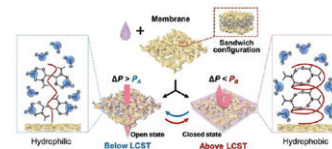
CONTENTS

Short communication

Temperature-regulation liquid gating membrane with controllable gas/liquid separation

Baiyi Chen¹, Huimeng Wang¹, Jiadai Xu, Liting Pan, Yuan Jing, Xu Hou* 1501

The temperature-regulation liquid gating membrane integrates a thermo-wettability responsive porous membrane with functional gating liquid, allowing for dynamically controllable gas/liquid transfer and multiphase separation, expanding the application range of liquid gating membranes.

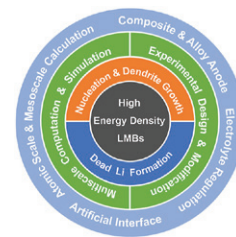


Review articles

Review on lithium metal anodes towards high energy density batteries

Jun-Fan Ding¹, Yu-Tong Zhang¹, Rui Xu, Rui Zhang, Ye Xiao, Shuo Zhang, Chen-Xi Bi, Cheng Tang, Rong Xiang, Ho Seok Park, Qiang Zhang*, Jia-Qi Huang* 1509

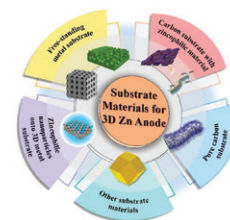
Authors highlight the current limitations and promising research directions of LMAs. This review sheds new lights on deeply understanding the intrinsic mechanism of LMAs, and calls for more endeavors to realize practical Li metal batteries.



Advances in the structure design of substrate materials for zinc anode of aqueous zinc ion batteries

Sinian Yang, Hongxia Du, Yuting Li, Xiangsi Wu, Bensheng Xiao, Zhangxing He*, Qiaobao Zhang*, Xianwen Wu* 1531

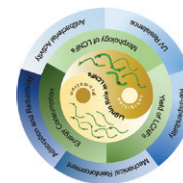
In this review, we systematically summarized the challenges faced by Zn metal anodes of AZIBs including the causes of dendrite growth, hydrogen evolution, corrosion reactions. Future directions and perspectives about the Zn anode are proposed for developing high-performance dendrite-free AZIBs based on our best knowledge.



The case-dependent lignin role in lignocellulose nanofibers preparation and functional application-A review

Xiya Zhang, Lili Zhang, Yimin Fan*, Zhiguo Wang* 1553

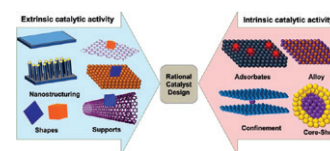
Lignin plays important role in the preparation and functionalization of LCNFs, which shows both promotion and inhibition effect, like “Yang” and “Yin” in “Tai Chi”. The two effects counteract each other, jointly and case-dependently affect LCNFs.



Rational catalyst design and mechanistic evaluation for electrochemical nitrogen reduction at ambient conditions

Muhammad Ibrar Ahmed, David Brynn Hibbert, Chuan Zhao* 1567

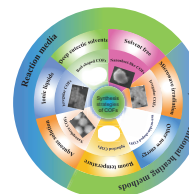
Recent insights into theoretical assisted rational catalyst design for electrochemical nitrogen reduction at ambient conditions are outlined. Based on the theoretical framework, different experimental strategies to improve the intrinsic and extrinsic catalytic properties of the eNRR catalyst are highlighted.



Synthesis strategies of covalent organic frameworks: An overview from nonconventional heating methods and reaction media

Jing Xiao, Jia Chen*, Juwen Liu, Hirotaka Ihara, Hongdeng Qiu* 1596

In this review, we comprehensively describe the synthetic strategies of COFs from the aspects of nonconventional heating methods and reaction media. In addition, we outline the main challenges of synthesizing COFs and propose some possible solutions.

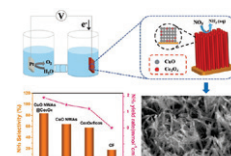


Research papers

A core-shell copper oxides-cobalt oxides heterostructure nanowire arrays for nitrate reduction to ammonia with high yield rate

Hui Liu¹, Jingsha Li¹, Feng Du¹, Luyun Yang, Shunyuan Huang, Jingfeng Gao, Changming Li*, Chunxian Guo* 1619

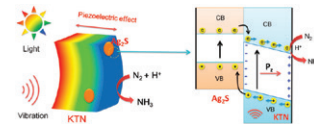
Authors present a core-shell heterostructure comprising cobalt oxide anchored on copper oxide nanowire arrays (CuO NWAs@Co₃O₄) for efficient NRA. It is proposed that the synergetic effects of the heterostructure combining atom hydrogen adsorption and nitrate reduction lead to the enhanced NRA performance.



Facile preparation of Ag₂S/KTa_{0.5}Nb_{0.5}O₃ heterojunction for enhanced performance in catalytic nitrogen fixation via photocatalysis and piezo-photocatalysis

Lu Chen, Junfeng Wang, Xiaojing Li, Jiayu Zhang, Chunran Zhao, Xin Hu, Hongjun Lin, Leihong Zhao, Ying Wu*, Yiming He*..... 1630

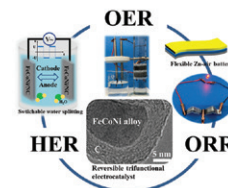
In this work, a novel heterojunction composite $\text{Ag}_2\text{S}/\text{KTa}_x\text{Nb}_{1-x}\text{O}_3$ was designed and synthesized through a combination of hydrothermal and precipitation procedures.



Self-supported metal (Fe, Co, Ni)-embedded nitrogen-doping carbon nanorod framework as trifunctional electrode for flexible Zn-air batteries and switchable water electrolysis

Qiuyan Jin¹, Liping Xiao¹, Weidong He, Hao Cui*, Chengxin Wang*..... 1644

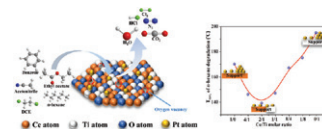
We develop a flexible trifunctional electrode consisted of alloy nanoparticles wrapped in self-supporting N-doped carbon nanorods (TMA/NC). The asprepared electrode can provide favorable and long-term performance for switchable overall water splitting and flexible rechargeable Zn-air batteries.



New insight into the design of highly dispersed Pt supported $\text{CeO}_2\text{-TiO}_2$ catalysts with superior activity for VOCs low-temperature removal

Yijun Shi¹, Xiaolin Guo¹, Yiyang Wang, Fanzhe Kong, Renxian Zhou*..... 1654

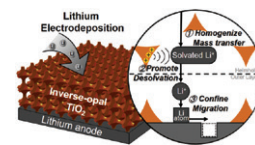
We made use of ascorbic acid to construct abundant structure defects on the surface of $\text{CeO}_2\text{-TiO}_2$ mixed oxides to strongly anchor and stabilize Pt atoms. The n-hexane was selected as a typical reactant to compare the catalytic performance of Pt/ $\text{CeO}_2\text{-TiO}_2$ catalyst with various Ce/Ti molar ratios.



Inverse-opal structured TiO_2 regulating electrodeposition behavior to enable stable lithium metal electrodes

Xuwen Wu, Shaolun Cui, Minfei Fei, Sheng Liu, Xueping Gao, Guoran Li*..... 1664

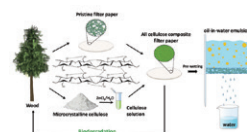
An inverse-opal structured TiO_2 membrane (~1 mm) is fabricated to regulate electrodeposition behavior of lithium: homogenizing mass transfer, promoting desolvation of solvated lithium-ions, and confining migration of adsorbed lithium atoms, to enable a stable lithium metal electrode.



Efficient oil-water separation by novel biodegradable all cellulose composite filter paper

Chizhou Wang¹, Shaodi Wu¹, Ning Zhang, Zhaoli Jiang, Xianglin Hou*, Long Huang*, Tiansheng Deng*..... 1673

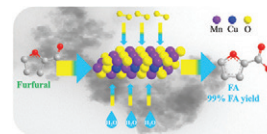
This work have developed a new and improved method using two different cellulose materials. The process allows to obtain membrane materials for oil-water separation that are ‘all cellulose’ (cellulose with two or more different crystal forms) and the membrane is friendly to the environment.



Heterogeneously-catalyzed aerobic oxidation of furfural to furancarboxylic acid with CuO-Promoted MnO₂

Xin Yu, Tingke Jin, Huiqiang Wang, Guoqing Zhang, Wenlong Jia, Lincui Peng, Yong Sun*, Xing Tang, Xianhai Zeng, Shuliang Yang, Zheng Li, Feng Xu, Lu Lin..... 1683

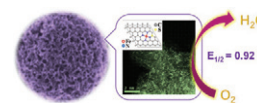
The fabrication of Mn-Cu bimetal oxides catalyst with enhanced lattice oxygen reactivity presents excellent activity for the oxidation of furfural.



Hierarchically porous Fe/N/S/C nanospheres with high-content of Fe-Nx for enhanced ORR and Zn-air battery performance

Luming Wu¹, Ruge Zhao¹, Guo Du, Huan Wang, Machuan Hou, Wei Zhang, Pingchuan Sun, Tiehong Chen*..... 1693

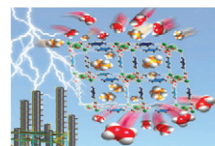
By a facile melting perfusion and mesopore-confined pyrolysis approach hierarchically porous Fe/NeS-doped carbon catalyst was prepared with high content single atomic Fe (3.7 wt%), and the catalyst exhibited excellent performance in ORR, OER and Zn-air battery.



Ethylene purification in a metal-organic framework over a wide temperature range via pore confinement

Xue-Qian Wu, Peng-Dan Zhang, Xin Zhang, Jing-Hao Liu, Tao He, Jiamei Yu, Jian-Rong Li*..... 1703

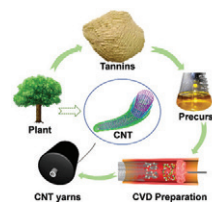
A C₂H₆-selective metaleorganic framework (BUT-315-a) has been constructed, which exhibits a superior high separation potential ΔQ for equimolar C₂H₆/C₂H₄ mixture at ambient conditions. It also maintains excellent separation performance at elevated temperatures, making it among the most promising MOF adsorbents for C₂H₄ purification.



One-step floating conversion of biomass into highly graphitized and continuous carbon nanotube yarns

Gongxun Zhai, Qianqian Wang, Fuyao Liu, Zexu Hu, Chao Jia, Dengxin Li, Hengxue Xiang*, Meifang Zhu..... 1711

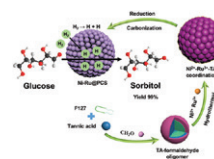
This work shows that biomass can be used as a carbon source for the continuous preparation of CNT yarns, and enriches the green, low-cost, large-scale, and low-carbon preparation methods of CNTs. The mechanical strength, electrical conductivity, and graphitization degree of TA-based CNT yarns reach values of 886 ± 46 MPa, 2×10^5 S m², and 6.25, respectively.



Selective hydrogenation of glucose to sorbitol with tannic acid-based porous carbon sphere supported Ni-Ru bimetallic catalysts

Ran Xi, Yiwei Tang, Richard Lee Smith Jr., Xiaoning Liu, Le Liu, Xinhua Qi*..... 1719

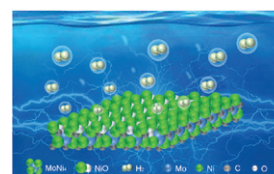
Template-free synthesis of Ni-Ru bimetallic porous carbon sphere (NiRu@PCS) catalyst with tannic acid (TA) precursor applied to hydrogenation of glucose affords 99% glucose conversion and 100% sorbitol selectivity at 140 °C, 150 min reaction time, 3 MPa H₂ partial pressure.



MoNi₄-NiO heterojunction encapsulated in lignin-derived carbon for efficient hydrogen evolution reaction

Yanlin Qin, Yunzhen Chen, Xuezhi Zeng, Yingchun Liu, Xuliang Lin*, Wenli Zhang*, Xueqing Qiu... 1728

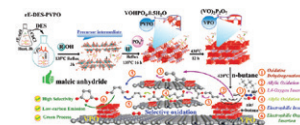
Lignin assisted the formation of NiO to construct the MoNi₄-NiO interface and MoNi₄-NiO heterojunction structure, which decreased the energy barrier by forming a more favorable transition states and then promoted the formation of adsorbed hydrogen at the interface position through water dissociation in alkaline media, leading to rapid progress in reaction kinetics.



Rare earth metal based DES assisted the VPO synthesis for n-butane selective oxidation toward maleic anhydride

Muhammad Faizan, Yingwei Li, Xingsheng Wang, Piao Song, Ruirui Zhang, Ruixia Liu* 1737

Rare earth metal based deep eutectic solvents (rE-DES) have been prepared for the assistance of vanadium phosphorus oxide (VPO) catalysts then evaluated its catalytic performance in n-butane selective oxidation to produce maleic anhydride (MA).



1+1>2: Learning from the interfacial modulation on single-atom electrocatalysts to design dual-atom electrocatalysts for dinitrogen reduction

Qiang Zhou, Feng Gong*, Yunlong Xie, Rui Xiao..... 1753

A high-throughput theoretic computation method was employed to investigate the synergistic effect of heterogenous substrates to single- atom catalysts (SACs), derived from which a new strategy for the design of dual-tom catalysts (DACs) was proposed.

