

Front Cover

Factors affecting the performance of membranes for H_2/CH_4 separation from the perspective of separation mechanisms

Shiyin Sun, Shuangde Li, Yunfa Chen**

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Special Topic

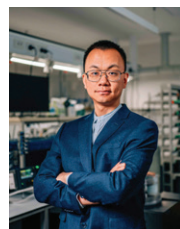
Nanocatalysis: Towards high-performance energy and environmental materials for achieving circular carbon economy



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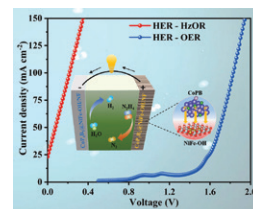
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Research papers

Heterointerface of nickel-ferrie hydroxide/cobalt-phosphide-boride boosting hydrazine-assisted water electrolysis

Jiayi Wang, Shaojun Qing*, Xili Tong*, Ting Xiang, Guangnan Luo, Kun Zhang, Liangji Xu*..... 1957

A robust bifunctional CoPB@NiFe-OH catalyst has been designed and constructed based on interfacial coupling effect. Benefitting from the efficient formed heterointerface, hydrogen-electric cogeneration can be spontaneously achieved via HzOR coupled with HER in hydrazine assisted water electrolysis system.



2D/2D homojunction-mediated charge separation: Synergistic effect of crystalline C_3N_5 and $g-C_3N_4$ via electrostatic self-assembly for photocatalytic hydrogen and benzaldehyde production

Sue-Faye Ng, Joel Jie Foo, Peipei Zhang, Steven Hao Wan Kok, Lling-Ling Tan, Binghui Chen, Wee-Jun Ong *..... 1968

Green Energy & Environment

This work presents an electrostatic self-assembly synthesis approach to achieve 2D/2D crystalline $C_3N_5/g-C_3N_4$ homojunction. The intimate interfacial contact between the C_3N_5 and $g-C_3N_4$ has successfully improved solar-driven hydrogen production, as well as simultaneous hydrogen and benzaldehyde production.

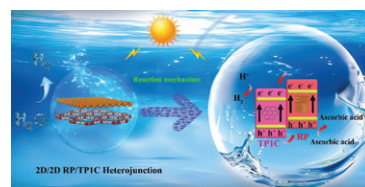


Construction of two-dimensional heterojunctions based on metal-free semiconductor materials and Covalent Organic Frameworks for exceptional solar energy catalysis

Haijun Hu¹, Daming Feng¹, Kailai Zhang, Hui Li, Hongge Pan, Hongwei Huang, Xiaodong Sun*, Tianyi Ma*.....

1981

Covalent organic frameworks (COFs) face limited photocatalytic hydrogen production due to carrier recombination. By constructing a heterojunction with red phosphorus, the RP/TPIC composite achieves a 10.19-fold increase in H_2 evolution rate, offering a novel strategy for developing efficient catalysts.

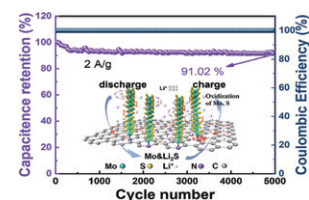


1T-MoS₂ nanosheets with enlarged interlayer spacing vertically bonded on rGO for high-performance lithium-ion capacitors

Wenjun Zhu*, Bofeng Zhang, Fanxing Bu*, Minghai Zhao, Xinyong Tao*, Keli Liu, Yuwen Fang, Wei Luo*

1990

Vertically aligned evenly distributed 1T-MoS₂ nanosheets with expanded interlayer spacing are bonded to rGO via robust Mo-N-C bonds, synergistically enhancing Li ion/electron transfer for high-performance LICs.

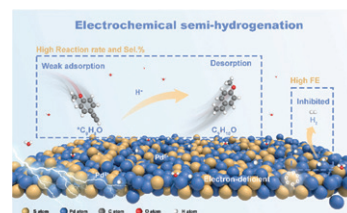


Lattice sulfur-induced disordered and electron-deficient Pd-based nanosheets enabling selective electrocatalytic semi-hydrogenation of alkynes

Hongyao Luo, Haochuan Jin, Bing Zhang, Nailiang Yang, Tao Sun*, Chuntian Qiu, Yangsen Xu*, Peng Yang*, Xiang Ling*.....

2002

By using sulfur-induced low-coordination disordered PdS_x nanosheets as catalysts, the electronic structure of the Pd site was modulated, which in turn affected the competitive adsorption during the ECSH process and improved the selectivity and energy utilization efficiency.



Contributed Papers

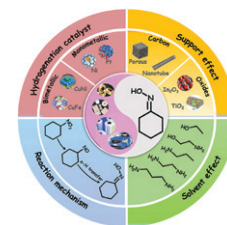
Review articles

Advancements in catalytic hydrogenation of nitrocyclohexane to cyclohexanone oxime

Jinzhi Lu, Tongxin Song, Weiping Ding, Yan Zhu*.....

2014

This review summarizes catalyst design, solvent effects, and reaction mechanisms for the atom-economical hydrogenation of nitrocyclohexane to cyclohexanone oxime—a key nylon precursor—and offers future perspectives.

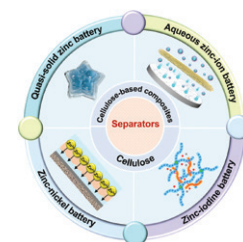


Recent advances in cellulose-based separators for zinc-based batteries: Performances, mechanism and perspectives

Zekun Zhang, Yongjun Li, Xuejing Yin, Siwen Li, Bin Li, Ningning Zhao, Jing Zhu*, Lei Dai, Ling Wang, Zhangxing He*, Zemin Feng*.....

2029

With its excellent hydrophilicity, strong mechanical strength, and abundant active sites of cellulose separators as the entry point, the correlation between the structure of cellulose-based separators and the energy storage improvement of zinc-based batteries was systematically summarized from the mechanism.

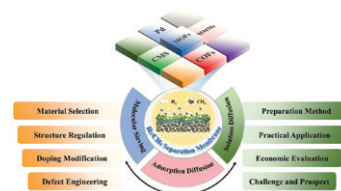


Factors affecting the performance of membranes for H₂/CH₄ separation from the perspective of separation mechanisms

Shiying Sun, Shuangde Li*, Yunfa Chen*

2047

This article covers the design aspects of H₂/CH₄ separation membranes including material selection, microstructure regulation and economic analysis from the perspective of separation mechanisms and it also discusses the current challenges and future prospect of their research and practical applications.



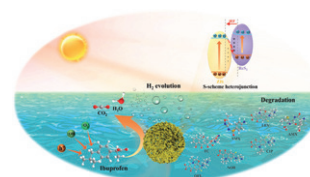
Research papers

Constructing S-scheme 3D Zn₃In₂S₆/ReS₂ heterojunction photocatalyst for simultaneous organic pollutants degradation and hydrogen production

Qi Gao, Tiantian Wang, Liangmeng Ni, Zhenrui Li, Xia Du, Shaowen Rong, Hui Wang, Liquan Jing*, Zhijia Liu*, Jinguang Hu*.....

2071

The S-scheme heterojunction constructed from Zn₃In₂S₆ and ReS₂ achieves efficient charge carrier separation and enhanced redox capability, thereby facilitating the augmented synergistic effect of ibuprofen degradation and hydrogen generation.

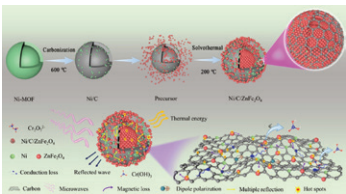


Construction of hollow porous lychee-structured Ni/C/ZnFe₂O₄ microwave-responsive catalysts with rapid efficiently reduction of Cr(VI) ions

Gaoqian Yuan¹, Ling Zhang¹, Jingzhe Zhang, Long Dong, Xuefeng Liu, Yage Li, Liang Huang, Faliang Li*, Haijun Zhang*.....

2086

A lychee-like Ni/C/ZnFe₂O₄ catalyst with a double-shell hollow porous heterojunction structure achieves 98% Cr(VI) removal under microwave irradiation, leveraging enhanced electron transfer and accelerated H⁺ ion dynamics for efficient heavy metal reduction.



Single-atom Mn-modified biomimetic phthalocyanine covalent organic frameworks with tunable pendant groups for high-efficiency sodium chloride batteries

Jiajun Cui¹, Zhenzhen Wang¹, Yongqiang Gu, Ting Xu, Tairan Pang, Chuanling Si*, Weiwei Huan*, Jie Li*

2097

The single-atom Mn-coordinated biomimetic phthalocyanine COF (SAMn-COF-NH₂) serves as both Cl₂ capturer and catalyst in rechargeable Na-Cl₂ batteries. The Mn-NH₂ functionalization substantially reduces the NaCl oxidation barrier and enhances reaction kinetics, enabling an ultrahigh discharge capacity of 2810 mAh g⁻¹ with 98% Coulombic efficiency. Practical demonstrations show Na || SAMn-COF-NH₂ pouch cells can power smartphones while maintaining 90.2% capacity retention over 50 cycles, confirming their commercial viability.

