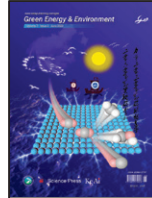




Front Cover
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Research highlight

Powerful qua-functional electrolyte additive for lithium metal batteries

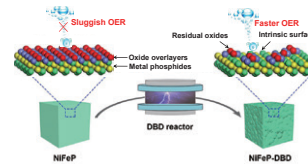
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Short communication

Etching oxide overlayers of NiFe phosphide to facilitate surface reconstruction for oxygen evolution reaction

Tehua Wang, Xian-Zhu Fu*, Shuangyin Wang*..... 365

The oxide overlayers of NiFeP are etched by DBD-plasma, exposing the intrinsic surface. Etching the oxide overlayers can accelerate the surface reconstruction of NiFeP and facilitate the formation of key intermediate phases for OER.

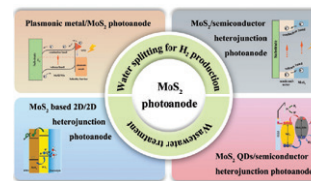


Review articles

The fabrication of atomically thin-MoS₂ based photoanodes for photoelectrochemical energy conversion and environment remediation: A review

Zexu Chi, Jingyun Zhao, Yi Zhang, Han Yu*, Hongbing Yu*..... 372

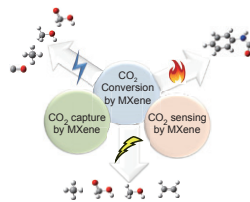
This work summarized the recent process in the development of atomically thin-MoS₂ (AT-MoS₂) based PEC photoanodes in the application fields of water splitting and wastewater treatment. We illustrated the effective strategies for the preparation of high-performance AT-MoS₂-based photoanode, and also provided guidance for the development of more effective AT-MoS₂-based PEC photoanode.



CO₂ capture and conversion to value-added products promoted by MXene-based materials

Yu Chen*, Chong Liu, Shien Guo, Tiancheng Mu*, Lei Wei, Yanhong Lu*..... 394

Capture, sensing and conversion of CO₂ to value-added products by MXene-based materials are reviewed. Improvement of MXene synthesis and efficiency in a green method is also discussed for the purpose of achieving the green absorbent, sensor and catalyst.



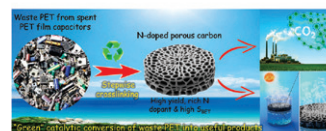
Research papers

Converting poly(ethylene terephthalate) waste into N-doped porous carbon as CO₂ adsorbent and solar steam generator

Changyuan Song, Boyi Zhang, Liang Hao, Jiakang Min, Ning Liu, Ran Niu, Jiang Gong*, Tao Tang*.....

411

Without activations, poly(ethylene terephthalate) is facily converted into N-doped porous carbon through stepwise crosslinking strategy by using melamine and molten salts ZnCl₂/NaCl at 550 °C, which shows high-performance in CO₂ capture and solar steam evaporation for producing drinkable water.

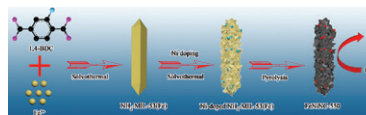


MOFs derived FeNi₃ nanoparticles decorated hollow N-doped carbon rod for high-performance oxygen evolution reaction

Gaopeng Liu, Bin Wang, Lin Wang, Wenxian Wei, Yu Quan, Chongtai Wang, Wenshuai Zhu*, Huaming Li, Jiexiang Xia*.....

423

FeNi₃ nanoparticles decorated hollow N-doped carbon rod derived from Ni-doped Fe-based MOFs via facile pyrolysis process. The as-prepared FeNiNC-550 elctrocatalyst possesses an efficient oxygen evolution performance with a low overpotential and fast kinetic reaction rate.

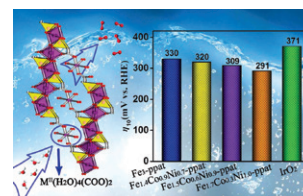


Synergistic effect of Ni^{II} and Co/Fe^{III} in doped mixed-valence phosphonate for enhancing electrocatalytic oxygen evolution

Juan-Juan Hou, Jian-Tao Yuan, Wei Zhang, Ying-Xia Wang, Xian-Ming Zhang*.....

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A mixed-valence iron phosphonate (Fe₃-ppat) has been constructed and applied to OER catalysis considered the potential active sites in pillars Fe^{II}(H₂O)₄(COO)₂ and inorganic layers Fe^{III}(μ₂-OH)PO₃. Optimized tri-metallic doping Fe_{1.7}Co_{0.3}Ni_{1.0}-ppat possesses a minimum overpotential (291 mV), small Tafel slope (91.65 mV dec⁻¹), and high stability up to 83 h. The enhanced catalytic performance could be mainly ascribed to the synergistic effect of Ni^{II} and Co/Fe^{III}.

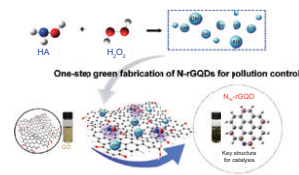


A facial synthesis of nitrogen-doped reduced graphene oxide quantum dot and its application in aqueous organics degradation

He Zhao¹, Juehua Wang¹, Zhuangjun Fan, Yongbing Xie*, Di Zhang, Shanshan Sun, Yi Zhang, Hongbin Cao*.....

440

One-step synthesis, doping and reduction of nitrogen-doped reduced graphene oxide quantum dots (N-rGQDs) was realized by adopting metal-free Fenton reaction using HA and H₂O₂ as the reactants. N-rGQDs with manipulative functional groups proved to be efficient candidates for pollution control..

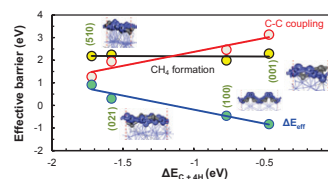


Mechanistic aspects of facet-dependent CH₄/C₂₊ selectivity over a χ -Fe₅C₂ Fischer–Tropsch catalyst

Thanh Hai Pham¹, Junbo Cao¹, Nan Song, Yueqiang Cao*, Bingxu Chen, Gang Qian, Xinggui Zhou, De Chen, Xuezhi Duan*.....

449

The geometry of χ -Fe₅C₂ surfaces shows negligible effects on CH₄ formation but significantly affects C-C coupling. The adsorption energy of C + 4H is demonstrated as a descriptor for CH₄/C₂₊ selectivity of χ -Fe₅C₂ surfaces based on the established Brønsted–Evans–Polanyi relations.

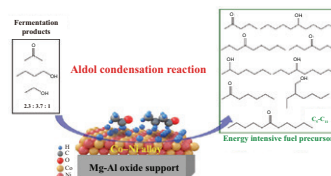


Preparation of bimetal Co–Ni supported on Mg–Al oxide for chemocatalytic upgrading of tailored fermentation products to energy intensive fuels

Jiajun Liu, Kui Wu, Zhengke Li, Wensong Li, Yuqing Ning, Weiyan Wang*, Yunquan Yang*.....

457

Due to the formation of Co–Ni alloy, electron transfer from Co to Ni and large pore, bimetal Co–Ni supported catalyst presented high activity: acetone conversion and C₅–C₁₁ total selectivity in the aldol condensation of fermentation products (acetone–butanol–ethanol) reached to 76% and 90%, respectively.

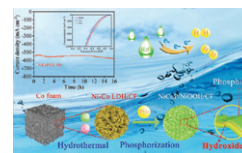


NiCoP/NiOOH nanoflowers loaded on ultrahigh porosity Co foam for hydrogen evolution reaction under large current density

Yuantao Pei, Liang Huang*, Lei Han, Haijun Zhang*, Longhao Dong, Quanli Jia, Shaowei Zhang...

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On a highly porous Co foam prepared via freeze-drying, a self-supporting hierarchical NiCoP/NiOOH electrode was in-situ fabricated and exhibited superior HER performance in alkaline media under a current density over ~500 mA cm⁻².

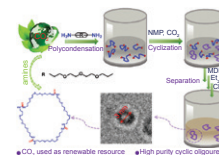


Cyclic oligourea synthesized from CO₂: Purification, characterization and properties

Ruhui Shi, Haiyang Cheng*, Hongxiang Li, Peixuan Wu, Chao Zhang, Masahiko Arai, Fengyu Zhao*.....

477

A kind of cyclic oligourea was synthesized via polycondensation of CO₂ and diamine followed by effective separation and purification.

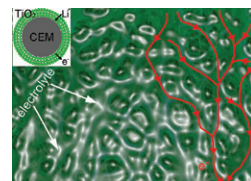


In-situ growth of TiO₂ film on carbonized eggshell membrane as 3D electrode for high-performance lithium storage

Xiao Yu, Xinyi Zhang, Yongjian Lai, Donghai Wang, Yong Liu*.....

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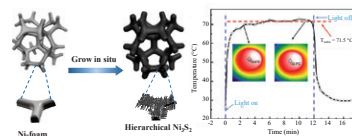
A 3D electrode was successfully prepared by in-situ growing nanocrystalline TiO₂ film on carbonized eggshell membrane, which favors continuous electron transport and electrolyte penetration along with Li⁺ ion diffusion in the whole electrode, leading to a superior lithium storage performance.



A mechanically durable, excellent recyclable 3D hierarchical Ni₃S₂@Ni foam photothermal membrane

Zhongping Yao, Kailun Yu, Mengyao Pan, Hongbo Xu*, Tianqi Zhao, Zhaohua Jiang..... 492

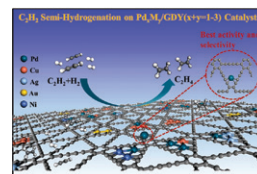
The photothermal membranes based on nanohierarchical Ni₃S₂/NF via grown in situ exhibited excellent solar absorption (93.13%) in the wavelength range of 250 nm to 2500 nm, reached 1.53 kg m⁻² h⁻¹ under one sun illumination and sustained anti-corrosion capacity for one month.



C₂H₂ semi-hydrogenation on the Pd_xM_y cluster/graphdiyne catalysts: Effects of cluster composition and size on the activity and selectivity

Ying Wang¹, Yamin Qi¹, Maohong Fan*, Baojun Wang, Lixia Ling, Riguang Zhang*..... 500

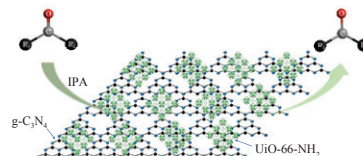
C₂H₂ semi-hydrogenation to C₂H₄ on the Pd_xM_y/GDY catalysts exhibits the composition and size dependence of the activity and selectivity. Pd₁/GDY catalyst presents the best C₂H₄ selectivity and its formation activity compared to the previously reported catalysts so far in C₂H₂ semi-hydrogenation.



Ultra-small UiO-66-NH₂ nanoparticles immobilized on g-C₃N₄ nanosheets for enhanced catalytic activity

Zhuizhui Su, Bingxing Zhang, Xiuyan Cheng, Fanyu Zhang, Qiang Wan, Lifei Liu, Xiuniang Tan, Dongxing Tan, Lirong Zheng, Jianling Zhang*..... 512

Herein, we synthesized UiO-66-NH₂ nanoparticles in size of 8–15 nm that are immobilized on g-C₃N₄ nanosheets. Compared with the UiO-66-NH₂ micronparticles (~0.2 μm), the ultra-small UiO-66-NH₂ nanoparticles exhibit high catalytic activity for Meerwein–Ponndorf–Verley reaction owing to more unsaturated coordination positions and increased Lewis acidity.



Synthesis of dihydrocapsaicin and dihydrocapsiate exclusively from lignocellulosic platform chemicals

Yan-Bing Li¹, Hui-Ying Guo¹, Chen-Qiang Deng, Jin Deng*..... 519

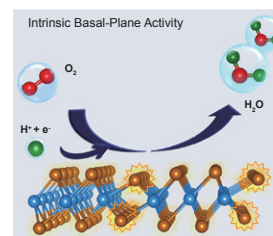
The natural products dihydrocapsaicin and dihydrocapsiate are exclusively synthesized from lignocellulose platform chemicals. All carbon atoms in the product are derived from lignocellulosic substrates, and the selective hydrodeoxygenation from carbonyl to methylene is achieved through a green process.



Two-dimensional metallic tantalum ditelluride with an intrinsic basal-plane activity for oxygen reduction: A microkinetic modeling study

Yu Wang, Kun Zhou* 525

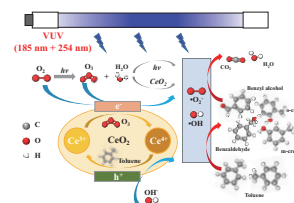
Two-dimensional metallic TaTe₂ nanosheet is proposed as a highly promising oxygen reduction reaction catalyst candidate with an intrinsic basal-plane activity based on density functional theory calculations, together with its underlying reaction mechanism/activity revealed by a comprehensive microkinetic modeling approach.



Mechanistic study of vacuum UV catalytic oxidation for toluene degradation over CeO₂ nanorods

Muyan Wu, Yingguang Zhang, Haibao Huang*, Dennis Y.C. Leung* 533

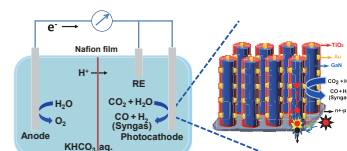
Pure CeO₂ was applied in the VUV catalytic oxidation system for toluene degradation involving VUV photolysis, UV-PCO, OZCO and UV-OZCO processes. The mechanism and synergetic effects of different processes were proposed.



Efficient photoelectrochemical conversion of CO₂ to syngas by photocathode engineering

Sheng Chu^{1*}, Pengfei Ou¹, Rokhsana Tonny Rashid¹, Yuyang Pan, Daolun Liang, Huiyan Zhang, Jun Song*, Zetian Mi* 545

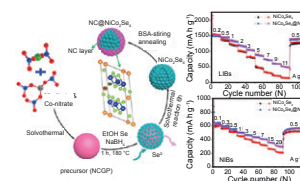
Efficient photoelectrochemical conversion of CO₂ to syngas has been achieved by engineering of photocathode, which has a planar p-n Si junction for strong light harvesting, GaN nanowires for efficient electron extraction and transfer, and Au/TiO₂ for rapid electrocatalytic syngas production.



Pomegranate-like porous NiCo₂Se₄ spheres with N-doped carbon as advanced anode materials for Li/Na-ion batteries

Xin Liu, Liwen Yang*, Guobao Xu, Juexian Cao* 554

3D pomegranate-like porous bimetallic spheres of nano-sized NiCo₂Se₄ particles as inner core and NiCo₂Se₄ layer/thin-walled N-doped carbon as inner/outer shell are demonstrated as high-performance anode materials for LIBs and NIBs.



Sunlight-controlled CO₂ separation resulting from a biomass-based CO₂ absorber

Shiming Zhang, Qianhao Pan, Yapei Wang* 566

A reversible CO₂ capture system is fabricated by using sunlight as the energy source and modified sawdust as the CO₂ absorbent. Using solar energy and wood chippings can minimize the additional CO₂ output in both preparation and regeneration process of absorbent.

