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Front Cover

Mechanistic insights into the role of N/O-doped biochar in enhanced phenolics production during biomass pyrolysis

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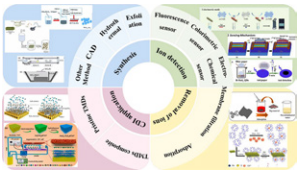
CONTENTS

In this article, we mainly review the synthesis and application of two-dimensional transition metal dichalcogenides (TMDs). We detail three main synthesis methods of TMDs: exfoliation, hydrothermal, and CVD, and conduct a comparative analysis of these three methods. Meanwhile, we also provide a detailed analysis of the main applications of TMDs, including their detection and removal of heavy metal ions in aqueous solutions, the desalination of seawater using capacitive deionization technology.



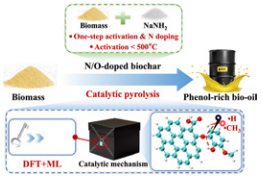
Recent progress of surface/interface modification of transition metal oxides for enhancing electrochemical energy storage and conversion activity

This review emphasizes the role of surface/interface modification in enhancing TMOs performance, especially in electrochemical energy storage and conversion, guiding future strategy design and optimization.

Research papers

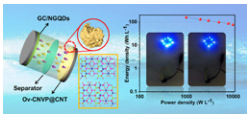
Mechanistic insights into the role of N/O-doped biochar in enhanced phenolics production during biomass pyrolysis

This study employed a single-step $NaNH_2$ activation method at mild temperatures to synthesize the N/O-doped biochar catalyst for enhanced phenolics production during biomass pyrolysis and combined DFT with machine learning (ML) methods to explore the microscopic catalytic mechanisms.



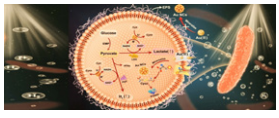
Enhancing high volumetric energy density of supercapacitors through diatomic reconstruction of layered double hydroxides

A high-performance hybrid supercapacitor cathode material was developed through dual-atom regulation and synergistic optimization of P-doping and oxygen vacancies.

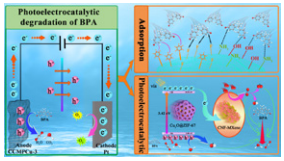


***Clostridium butyricum* mineralization of intracellular gold nanoclusters to boost biohydrogen production using visible light**

Our work demonstrates a C. *butyricum*-based biohybrid system that mineralizes intracellular gold nanoclusters, and this system achieves highly efficient solar-driven hydrogen production, showcasing a novel strategy for sustainable energy conversion.

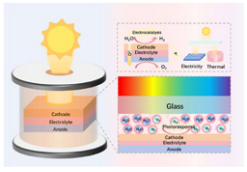


CCMPCu, a chitosan/CNF-MXene/polyaniline hydrogel photoelectrode embedding Cu_2O@ZIF-67, preconcentrates pollutants and enhances charge separation, achieving ~100% BPA removal in 40 min (k = 0.0836 min^{-1}) under visible light, with <5 ppb Cu leaching over 10 cycles and broad bisphenol applicability.



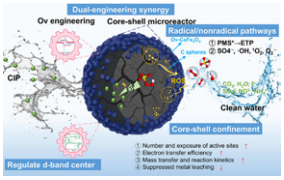
Heat and hydrogen Co-production based on photoresponsive electrode in the full-spectrum SOEC hybrid system

A full-spectrum SOEC system for co-production of heat and hydrogen was introduced. Direct solar irradiation enhances hydrogen output via photocurrent, achieving 58.98% exergy, 28.30% STH, and 43.78% STT efficiency under optimized conditions.



Engineering oxygen vacancy-rich $CoFe_2O_4$@C core-shell microreactors via defect-morphology dual synergy for ultrafast peroxymonosulfate activation

Defect-morphology dual engineering constructs OV-$CoFe_2O_4$@C core-shell microreactors with four merits: more exposed active sites, enhanced electron transfer, facilitated mass transfer and reaction kinetics, and suppressed metal leaching, achieving 97.65% CIP removal in 12 min (k_{obs}=0.2984 min^{-1}).



Tailoring a photoreactive biomass-based redox coupled material for interaction enhanced removal of Cr(VI) and As(III)

The photoreactive biomass-based redox-coupled material constructed from eucalyptus, polyethyleneimine, porous carbon, and iron oxide, which can adsorb highly toxic Cr(VI) and As(III) and convert them with >95% efficiency into less toxic species, enabling comprehensive water purification.