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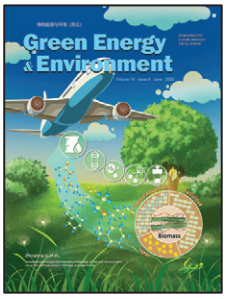


Front Cover

Sustainable aviation fuels from biomass and biowaste via bio- and chemo-catalytic conversion: Catalysis, process challenges, and opportunities

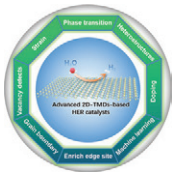
Junyan Zhang, Matthew S. Webber, Yunqiao Pu, Zhenglong Li, Xianzhi Meng, Michael L. Stone, Bingqing Wei, Xueqi Wang, et al.*

CONTENTS

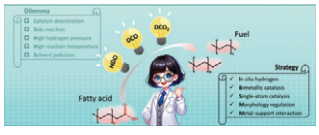
Review articles

This review summarizes the most recent efforts devoted to IL-based absorption, catalysts, and CO_2 capture and utilization processes. We discuss the factors that affect the interaction between ILs and CO_2, impacting on the viscosity and CO_2 solubility and preview the coupling of CO_2 capture with electrochemical conversion of CO_2.

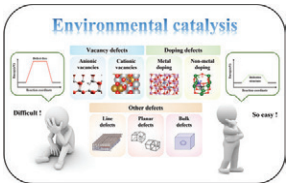
This review highlights the design and synthesis of high-performance 2D-TMDs-based HER electrocatalysts by combining theoretical calculations with experimental methods.



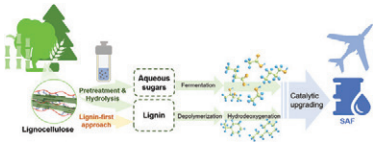
This review introduced and compared the three reaction pathways of hydrodeoxygenation, decarboxylation and decarbonylation, for the deoxygenation of fatty acids and esters. The preference of reaction pathway is closely related to the type of raw materials and catalysts as well as reaction conditions.



This review provides an overview of recent advances in defect engineering for environmental catalysis, addressing current research challenges and proposing future directions. Its aim is to guide the design and development of efficient environmental catalysts, along with future mechanistic studies.

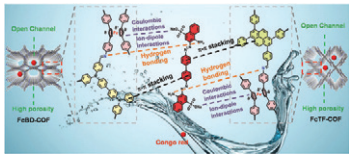


Lignin-first approach followed by hydrodeoxygenation is used to produce SAF. Bio- and chemo-catalytic conversion pathways utilize the carbohydrate fraction of lignocellulose for SAF production. These parallel pathways offer great potential to producing all components of a cost-effective, 100% SAF.

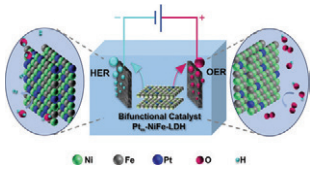


Research papers

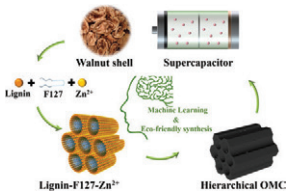
Two ferrocene (Fc)-based covalent organic frameworks are successfully synthesized for the first time and the obtained Fc-COFs exhibit ultrahigh adsorption capacity and good pH-resistance towards Congo red, and rank top among all porous materials reported previously, showing promising applications for organic dye removal in sewage processing.



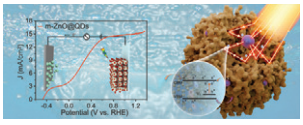
Simple milling produces highly dispersed Pt-loaded NiFe-layered double hydroxide electrocatalysts with enhanced water-splitting efficiency. This technique is practical for industrial-scale production.



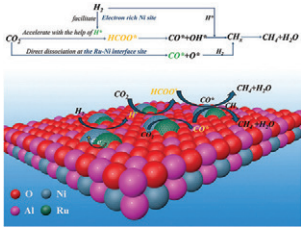
Hierarchical ordered mesoporous carbon (HOMC) was fabricated and activated using an eco-friendly synthetic method with walnut shell derived lignin as carbon percussor, and Zn^{2+} as crosslinking agent. The HOMC demonstrated high performance for supercapacitors with the assistance of machine learning.



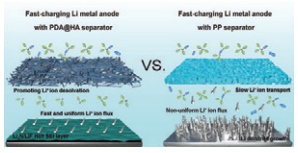
This work reported a facile one-step pyrolysis method which can convert Zn-based MOF to porous ZnO (m-ZnO) with rough surface and abundant oxygen vacancies (O_v). When incorporating core–shell quantum dots (QDs) as the light absorbers, the obtained photoanodes (m-ZnO@QDs) achieved outstanding PEC performance for hydrogen generation, exhibiting 1.6 times and 5.8 times higher saturated photocurrent density than those of conventional TiO_2@QDs and ZnO@QDs photoanodes, respectively.



The catalytic performance of the Ru–Ni–Al catalyst for CO_2 methanation is significantly improved through electronic interaction between Ru and Ni. The electron-rich Ni sites, derived from the electron transfer of Ru sites, help activate H_2, produce more hydrides, and speed up the conversion of CO_2 to HCOO∗. Additionally, the formed Ru–Ni metal interface sites aid in the direct dissociation of CO_2 to CO∗. Both HCOO∗- and CO∗-mediated pathways work together to enhance CO_2 methanation on the Ru–Ni–Al catalyst.

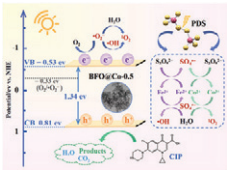


A polydopamine-modified hydroxyapatite/aramid (PDA@HA) hybrid nanofibers separator is developed to improve the stability and thermal safety of fast-charging lithium metal batteries (LMBs). The PDA@HA separator can accelerate Li^+ ion transfer kinetics and improve Li metal anode stability, thereby enabling excellent fast-charging LMB performance.



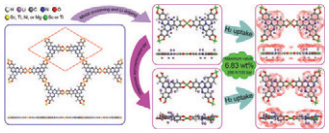
Enhanced degradation of ciprofloxacin via Co-doped $Bi_2Fe_4O_9$ photocatalysis under peroxydisulfate activation

In this study, BFO@Co-0.5photocatalyst with good magnetic and photoelectric properties was prepared for the synergistic degradation of CIP in visible light and PDS. The electron transfer paths and photocatalytic degradation mechanism are shown in the TOC figure.



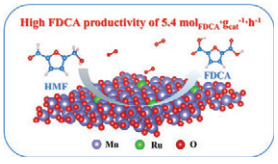
Tricycloquinazoline-based monolayer conjugated metal–organic frameworks as promising hydrogen storage media: A theoretical investigation

This work demonstrated the potential of tricycloquinazoline-based monolayer metal–organic frameworks (MMOFs with the first "M" representing metal species) as highly efficient materials for hydrogen (H_2) storage, with a particular emphasis on the influence of various metal species on H_2 binding and adsorption.



Ru single atoms in Mn_2O_3 efficiently promote the catalytic oxidation of 5-hydroxymethylfurfural through dual activation of lattice and molecular oxygen

The introduction of Ru single atoms into Mn_2O_3 facilitates the activation of both lattice and molecular oxygen, thus providing an exceptional catalytic activity for the aerobic oxidation of HMF to FDCA.



Enhanced and selective photocatalytic reduction of CO_2 to CH_4 using a Pt-loaded CuPc/g-C_3N_4 Z-scheme heterojunction catalyst

In this study, a novel Pt-loaded CuPc/g-C_3N_4 (PtCuCN) composite was synthesized for the selective photocatalytic reduction of CO_2 to CH_4 under visible light. The PtCuCN catalyst achieved a CH_4 yield of 39.8 μmol g^{-1} h^{-1}, significantly outperforming bulk g–C_3N_4 and CuPc alone by factors of 2.5 and 3.1, respectively, with a high selectivity of 90%.