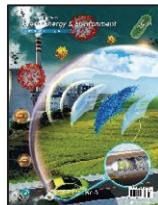


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### Viewpoint

#### Towards a molecular understanding of the electronic metal-support interaction (EMSI) in heterogeneous catalysis

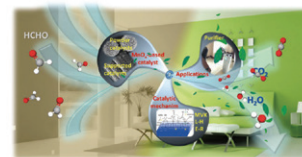
Keng Sang<sup>1</sup>, Ji Zuo<sup>1</sup>, Xiangxue Zhang, Qianhong Wang, Wenyao Chen\*, Gang Qian, Xuezhi Duan\* ..... 619

### Review articles

#### Advances of manganese-oxides-based catalysts for indoor formaldehyde removal

Jia Yu Zheng, Wen Kang Zhao, Liyun Song, Hao Wang, Hui Yan, Ge Chen, Chang Bao Han\*, Jiujun Zhang\* ..... 626

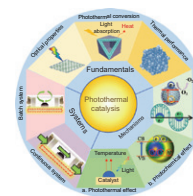
Recent progress of manganese oxides-based catalysts for indoor formaldehyde removal is systematically reviewed and the application of purifier and Trombe wall for HCHO catalysis were summarized.



#### Recent advancement and future challenges of photothermal catalysis for VOCs elimination: From catalyst design to applications

Yang Yang, Shenghao Zhao, Lifeng Cui\*, Fukun Bi, Yining Zhang, Ning Liu, Yuxin Wang, Fudong Liu, Chi He, Xiaodong Zhang\* ..... 654

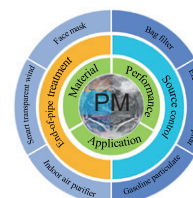
A broad view of recent photothermal catalyst fabrication, applications, challenges, and prospects can be systemically provided by this review.



#### Advances in particulate matter filtration: Materials, performance, and application

Xuzheng Ji, Jianying Huang\*, Lin Teng, Shuhui Li, Xiao Li, Weilong Cai\*, Zhong Chen, Yuekun Lai\* ..... 673

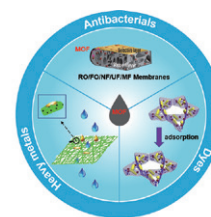
Advanced filtration materials and their functions are then summarized, among which polymers and MOFs are discussed in detail together with their antibacterial performance, and the discussion on the application is divided into end-of-pipe treatment and source control.



## Application of metal organic framework in wastewater treatment

Xiaoge Liu, Yuying Shan, Songtao Zhang, Qingquan Kong, Huan Pang\* ..... 698

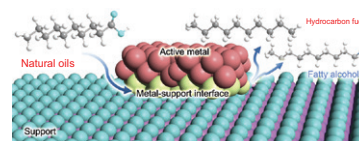
The applications of pristine MOFs as membrane filler or membrane raw materials and adsorbents in the separation of heavy metals, dyes and antibacterials from wastewater have been reviewed. The pristine MOFs demonstrate huge potential in sustainable wastewater treatment.



## Tuning the selectivity of natural oils and fatty acids/esters deoxygenation to biofuels and fatty alcohols: A review

Yingdong Zhou, Javier Remón, Zhicheng Jiang, Avtar S. Matharu, Changwei Hu\* ..... 722

This review presents the recent progress achieved in the catalytic deoxygenation of natural oils or related model compounds (e.g., fatty acids) to renewable liquid fuels (green diesel and bio-jet fuels) and valuable fatty alcohols (unsaturated and saturated fatty alcohols).

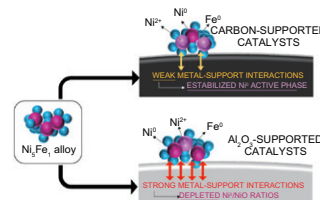


## Research papers

### Are Ni/ and Ni<sub>5</sub>Fe<sub>1</sub>/biochar catalysts suitable for synthetic natural gas production? A comparison with $\gamma$ -Al<sub>2</sub>O<sub>3</sub> supported catalysts

M. González-Castaño\*, C. Morales, J.C. Navarro de Miguel, J.H. Boelte, O. Klepel, I. Flege, H. Arellano-García..... 744

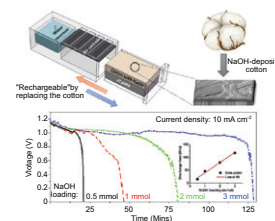
Taking Ni and NiFe catalysts supported over  $\gamma$ -Al<sub>2</sub>O<sub>3</sub> oxide as reference materials, this work evaluates the potentiality of Ni and NiFe supported biochar catalysts for CO<sub>2</sub> methanation. The development of competitive biochar catalysts was found dependent on the creation of basic sites on the catalyst surface.



## Aluminum-air battery with cotton substrate: Controlling the discharge capacity by electrolyte pre-deposition

Wending Pan, Yifei Wang\*, Holly Y.H. Kwok, Dennis Y.C. Leung\* ..... 757

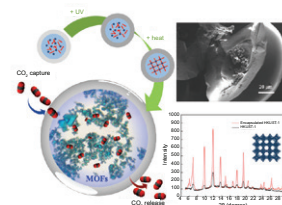
A low-cost, lightweight and pumpless aluminum-air battery using alkaline-deposited cotton as electrolyte substrate was developed, whose discharge lifetime can be precisely controlled by the alkaline loading inside cotton, eliminating the Al corrosion loss after battery usage.



## Novel in-capsule synthesis of metal-organic framework for innovative carbon dioxide capture system

Wei Yu, Ming Gao, Guanhe Rim, Tony G. Feric, Mark L. Rivers, Ammar Alahmed, Aqil Jamal, Ah-Hyung Alissa Park\* ..... 767

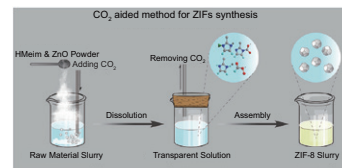
This study focuses on a novel MOF-based hybrid sorbent that is for the first time produced via an innovative in-situ encapsulated synthesis with glass double-capillary devices. The developed MOF-bearing microcapsules were characterized by various tools and tested for CO<sub>2</sub> capture.



## A purely green approach to low-cost mass production of zeolitic imidazolate frameworks

Hai Li<sup>1</sup>, Wan Chen<sup>1</sup>, Bei Liu\*, Mingke Yang<sup>1</sup>, Zixuan Huang, Changyu Sun, Chun Deng, Dapeng Cao\*, Guangjin Chen\*..... 775

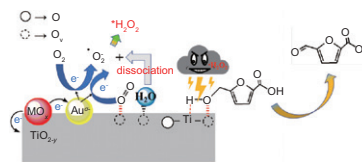
This work report an unconventional method suitable for environmentally friendly and low-cost mass-production of ZIFs. This method is really green as no waste gas or liquid generates because CO<sub>2</sub> and water could be recycled perfectly.



## Au<sup>δ-</sup>-O<sub>v</sub>-Ti<sup>3+</sup>: Active site of MO<sub>x</sub>-Au/TiO<sub>2</sub> catalysts for the aerobic oxidation of 5-hydroxymethylfurfural

Weiyao Yang<sup>1</sup>, Mengchen Fu<sup>1</sup>, Chenyu Yang, Yiwen Zhang, Chun Shen\*..... 785

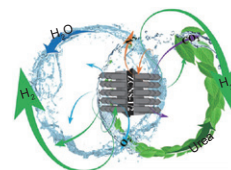
A series of metal oxide modified MO<sub>x</sub>-Au/TiO<sub>2</sub> (M = Fe, Co, Ni) catalysts with low Au loading amount of 0.5 wt% were synthesized in this research. Addition of transition metal oxides promotes electron transfer and generation of the Au<sup>δ-</sup>-O<sub>v</sub>-Ti<sup>3+</sup> interface.



## MOF-derived Zn-Co-Ni sulfides with hollow nanosword arrays for high-efficiency overall water and urea electrolysis

Xiaoqiang Du\*, Yangyang Ding, Xiaoshuang Zhang..... 798

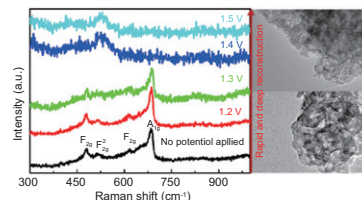
This research will provide certain reference to design and synthesize MOF-derived trimetallic sulfides as efficient and stable electrocatalyst for enhanced water and urea electrolysis.



## A fast and in-depth self-reconstruction of anion ligands optimized CoFe-based pre-catalysts for water oxidation

Qiuyan Jin, Hao Cui\*, Chengxin Wang..... 812

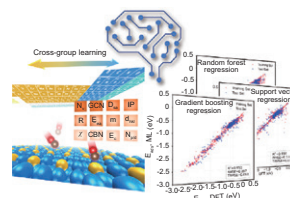
PO<sub>4</sub><sup>3-</sup> optimized pre-catalyst is able to achieve a rapid and deep reconstruction, which generates active CoOOH species at a low potential of 1.4 V and deeply transforms into nanosheets with enriched active species. The evolved catalysts exhibit the greatly improved OER catalytic activity with decent durability.



## Accelerated prediction of Cu-based single-atom alloy catalysts for CO<sub>2</sub> reduction by machine learning

Dashuai Wang<sup>1</sup>, Runfeng Cao<sup>1</sup>, Shaogang Hao\*, Chen Liang, Guangyong Chen, Pengfei Chen, Yang Li, Xiaolong Zou\*..... 820

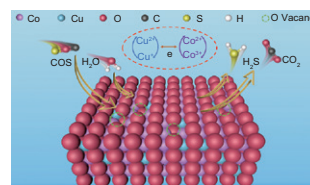
Based on screening of optimal CO adsorption sites with high selectivity over hydrogen evolution reaction, Cu-based single-atom alloys, as promising catalysts for CO<sub>2</sub> reduction reaction, are obtained by machine learning and high-throughput first-principles calculations.



## Oxygen vacancy defects engineering on Cu-doped Co<sub>3</sub>O<sub>4</sub> for promoting effective COS hydrolysis

Guanyu Mu, Yan Zeng, Yong Zheng, Yanning Cao\*, Fujian Liu, Shijing Liang\*, Yingying Zhan, Lilong Jiang..... 831

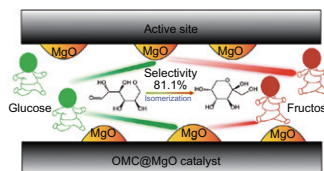
A series of Cu-doped Co<sub>3</sub>O<sub>4</sub> catalysts is prepared by a solvothermal method. Cu-doped Co<sub>3</sub>O<sub>4</sub> with the enhanced surface defect concentrations show high COS hydrolysis activities. Moreover, the degree of sulfation is reduced after Cu doped which makes the catalyst with higher stability.



## Synthesis of MgO-doped ordered mesoporous carbons by Mg<sup>2+</sup>-tannin coordination for efficient isomerization of glucose to fructose

Junyan Fu<sup>1</sup>, Feng Shen<sup>1</sup>, Xiaoning Liu, Xinhua Qi\*..... 842

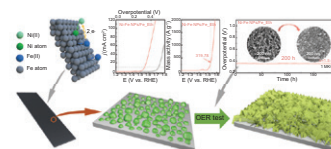
In this work, MgO in-situ doped ordered mesoporous carbon (OMC@MgO) with high activity towards glucose isomerization was synthesized from sustainable tannin via formaldehyde-free self-assembly strategy.



## Deep eutectic solvent-induced synthesis of Ni–Fe catalyst with excellent mass activity and stability for water oxidation

Ruichang Xue, Mengwei Guo, Zhuoming Wei, Qibo Zhang\*..... 852

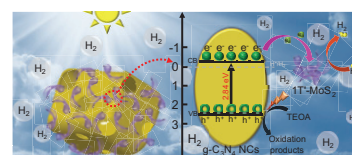
Well-defined Ni-Fe nanoparticles in-situ developed on a planar Fe substrate (Ni-Fe NPs/Fe) is fabricated via a facial one-step galvanic replacement reaction (GRR) carried out in a Ethaline-based deep eutectic solvent (DES), which exhibit excellent catalytic activity and robust stability for oxygen evolution reaction (OER).



## Heterostructuring noble-metal-free 1T' phase MoS<sub>2</sub> with g-C<sub>3</sub>N<sub>4</sub> hollow nanocages to improve the photocatalytic H<sub>2</sub> evolution activity

YanJun Xue, Yinghong Ji, Xinyu Wang, Huanli Wang\*, Xiaobo Chen\*, Xiaoli Zhang, Jian Tian\*..... 864

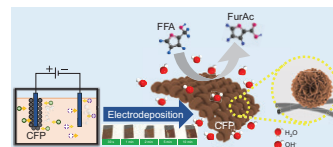
This work successfully designed a novel 1T'-MoS<sub>2</sub>/g-C<sub>3</sub>N<sub>4</sub> NC composite photocatalyst by loading 1T'-MoS<sub>2</sub> on the g-C<sub>3</sub>N<sub>4</sub> with nanocage structures. The synthesized 1T'-MoS<sub>2</sub>/g-C<sub>3</sub>N<sub>4</sub> NC composite present outstanding photocatalytic hydrogen production performance compared with g-C<sub>3</sub>N<sub>4</sub> NCs and g-C<sub>3</sub>N<sub>4</sub> NSs.



## Electrodeposited 3D hierarchical NiFe microflowers assembled from nanosheets robust for the selective electrooxidation of furfuryl alcohol

Biying Liu, Man Zhang, Yaoyu Liu, Yuchen Wang, Kai Yan \* ..... 874

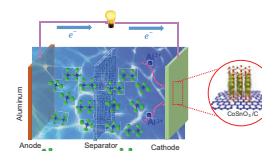
This work reported an efficient electrocatalyst based on NiFe microflower facily prepared by one-step electrodeposition strategy robust for the electrocatalytic oxidation of biomass-derived FFA (FFAOR) towards FurAc.



## CoSnO<sub>3</sub>/C nanocubes with oxygen vacancy as high-capacity cathode materials for rechargeable aluminum batteries

Shuainan Guo<sup>1</sup>, Mingquan Liu<sup>1</sup>, Haoyi Yang, Xin Feng, Ying Bai, Chuan Wu\* ..... 883

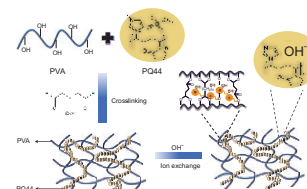
Herein, CoSnO<sub>3</sub>/C nanocubes with oxygen vacancy have been successfully prepared and investigated as high-capacity cathode material for rechargeable aluminum batteries for the first time.



## Imidazolium group prompted alkaline anion-exchange membrane with high performance for efficient electrochemical CO<sub>2</sub> conversion

Min Wang<sup>1</sup>, Qianqian Zou<sup>1</sup>, Xueqi Dong, Nengneng Xu, Rong Shao, Jianfei Ding, Yidong Zhang, Jinli Qiao\* ..... 893

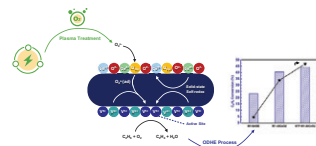
A sequence of innovative PVA/PQ44-OH<sup>-</sup> alkaline anion-exchange membranes have been prepared using polymer PVA and PQ44, which exhibited superior hydroxide conductivity (21.47 mS cm<sup>-1</sup>) and robust alkaline stability, as well as excellent thermal stability with onset degradation temperature high above 170 °C.



## Plasma treated M1 MoVNbTeO<sub>x</sub>-CeO<sub>2</sub> composite catalyst for improved performance of oxidative dehydrogenation of ethane

Shuairan Qian<sup>1</sup>, Yuxin Chen<sup>1</sup>, Binhang Yan, Yi Cheng\* ..... 904

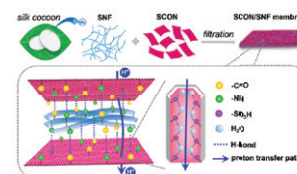
Plasma treatment to enhance catalytic performance of M1-CeO<sub>2</sub> catalyst and convert electrical energy into chemical energy in materials.



## Silk nanofibril as nanobinder for preparing COF nanosheet-based proton exchange membrane

Ping Li, Ningxin Zhang, Xuan Li, Shaokun Tang\* ..... 915

1D flexible SNF from silk cocoon is utilized as nanobinder to link 2D porous SCON into robust SCON-based membrane. The crystalline porous nanochannels with abundant -SO<sub>3</sub>H groups and interfacial H-bond pathways permit high-rate proton transfer.



# Green Energy & Environment

## Enhanced hydrodeoxygenation of lignin-derived anisole to arenes catalyzed by Mn-doped Cu/Al<sub>2</sub>O<sub>3</sub>

Xiaofei Wang, Shixiang Feng, Yue Wang, Yujun Zhao, Shouying Huang, Shengping Wang, Xinbin Ma\* ..... 927

In this work, Mn-doped Cu/Al<sub>2</sub>O<sub>3</sub> developed from LDH precursor was synthesized and applied in liquid-phase HDO of lignin-derived anisole. It was found that the doping of Mn into Cu/Al<sub>2</sub>O<sub>3</sub> significantly enhanced selectivity to arenes. The promoting effect of MnOx for active sites reconstruction and HDO activity improvement was investigated in details.

