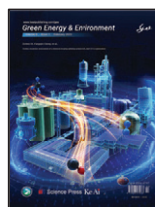




### Front Cover

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### Back Cover

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## CONTENTS

### Research highlight

**Endeavors on the development of efficient and sustainable supported metal catalysts for chemical synthesis on solid-liquid interfaces**

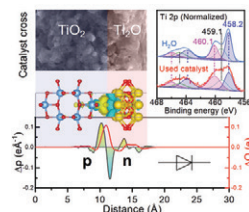
Chao Yang\*, Lifeng Cui\*..... 1

### Short communication

**Selective capture of  $Tl_2O$  from flue gas with formation of p-n junction on  $V_2O_5-WO_3/TiO_2$  catalyst under working conditions**

Jianjun Chen<sup>1</sup>, Rongqiang Yin<sup>1</sup>, Gongda Chen\*, Junyu Lang, Xiaoping Chen, Xuefeng Chu, Junhua Li\*..... 4

Gaseous  $Tl_2O$  in flue gas can be selectively captured by industrial  $V_2O_5-WO_3/TiO_2$  catalyst under working condition.  $Tl_2O$  has significant electron-feeding capacity and easily donate electron to unoccupied orbitals of  $TiO_2$ , leading to inartificial formation of p-n junction on  $TiO_2$  surface.

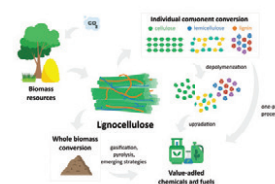


### Review articles

**Catalytic conversion of lignocellulosic biomass into chemicals and fuels**

Weiping Deng, Yunchao Feng, Jie Fu, Haiwei Guo, Yong Guo, Buxing Han\*, Zhicheng Jiang, Lingzhao Kong, Changzhi Li, Haichao Liu\*, Phuc T.T. Nguyen, Puning Ren, Feng Wang, Shuai Wang, Yanqin Wang, Ye Wang\*, Sie Shing Wong, Kai Yan, Ning Yan\*, Xiaofei Yang, Yuanbao Zhang, Zhanrong Zhang, Xianhai Zeng, Hui Zhou..... 10

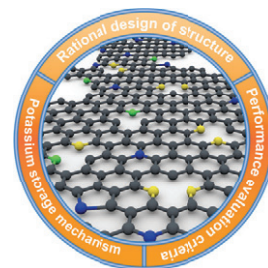
This review focuses on the state-of-the-art catalytic transformation of lignocellulosic biomass into value-added chemicals and fuels. Over 800 references related to catalytic conversion of lignocellulosic biomass are discussed.



## Carbon materials toward efficient potassium storage: Rational design, performance evaluation and potassium storage mechanism

Daping Qiu, Yanglong Hou\*..... 115

Carbon materials are considered to be the most promising potassium-ion batteries anode materials for their tunable structure, acceptable theoretical specific capacity, low plateau voltage, as well as satisfactory rate capability and cyclability. This review carried out a comprehensive overview of carbon anode in terms of three aspects of rational design of structure, performance evaluation criteria and characterization of potassium storage mechanism.

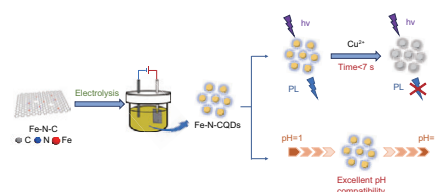


## Research papers

### Electrochemical synthesis of FeN<sub>x</sub> doped carbon quantum dots for sensitive detection of Cu<sup>2+</sup> ion

Siyuan Sun<sup>1</sup>, Weijie Bao<sup>1</sup>, Fan Yang\*, Xingru Yan, Yang Sun, Ge Zhang, Wang Yang, Yongfeng Li\*..... 141

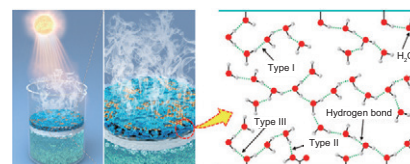
The FeN<sub>x</sub> structure are reserved integrally in Fe-N-CQDs from Fe-N-C through a simple chemical oxidation method. Fe-N-CQDs-2 exhibits excellent selectivity to Cu<sup>2+</sup>, outstanding pH compatibility and fast response in metal ions detection. Energy level simulation and fluorescence lifetime detection reveal that the LUMO of Fe-N-CQDs are closer to the redox potential of Cu<sup>2+</sup>, leading to the non-radiative recombination between Fe-N-CQDs and Cu<sup>2+</sup>, which quench the fluorescence.



### Poly(ionic liquid)-crosslinked graphene oxide/carbon nanotube membranes as efficient solar steam generators

Jiangjin Han<sup>1</sup>, Zhiyue Dong<sup>1</sup>, Liang Hao, Jiang Gong\*, Qiang Zhao\*..... 151

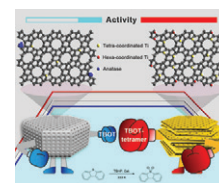
A flexible, robust graphene oxide/carbon nanotube membrane is facilely prepared by a self-crosslinked PIL under mild conditions, which exhibits a remarkable reduction of water evaporation enthalpy and a high evaporation rate of 1.87 kg m<sup>-2</sup> h<sup>-1</sup> in solar seawater desalination.



### Titanium-rich TS-1 zeolite for highly efficient oxidative desulfurization

Risheng Bai, Yue Song, Ge Tian, Fei Wang, Avelino Corma\*, Jihong Yu\*..... 163

Ti-rich TS-1 zeolite, achieved with tetrabutyl orthotitanate tetramer as the Ti source, demonstrates superior catalytic performance in the oxidation of dibenzothiophene than the conventional Ti-rich TS-1 zeolite prepared by using tetrabutyl orthotitanate.

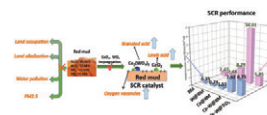


## Cerium-tungsten oxides supported on activated red mud for the selective catalytic reduction of $\text{NO}_x$

Qiuzhun Chen, Dong Wang\*, Chuan Gao, Bin Wang, Shengli Niu, Gaiju Zhao, Yue Peng, Junhua Li, Chunmei Lu, John Crittenden.....

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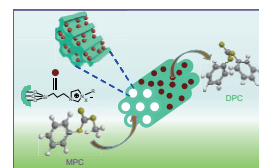
Red mud waste supported cerium-tungsten oxide possesses adequate Brønsted and Lewis acid sites as well as oxygen vacancies, embodying T90 active window as broad as 219-480 °C.



## Ionic liquids-SBA-15 hybrid catalysts for highly efficient and solvent-free synthesis of diphenyl carbonate

Songlin Wang, Qiyang Zhang, Chengxing Cui, Hongying Niu, Cailing Wu, Jianji Wang\*..... 183

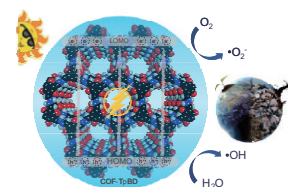
Metal-free ionic liquids-SBA-15 hybrid catalysts have been developed for the effective and clean synthesis of diphenyl carbonate under solvent-free condition.



## Visible-light degradation of azo dyes by imine-linked covalent organic frameworks

Hongbo Xue, Sen Xiong, Kai Mi, Yong Wang\*..... 194

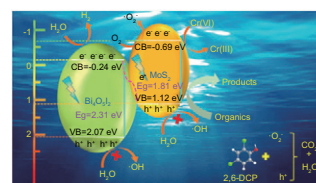
Eliminate dyes under sunshine with covalent organic frameworks (COFs): Such a high photodegradation performances to azo dyes comes from the synergetic effect of densely conjugated structure, wide absorbance range, good water dispersibility, and high surface area of imine-linked COFs.



## 3D flower-like mesoporous Bi<sub>4</sub>O<sub>5</sub>I<sub>2</sub>/MoS<sub>2</sub> Z-scheme heterojunction with optimized photothermal-photocatalytic performance

Sijia Song, Zipeng Xing\*, Ke Wang, Huanan Zhao, Peng Chen\*, Zhenzi Li, Wei Zhou\*..... 200

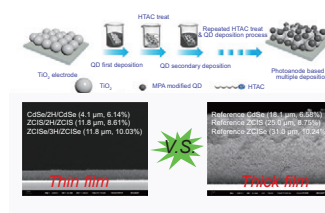
3D Flower-Like Hierarchical Mesoporous Bi<sub>4</sub>O<sub>5</sub>I<sub>2</sub>/MoS<sub>2</sub> Z-Scheme Layered Heterojunctions with Broad-Spectrum Response is fabricated via oil bath-hydrothermal strategy, which exhibits excellent photothermal-photocatalytic performance due to formation of Z-scheme layered heterojunctions favoring spatial charge separation, promoted photothermal effect and 3D flower-like hierarchical mesoporous structure providing adequate surface active-sites and facilitating mass transfer.



## Efficient quantum dot sensitized solar cells via improved loading amount management

Wei Wang, Yiling Xie, Fangfang He, Yuan Wang, Weinan Xue, Yan Li\*..... 213

By controlling the times of HTAC assisted depositions, the performance of an optimized QD/nH/QD photoanode with a thin photoanode is close to or slightly lower than that of the thick reference one.



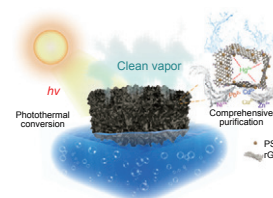


# Green Energy & Environment

## Polysulfide nanoparticles-reduced graphene oxide composite aerogel for efficient solar-driven water purification

Fantao Meng, Yuang Zhang, Shufen Zhang, Benzhi Ju, Bingtao Tang\* ..... 267

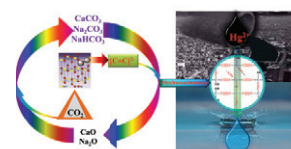
An ideal mercury-removal platform, PSNs, was first introduced to fabricate PSN-functionalized rGO aerogel for multifunctional solar-driven water purification. This rationally designed evaporator with comprehensive purification performance of ions achieved a high evaporation rate of  $1.55 \text{ kg m}^{-2} \text{ h}^{-1}$  with 90.8% energy efficiency under 1 sun.



## Mechanochemical synthesis of oxygenated alkynyl carbon materials with excellent Hg(II) adsorption performance from CaC<sub>2</sub> and carbonates

Yingjie Li<sup>1</sup>, Songping Li<sup>1</sup>, Xinyi Xu, Hong Meng, Yingzhou Lu, Chunxi Li\* ..... 275

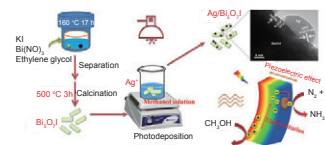
OACMs is synthesized via mechanochemical reaction of CaC<sub>2</sub> and a carbonate, which may be used for heavy metal ions adsorption and CO<sub>2</sub> utilization.



## High piezo/photocatalytic efficiency of Ag/Bi<sub>5</sub>O<sub>7</sub>I nanocomposite using mechanical and solar energy for N<sub>2</sub> fixation and methyl orange degradation

Lu Chen, Wenqian Zhang, Junfeng Wang, Xiaojing Li, Yi Li, Xin Hu, Leihong Zhao, Ying Wu\*, Yiming He\* ..... 283

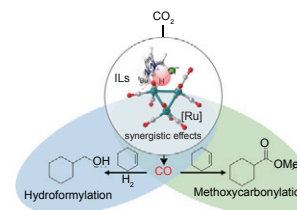
Ag/Bi<sub>5</sub>O<sub>7</sub>I nanocomposites were prepared by a combination of hydrothermal and photodeposition methods, and were used for the first time in piezo-photocatalytic reduction of N<sub>2</sub> to NH<sub>3</sub>.



## Mechanism of CO<sub>2</sub> reduction in carbonylation reaction promoted by ionic liquid additives: A computational and experimental study

Kai-Lun Bi, Bao-Hua Xu, Wei-Lu Ding, Li-Jun Han\*, Lin Ji\* ..... 296

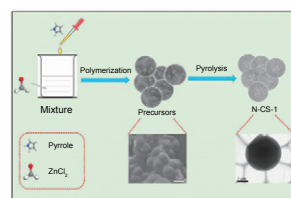
The anion and cation synergistic effect of ionic liquids promotes Ru-catalyzed carbonylation of olefins with CO<sub>2</sub>. The proton ionic liquid BmimCl bearing C–H functionality at the C<sup>2</sup> site of the cation assists the reduction rate of CO<sub>2</sub> to CO as a hydrogen donor medium.



## Micropores regulating enables advanced carbon sphere catalyst for Zn-air batteries

Jingsha Li<sup>1</sup>, Shijie Yi<sup>1</sup>, Ranjusha Rajagopalan, Zejie Zhang, Yougen Tang\*, Haiyan Wang\* ..... 308

N-doped carbon spherical material (N-CS) with abundant microporous structure have been fabricated by the polymerization of pyrrole and formaldehyde and followed by a facile pyrolysis process. The resultant N-CS demonstrated more excellent catalytic activity and durability than commercial 20 wt% Pt/C catalyst in alkaline media and the home-made Zn-air batteries.

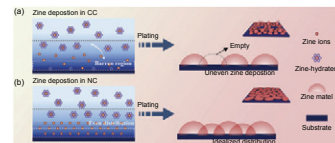


# Green Energy & Environment

## Manipulating the ion-transference and deposition kinetics by regulating the surface chemistry of zinc metal anodes for rechargeable zinc-air batteries

Miao He, Chaozhu Shu\*, Ruixing Zheng, Wei Xiang, Anjun Hu, Yu Yan, Zhiqun Ran, Minglu Li, Xiaojuan Wen, Ting Zeng, Jianping Long\* ..... 318

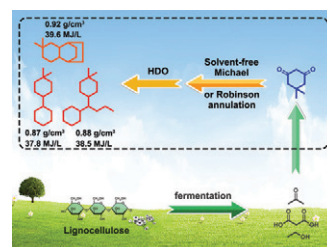
The N-doped carbon cloth (NC) prepared via magnetron sputtering is explored as the substrate to induce the uniform nucleation of zinc metal and suppress dendrite growth.



## High tension cyclic hydrocarbons synthesized from biomass-derived platform molecules for aviation fuels in two steps

Zhanchao Li, Yizhuo Wang, Qing Li, Liqing Xu, Hong Wang\* ..... 331

A series of high tension cyclic hydrocarbons were synthesized from biomass-derived platform molecules in two steps with high yields up to 90%. These new biofuels contain linked-ring structures, fused-ring structures, and bridged-ring structures alkanes, which exhibit high VNHOC of 38.6 MJ L<sup>-1</sup> and high density of 0.88 g cm<sup>-3</sup>. They are close to the fuel properties of the best artificial fuel JP-10 (39.6 MJ L<sup>-1</sup> and 0.94 g cm<sup>-3</sup>). The results demonstrate a promising way for the synthesis of high-density aviation fuels with different fuel properties at high yields.



## Techno-economic assessment of a chemical looping splitting system for H<sub>2</sub> and CO Co-generation

Hao Peng<sup>1</sup>, Zichen Di<sup>1\*</sup>, Pan Gong, Fengling Yang, Fangqin Cheng\* ..... 338

A chemical looping splitting system is proposed for H<sub>2</sub> and CO co-generation, with theoretically zero emissions. The proposed process's heat integration can be achieved by circulating hot oxygen carriers, and an economically feasible was demonstrated.

