



# Chinese Journal of Catalysis

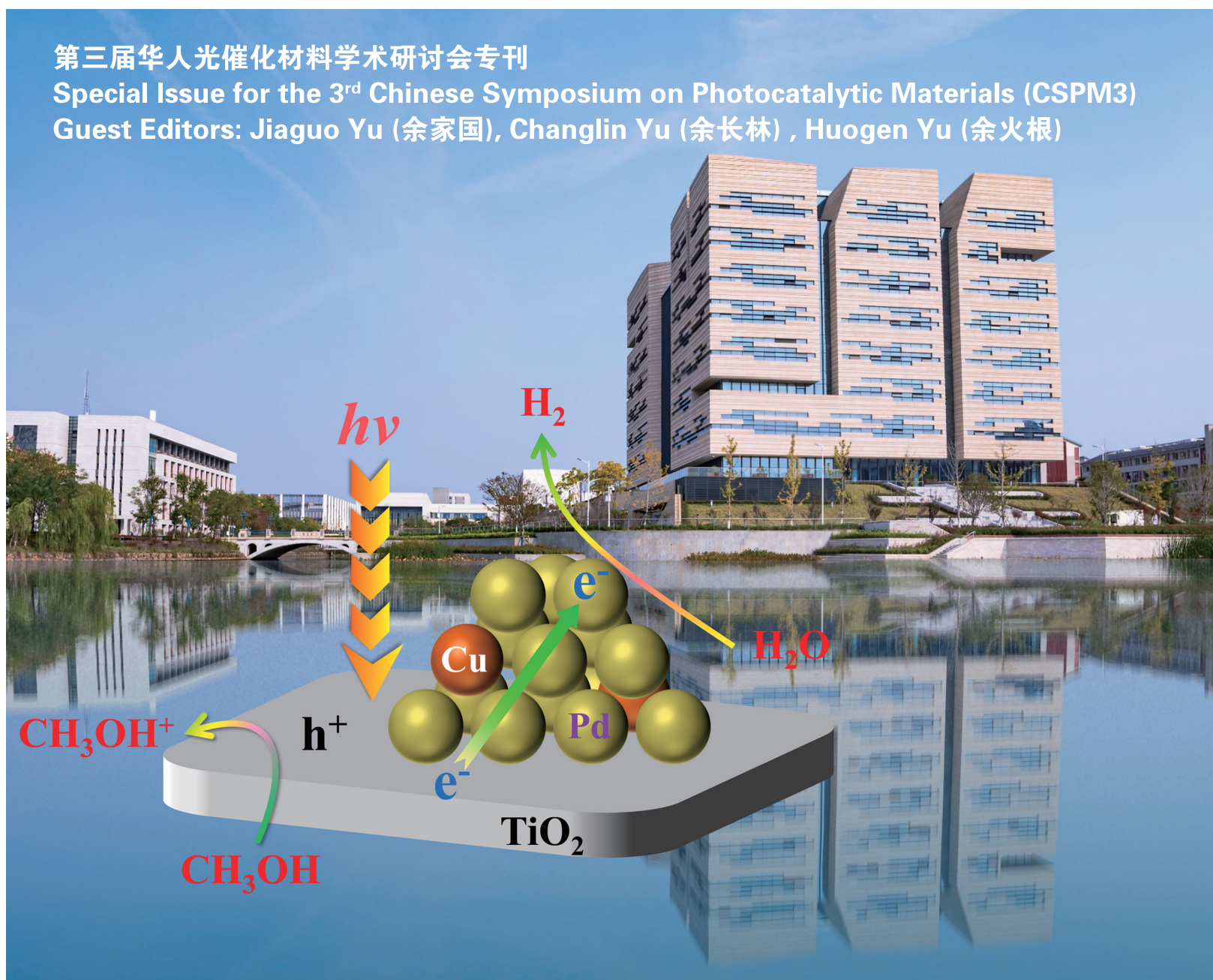
www.cjcatal.com

Volume 43 | Number 2 | February 2022

第三届华人光催化材料学术研讨会专刊

Special Issue for the 3<sup>rd</sup> Chinese Symposium on Photocatalytic Materials (CSPM3)

Guest Editors: Jiaguo Yu (余家国), Changlin Yu (余长林), Huogen Yu (余火根)



CHINESE  
CHEMICAL  
SOCIETY

Editors-in-Chief Can Li Tao Zhang

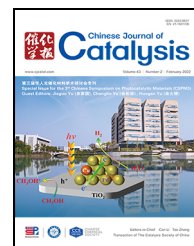
Transaction of The Catalysis Society of China



available at www.sciencedirect.com



journal homepage: www.sciencedirect.com/journal/chinese-journal-of-catalysis



## Special Issue for the 3<sup>rd</sup> Chinese Symposium on Photocatalytic Materials (CSPM3)

Guest Editors: Jiaguo Yu (余家国), Changlin Yu (余长林), Huogen Yu (余火根)

### Chinese Journal of Catalysis

### Graphical Contents

#### Editorial

*Chin. J. Catal.*, 2022, 43: 177 doi: 10.1016/S1872-2067(21)63971-2

#### Preface to special issue for the 3<sup>rd</sup> Chinese Symposium on Photocatalytic Materials (CSPM3)

Jiaguo Yu, Changlin Yu, Huogen Yu

*China University of Geosciences; Guangdong University of Petrochemical Technology*



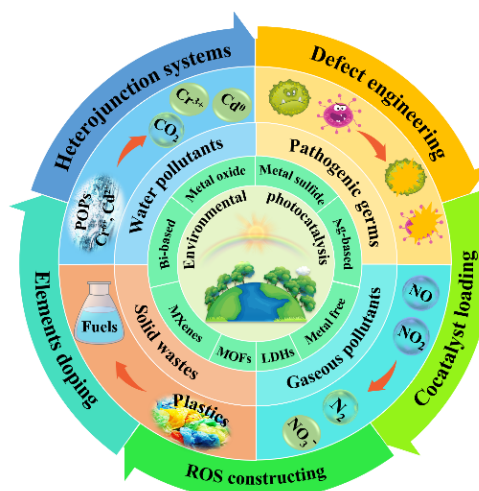
#### Review

*Chin. J. Catal.*, 2022, 43: 178–214 doi: 10.1016/S1872-2067(21)63910-4

#### A review on heterogeneous photocatalysis for environmental remediation: From semiconductors to modification strategies

Huijie Wang, Xin Li, Xiaoxue Zhao, Chunyan Li, Xianghai Song,  
Peng Zhang, Pengwei Huo \*, Xin Li \*  
*Jiangsu University; Zhengzhou University;  
South China Agricultural University*

Herein, the fundamentals of heterogeneous photocatalysis in the environmental remediation of several pollutants, including H<sub>2</sub>O pollutants, pathogenic microorganisms, gaseous pollutants, and solid wastes, are discussed. In addition, potential semiconductors and their modification strategies are systematically addressed. Furthermore, future developments are prospected.



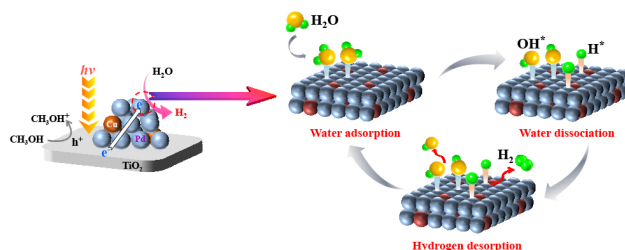
## Articles

*Chin. J. Catal.*, 2022, 43: 215–225 doi: 10.1016/S1872-2067(21)63830-5

**Palladium-copper nanodot as novel H<sub>2</sub>-evolution cocatalyst: Optimizing interfacial hydrogen desorption for highly efficient photocatalytic activity**

Jiachao Xu, Duoduo Gao, Huogen Yu\*, Ping Wang, Bichen Zhu, Linxi Wang\*, Jiajie Fan  
Wuhan University of Technology; China University of Geosciences; Zhengzhou University

Transition metal Cu was successfully introduced into the metallic Pd to optimize the strength of palladium-hydrogen bond (Pd–H) through Pd–Cu alloying effect to obtain the excellent H<sub>2</sub>-evolution performance.

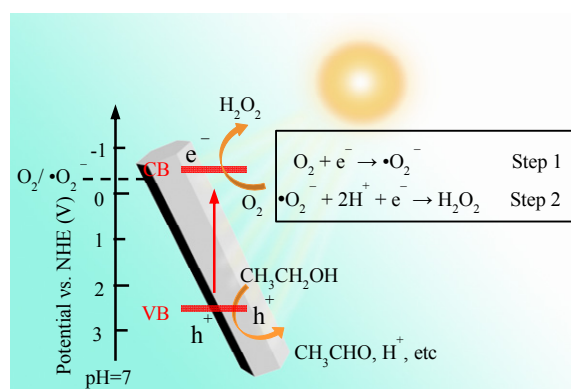


*Chin. J. Catal.*, 2022, 43: 226–233 doi: 10.1016/S1872-2067(21)63832-9

**Effect of calcination temperatures on photocatalytic H<sub>2</sub>O<sub>2</sub>-production activity of ZnO nanorods**

Zicong Jiang, Yong Zhang, Liuyang Zhang\*, Bei Cheng\*, Linxi Wang  
Wuhan University of Technology; Foshan Xianhu Laboratory of the Advanced Energy Science and Technology Guangdong Laboratory; Hubei Polytechnic University; China University of Geosciences

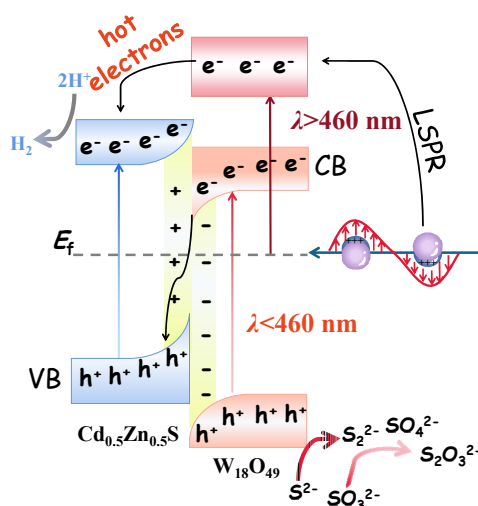
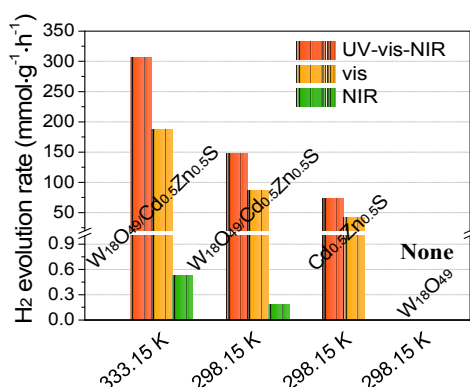
Upon light irradiation, ZnO nanorods possess the superior photocatalytic activity for hydrogen peroxide production by means of two-step single-electron oxygen reduction.



*Chin. J. Catal.*, 2022, 43: 234–245 doi: 10.1016/S1872-2067(20)63783-4

**UV-VIS-NIR-induced extraordinary H<sub>2</sub> evolution over W<sub>18</sub>O<sub>49</sub>/Cd<sub>0.5</sub>Zn<sub>0.5</sub>S: Surface plasmon effect coupled with S-scheme charge transfer**

Wenhua Xue, Hongli Sun, Xiaoyun Hu, Xue Bai, Jun Fan, Enzhou Liu\*  
Northwest University



An ultraviolet-visible-near infrared induced extraordinary H<sub>2</sub> evolution over W<sub>18</sub>O<sub>49</sub>/Cd<sub>0.5</sub>Zn<sub>0.5</sub>S photocatalyst based on the surface plasma effect and the S-scheme charge transfer.



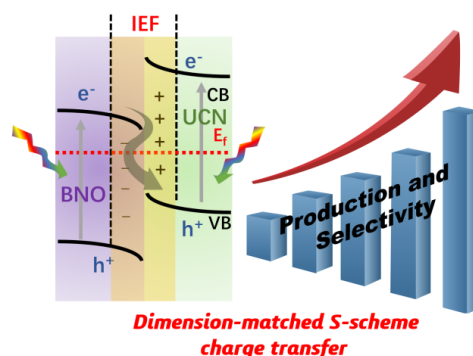
*Chin. J. Catal.*, 2022, 43: 246–254 doi: 10.1016/S1872-2067(21)63819-6

### Selective CO<sub>2</sub> photoreduction to CH<sub>4</sub> mediated by dimension-matched 2D/2D Bi<sub>3</sub>NbO<sub>7</sub>/g-C<sub>3</sub>N<sub>4</sub> S-scheme heterojunction

Kai Wang \*, Xuezhen Feng, Yangzi Shangguan, Xiaoyong Wu \*, Hong Chen \*

Hubei Normal University; Wuhan University of Technology;  
Southern University of Science and Technology

Dimension-matched S-scheme Bi<sub>3</sub>NbO<sub>7</sub>/g-C<sub>3</sub>N<sub>4</sub> heterojunctions were synthesized by a facile solvothermal approach and were capable of achieving selective CO<sub>2</sub> reduction to CH<sub>4</sub>. The presence of the internal electric field in the Bi<sub>3</sub>NbO<sub>7</sub>/g-C<sub>3</sub>N<sub>4</sub> heterojunction efficiently separates photoinduced charge carriers through an S-scheme mechanism.



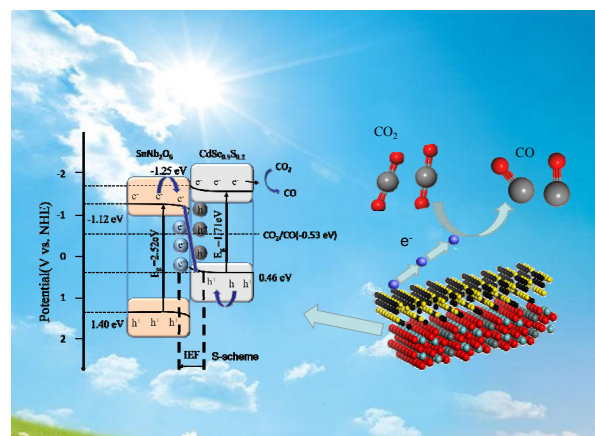
*Chin. J. Catal.*, 2022, 43: 255–264 doi: 10.1016/S1872-2067(20)63784-6

### Organic amine surface modified one-dimensional CdSe<sub>0.8</sub>S<sub>0.2</sub>-diethylenetriamine/two-dimensional SnNb<sub>2</sub>O<sub>6</sub> S-scheme heterojunction with promoted visible-light-driven photocatalytic CO<sub>2</sub> reduction

Hui Yang, Jin feng Zhang \*, Kai Dai \*

Huaibei Normal University

An S-scheme CdSe<sub>0.8</sub>S<sub>0.2</sub>-DETA/SnNb<sub>2</sub>O<sub>6</sub> heterojunction was successfully fabricated by hydrothermal and chemical deposition processes. The heterojunction is favorable for photocatalytic CO<sub>2</sub> reduction, which is attributed to the spatial separation of electron-hole pairs and improved transmission efficiency.



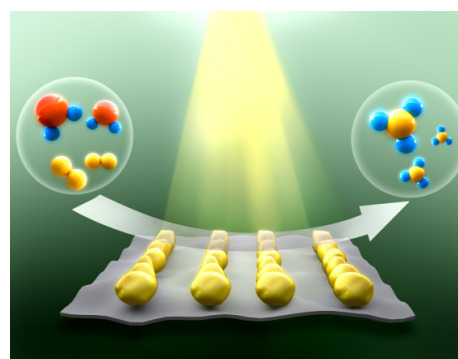
*Chin. J. Catal.*, 2022, 43: 265–275 doi: 10.1016/S1872-2067(21)63801-9

### Boosting the catalytic activity of a step-scheme In<sub>2</sub>O<sub>3</sub>/ZnIn<sub>2</sub>S<sub>4</sub> hybrid system for the photofixation of nitrogen

Jin Zhang, Zi-Hao Pan, Ying Yang, Peng-Fei Wang, Chen-Yang Pei, Wei Chen \*, Guo-Bo Huang \*

Taizhou University

An In<sub>2</sub>O<sub>3</sub>/ZnIn<sub>2</sub>S<sub>4</sub> hybrid system shows enhanced photocatalytic activity for the fixation of nitrogen as a result of the synergistic effect of oxygen vacancies and a step-scheme charge-separation mechanism.



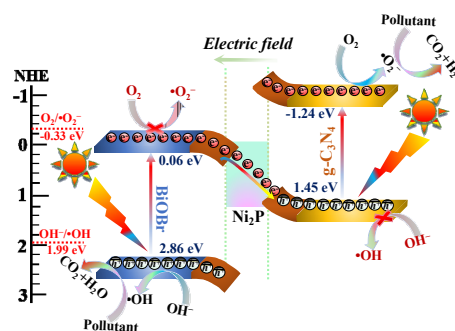
*Chin. J. Catal.*, 2022, 43: 276–287 doi: 10.1016/S1872-2067(21)63817-2

### Promoting photocarriers separation in S-scheme system with Ni<sub>2</sub>P electron bridge: The case study of BiOBr/Ni<sub>2</sub>P/g-C<sub>3</sub>N<sub>4</sub>

Nannan Chen, Xuemei Jia, Heng He, Haili Lin \*, Minna Guo, Jing Cao, Jinfeng Zhang, Shifu Chen \*

Huaibei Normal University

A dual adjustment for Ni<sub>2</sub>P electron bridge and S-scheme heterojunction was realized on a BiOBr/Ni<sub>2</sub>P/g-C<sub>3</sub>N<sub>4</sub> composite prepared via a deposition-precipitation method, which exhibited largely enhanced visible light photocatalytic activity.



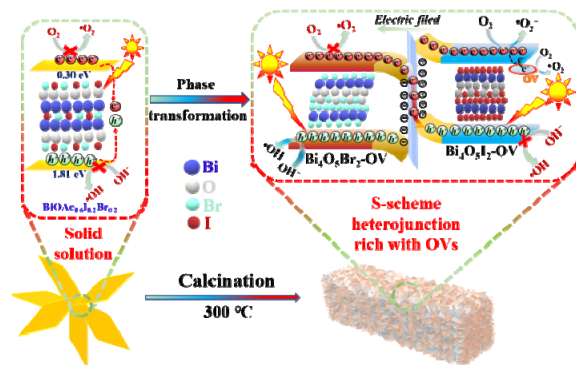


*Chin. J. Catal.*, 2022, 43: 288–302 doi: 10.1016/S1872-2067(20)63768-8

### Rod-like $\text{Bi}_4\text{O}_5\text{I}_2/\text{Bi}_4\text{O}_5\text{Br}_2$ step-scheme heterostructure with oxygen vacancies synthesized by calcining the solid solution containing organic group

Xuemei Jia, Zichen Shen, Qiaofeng Han \*, Huiping Bi  
Nanjing University of Science and Technology

A dual adjustment for surface OV and S-scheme heterojunction was realized on 1D nanorod-like  $\text{Bi}_4\text{O}_5\text{I}_2/\text{Bi}_4\text{O}_5\text{Br}_2$  heterojunction prepared via low temperature calcination of 2D nanosheets  $\text{BiO-Ac}_{0.6}\text{Br}_{0.2}\text{I}_{0.2}$  solid solution, which exhibited largely enhanced visible light photocatalytic activity.

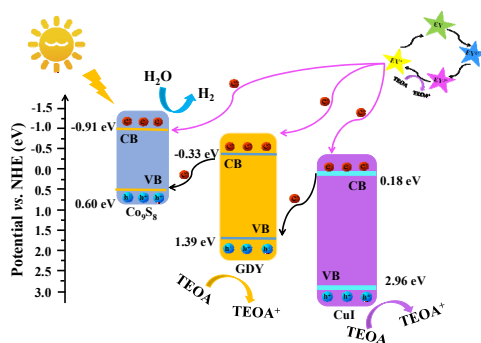


*Chin. J. Catal.*, 2022, 43: 303–315 doi: 10.1016/S1872-2067(21)63818-4

### Efficient photocatalytic hydrogen evolution over graphdiyne boosted with a cobalt sulfide formed S-scheme heterojunction

Zhiliang Jin \*, Hongying Li \*, Junke Li  
North Minzu University

The special structure of GDY-CuI and the existence of the S-scheme heterojunction between  $\text{Co}_9\text{S}_8$  provide a special transmission path for the transfer of electrons between semiconductors so that it has good hydrogen production performance.

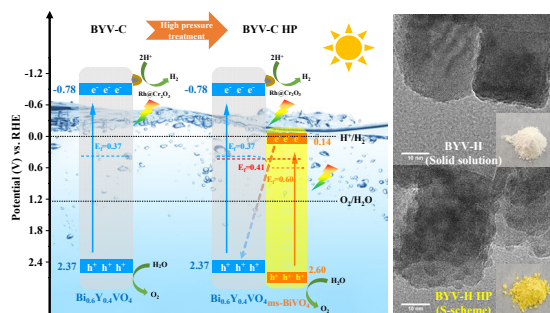


*Chin. J. Catal.*, 2022, 43: 316–328 doi: 10.1016/S1872-2067(21)63846-9

### In-situ pressure-induced $\text{BiVO}_4/\text{Bi}_{0.6}\text{Y}_{0.4}\text{VO}_4$ S-scheme heterojunction for enhanced photocatalytic overall water splitting activity

Weiqi Guo, Haolin Luo, Zhi Jiang \*, Wenfeng Shangguan  
Shanghai Jiao Tong University

The enhanced photocatalytic OWS performance was achieved in BYV-H HP, which was based on the effective charge separation route of the S-scheme heterojunction constructed by the pressure-induced phase transition of  $\text{BiVO}_4$ .

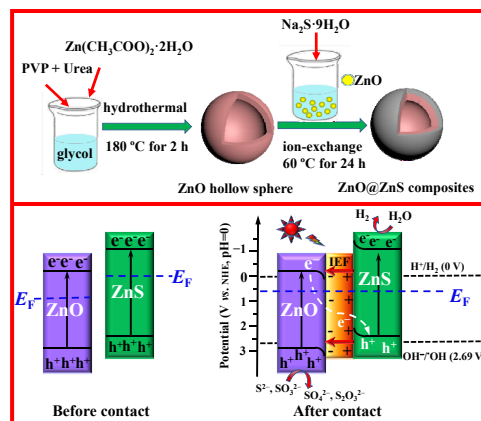


*Chin. J. Catal.*, 2022, 43: 329–338 doi: 10.1016/S1872-2067(21)63889-5

### Step-scheme $\text{ZnO}@\text{ZnS}$ hollow microspheres for improved photocatalytic $\text{H}_2$ production performance

Jie Jiang, Guohong Wang \*, Yanchi Shao, Juan Wang, Shuang Zhou \*, Yaorong Su  
Hubei Normal University; Shenzhen Technology University

The hierarchical  $\text{ZnO}@\text{ZnS}$  step-scheme photocatalyst with a hollow microsphere structure delivers superior hydrogen evolution performance compared to pure ZnO and ZnS due to formation of a S-scheme heterojunction between ZnO and ZnS.



*Chin. J. Catal.*, 2022, 43: 339–349 doi: 10.1016/S1872-2067(21)63875-5

### 1D/2D TiO<sub>2</sub>/ZnIn<sub>2</sub>S<sub>4</sub> S-scheme heterojunction photocatalyst for efficient hydrogen evolution

Jinmao Li, Congcong Wu, Jin Li \*, Binghai Dong, Li Zhao \*, Shimin Wang \*  
Hubei University; Hubei Normal University

The TiO<sub>2</sub>/ZnIn<sub>2</sub>S<sub>4</sub> composite prepared by the *in-situ* growth of ZnIn<sub>2</sub>S<sub>4</sub> on TiO<sub>2</sub> nanofibers exhibits remarkable photocatalytic hydrogen evolution activity. The S-scheme charge transfer route enhances the separation efficiency of the photoexcited carriers as well as the photocatalytic activity.

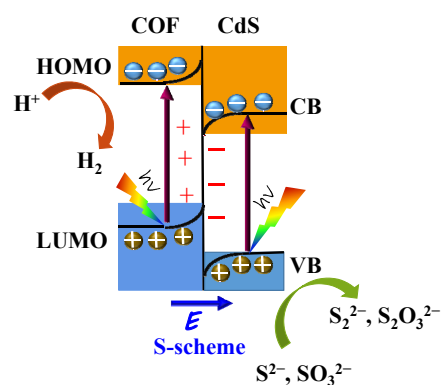


*Chin. J. Catal.*, 2022, 43: 350–358 doi: 10.1016/S1872-2067(21)63869-X

### Fabricating covalent organic framework/CdS S-scheme heterojunctions for improved solar hydrogen generation

Long Sun, Lingling Li, Juan Yang, Jiajie Fan \*, Quanlong Xu \*  
Wenzhou University; Zhengzhou University;  
Guangdong University of Technology

CdS hollow cube structures are combined with an imine-based porous COF to fabricate an S-scheme heterojunction, which maintains a strong redox ability and improves the photocatalytic H<sub>2</sub> generation efficiency.

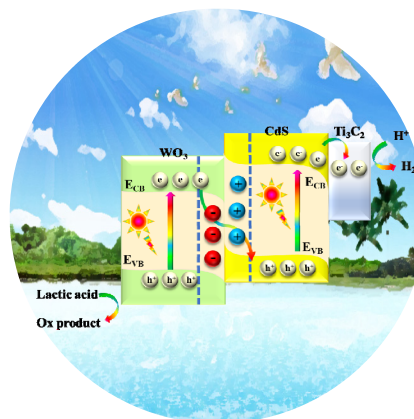


*Chin. J. Catal.*, 2022, 43: 359–369 doi: 10.1016/S1872-2067(21)63883-4

### Integration of 2D layered CdS/WO<sub>3</sub> S-scheme heterojunctions and metallic Ti<sub>3</sub>C<sub>2</sub> MXene-based Ohmic junctions for effective photocatalytic H<sub>2</sub> generation

Junxian Bai, Rongchen Shen, Kang Zhou, Zhimin Jiang, Peng Zhang, Xin Li \*  
South China Agricultural University; Zhengzhou University

Constructing an S-scheme heterojunction reduces the recombination of photogenerated electron-hole pairs and maintains electrons with strong reducibility. The loading of MX offers more hydrogen active sites and effectively utilizes electrons for photocatalytic reactions through ohmic junctions.

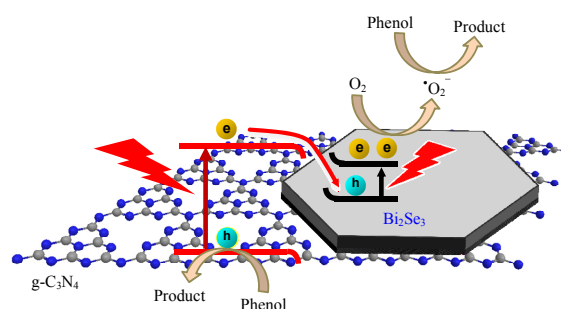


*Chin. J. Catal.*, 2022, 43: 370–378 doi: 10.1016/S1872-2067(21)63911-6

### In situ fabrication of Bi<sub>2</sub>Se<sub>3</sub>/g-C<sub>3</sub>N<sub>4</sub> S-scheme photocatalyst with improved photocatalytic activity

Rongan He, Sijiao Ou, Yexuan Liu, Yu Liu, Difa Xu \*  
Changsha University

Under visible light irradiation, the Bi<sub>2</sub>Se<sub>3</sub>/g-C<sub>3</sub>N<sub>4</sub> composite exhibited superior photocatalytic activity for the degradation of phenol through an S-scheme mechanism.

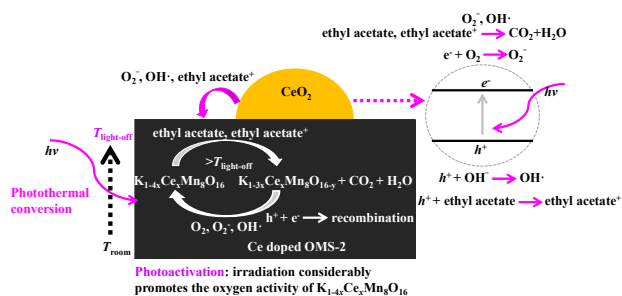


*Chin. J. Catal.*, 2022, 43: 379–390 doi: 10.1016/S1872-2067(21)63816-0

### Highly efficient UV-visible-infrared photothermocatalytic removal of ethyl acetate over a nanocomposite of CeO<sub>2</sub> and Ce-doped manganese oxide

Long Zhang, Yi Yang, Yuanzhi Li\*, Jichun Wu, Shaowen Wu, Xin Tan, Qianqian Hu  
Wuhan University of Technology; Huazhong Agricultural University

A CeO<sub>2</sub>-CeOMS-2 nanocomposite exhibited extremely high photothermocatalytic activity and excellent durability for ethyl acetate removal under UV-vis-IR irradiation. The high activity is a result of synergetic photocatalysis, light-driven thermocatalysis, and novel photoactivation.

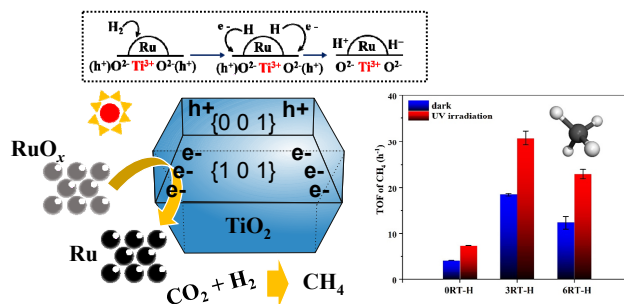


*Chin. J. Catal.*, 2022, 43: 391–402 doi: 10.1016/S1872-2067(21)63825-1

### Photo-enhanced thermal catalytic CO<sub>2</sub> methanation activity and stability over oxygen-deficient Ru/TiO<sub>2</sub> with exposed TiO<sub>2</sub> {001} facets: Adjusting photogenerated electron behaviors by metal-support interactions

Ke Wang, Shihui He, Yunzhi Lin, Xun Chen, Wenxin Dai\*, Xianzhi Fu\*  
Fuzhou University

The photogenerated electrons was affected by the various support-metal interaction, so the regenerated surface oxygen vacancies could further promote the CO<sub>2</sub> methanation under UV irradiation on the Ru/TiO<sub>2</sub> exposed TiO {001} facet.

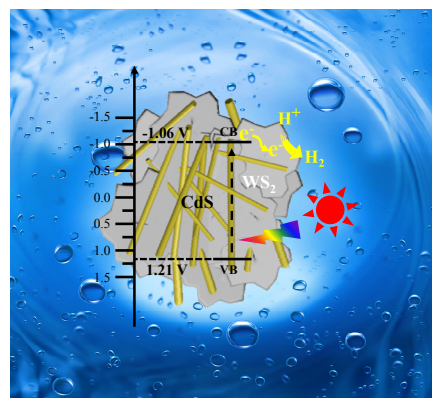


*Chin. J. Catal.*, 2022, 43: 403–409 doi: 10.1016/S1872-2067(21)63844-5

### Ultrahigh photocatalytic hydrogen evolution performance of coupled 1D CdS/1T-phase dominated 2D WS<sub>2</sub> nanoheterojunctions

Chao Ding, Chengxiao Zhao, Shi Cheng, Xiaofei Yang\*  
Nanjing Forestry University

1T-phase dominated WS<sub>2</sub> nanosheets with high conductivity and large specific surface area were employed to construct mixed-dimensional heterojunctions for ultrahigh solar-powered photocatalytic hydrogen evolution *via* water splitting.

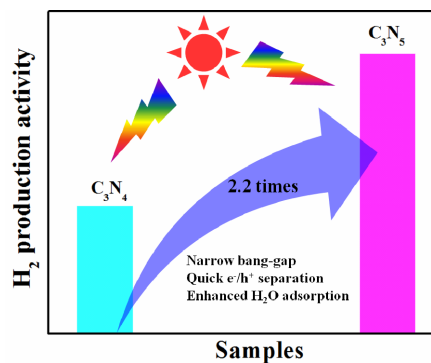


*Chin. J. Catal.*, 2022, 43: 410–420 doi: 10.1016/S1872-2067(21)63813-5

### Comprehensive investigation on robust photocatalytic hydrogen production over C<sub>3</sub>N<sub>5</sub>

Cong Peng, Lixiao Han, Jinming Huang, Shengyao Wang, Xiaohu Zhang\*, Hao Chen\*  
Huazhong Agricultural University

As a new type of carbon nitride, C<sub>3</sub>N<sub>5</sub> exhibits much higher photocatalytic H<sub>2</sub> production activity than conventional C<sub>3</sub>N<sub>4</sub>, which represents a new direction for designing materials for photocatalytic applications.

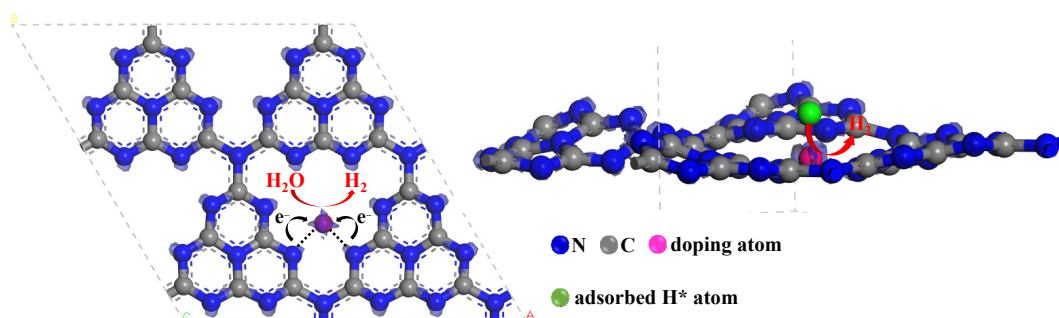




*Chin. J. Catal.*, 2022, 43: 421–432 doi: 10.1016/S1872-2067(21)63849-4

### Doping-induced metal-N active sites and bandgap engineering in graphitic carbon nitride for enhancing photocatalytic H<sub>2</sub> evolution performance

Xiaohui Yu, Haiwei Su, Jianping Zou \*, Qinqin Liu \*, Lele Wang, Hua Tang \*  
Jiangsu University; Nanchang Hangkong University; Qingdao University



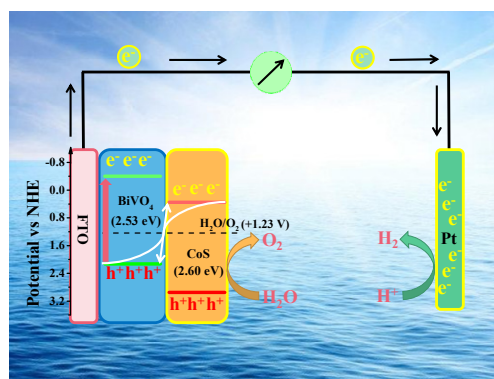
Atomic-level structural engineering of g-C<sub>3</sub>N<sub>4</sub> induced metal-N active sites in the framework and modulated the bandgap structure, thereby improving the separation efficiency of photogenerated charges, reductive ability, and light absorption.

*Chin. J. Catal.*, 2022, 43: 433–441 doi: 10.1016/S1872-2067(21)63845-7

### Enhanced photoelectrochemical water splitting using a cobalt-sulfide-decorated BiVO<sub>4</sub> photoanode

Zhiming Zhou, Jinjin Chen, Qinlong Wang, Xingxing Jiang, Yan Shen \*  
Huazhong University of Science and Technology

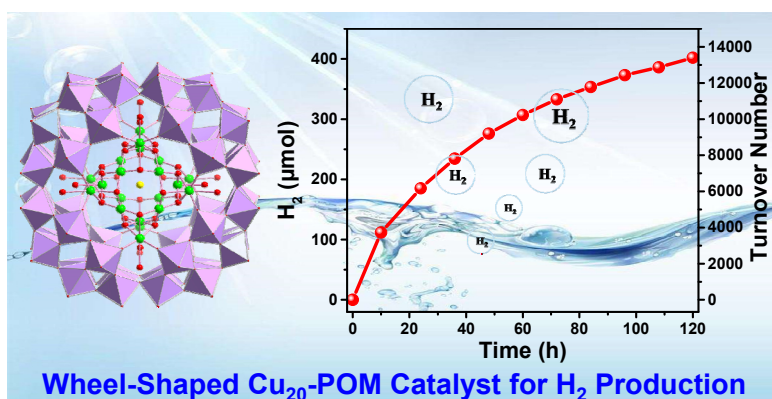
An excellent CoS/BiVO<sub>4</sub> photoanode was prepared by decorating CoS onto the surface of BiVO<sub>4</sub>. The resulting CoS/BiVO<sub>4</sub> photoanode exhibited a significantly enhanced photocurrent density with considerably enhanced charge injection and separation efficiencies compared to those of pure BiVO<sub>4</sub>. This study provides valuable instructions for surface-modification-based design and decoration of photoanodes for efficient photoelectrochemical water splitting.



*Chin. J. Catal.*, 2022, 43: 442–450 doi: 10.1016/S1872-2067(21)63840-8

### Wheel-shaped icosanuclear Cu-containing polyoxometalate catalyst: Mechanistic and stability studies on light-driven hydrogen generation

Yeqin Feng, Lin Qin, Junhao Zhang, Fangyu Fu \*, Huijie Li, Hua Xiang, Hongjin Lv \*  
Beijing Institute of Technology



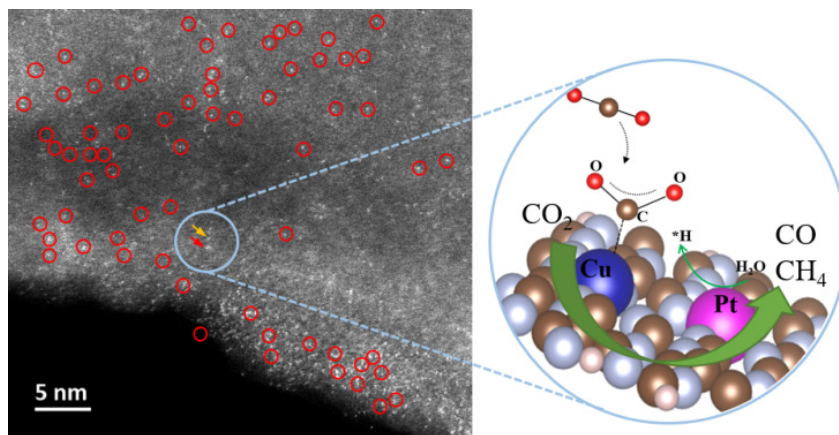
A wheel-shaped icosanuclear Cu-containing polyoxometalate (Cu<sub>20</sub>-POM) was synthesized and investigated as an efficient catalyst for visible-light-driven H<sub>2</sub> production. It achieved an exceptionally high turnover number of ~13400 after 120 h of photocatalytic reaction. The catalytic mechanism and catalyst stability under turnover conditions were systematically studied using various spectroscopic and experimental techniques.

*Chin. J. Catal.*, 2022, 43: 451–460 doi: 10.1016/S1872-2067(21)63879-2

### Copper and platinum dual-single-atoms supported on crystalline graphitic carbon nitride for enhanced photocatalytic CO<sub>2</sub> reduction

Lei Cheng, Peng Zhang, Qiye Wen, Jiajie Fan, Quanjun Xiang \*

University of Electronic Science and Technology of China; Zhengzhou University



Atomically dispersed Pt-Cu sites inside crystalline carbon nitride were designed to maximize Pt mass activity and integrate their respective merits, leading to enhanced CO<sub>2</sub> photoreduction.

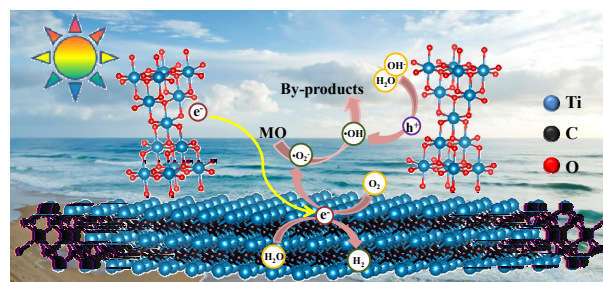
*Chin. J. Catal.*, 2022, 43: 461–471 doi: 10.1016/S1872-2067(21)63915-3

### Ti<sub>3</sub>C<sub>2</sub> MXene co-catalyst assembled with mesoporous TiO<sub>2</sub> for boosting photocatalytic activity of methyl orange degradation and hydrogen production

Huapeng Li, Bin Sun \*, Tingting Gao, Huan Li, Yongqiang Ren, Guowei Zhou \*

Qilu University of Technology (Shandong Academy of Sciences)

Mesoporous TiO<sub>2</sub>/Ti<sub>3</sub>C<sub>2</sub> composites are fabricated by electrostatic self-assembly strategy, exhibiting a considerable improvement in the photocatalytic methyl orange degradation and H<sub>2</sub> production through introducing the highly conductive Ti<sub>3</sub>C<sub>2</sub> MXene as co-catalyst.

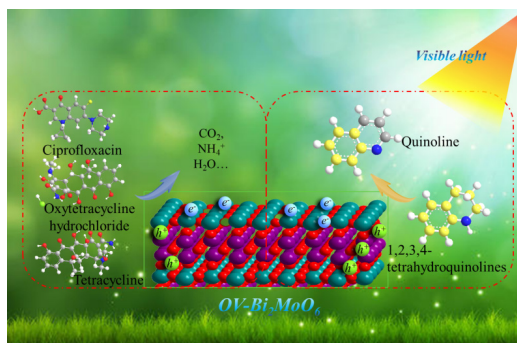


*Chin. J. Catal.*, 2022, 43: 472–484 doi: 10.1016/S1872-2067(21)63876-7

### Solvothermal fabrication of Bi<sub>2</sub>MoO<sub>6</sub> nanocrystals with tunable oxygen vacancies and excellent photocatalytic oxidation performance in quinoline production and antibiotics degradation

Zhen Liu, Jian Tian, Changlin Yu \*, Qizhe Fan, Xingqiang Liu \*

Guangdong University of Petrochemical Technology; Harbin Institute of Technology (Shenzhen); Xiamen University Tan Kah Kee College



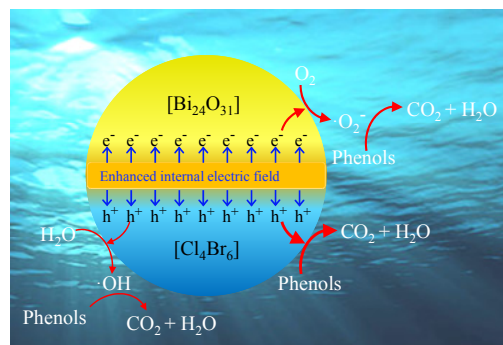
Excellent photocatalytic performance in the oxidation of 1,2,3,4-tetrahydroquinoline to produce quinoline and in antibiotic degradation was obtained over novel Bi<sub>2</sub>MoO<sub>6</sub> nanocrystals with tunable oxygen vacancies under visible light irradiation.

*Chin. J. Catal.*, 2022, 43: 485–496 doi: 10.1016/S1872-2067(21)63897-4

### Enhancing an internal electric field by a solid solution strategy for steering bulk-charge flow and boosting photocatalytic activity of $\text{Bi}_{24}\text{O}_{31}\text{Cl}_x\text{Br}_{10-x}$

Jun Wan, Weijie Yang, Jiaqing Liu, Kailong Sun, Lin Liu \*, Feng Fu \*  
Yan'an University;  
Clean Utilization of Low Rank Coal of Shaanxi Collaborative Innovation Center

The unsymmetrical crystal structure construction of a  $\text{Bi}_{24}\text{O}_{31}\text{Cl}_4\text{Br}_6$  solid solution strategy could remarkably enhance the internal electric field, resulting in bulk-charge flow in a desired and efficient manner to dramatically improve the photocatalytic degradation of phenolic compounds.

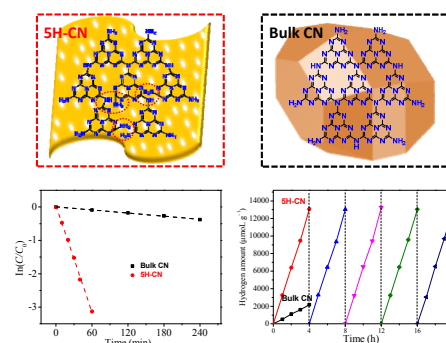


*Chin. J. Catal.*, 2022, 43: 497–506 doi: 10.1016/S1872-2067(21)63873-1

### Precursor-modified strategy to synthesize thin porous amino-rich graphitic carbon nitride with enhanced photocatalytic degradation of RhB and hydrogen evolution performances

Ting Huang, Jiaqi Chen, Lili Zhang, Alireza Khataee, Qiaofeng Han, Xiaoheng Liu, Jingwen Sun, Junwu Zhu, Shugang Pan \*, Xin Wang \*, Yongsheng Fu \*  
Nanjing University of Science and Technology, China;  
Huaiyin Normal University, China; University of Tabriz, Iran;  
Changzhou Institute of Technology, China

The self-modified thin porous amino-rich 5H-CN was successfully synthesized via a precursor-modified strategy, and it displays outstanding photocatalytic performance in the degradation of RhB and hydrogen evolution, which is much higher than that of bulk CN.

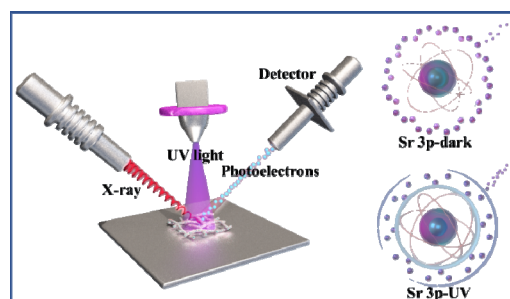


*Chin. J. Catal.*, 2022, 43: 507–518 doi: 10.1016/S1872-2067(21)63898-6

### Tracking charge transfer pathways in $\text{SrTiO}_3/\text{CoP}/\text{Mo}_2\text{C}$ nanofibers for enhanced photocatalytic solar fuel production

Li Wang, Yukun Li, Chao Wu, Xin Li, Guosheng Shao \*, Peng Zhang \*  
Zhengzhou University; South China Agricultural University

A dual cocatalysts system for photocatalytic solar fuel production was constructed, and we confirmed the band bending and photoexcited electron transfer pathway between the  $\text{SrTiO}_3$  and cocatalysts using UPS and ISI-XPS characterization.

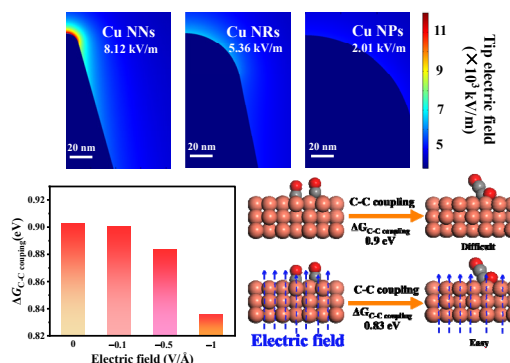


*Chin. J. Catal.*, 2022, 43: 519–525 doi: 10.1016/S1872-2067(21)63866-4

### Electric-field promoted C–C coupling over Cu nanoneedles for $\text{CO}_2$ electroreduction to $\text{C}_2$ products

HuangJingWei Li, Huimin Zhou, Yajiao Zhou, Junhua Hu, Masahiro Miyauchi, Junwei Fu \*, Min Liu \*  
Central South University, China; Zhengzhou University, China;  
Tokyo Institute of Technology, Japan

Finite-element simulations and DFT calculations were used to predict that highly curved copper nanoneedles exhibit a strong electric field, which can promote C–C coupling and thus improve the generation of multi-carbon ( $\text{C}_2$ ) products during the electroreduction of  $\text{CO}_2$ .

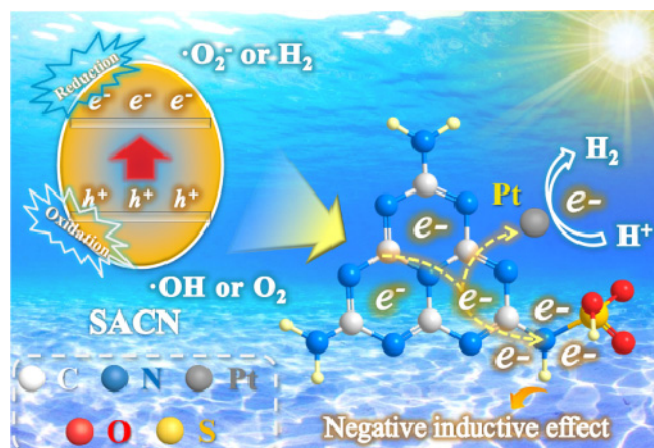




*Chin. J. Catal.*, 2022, 43: 526–535 doi: 10.1016/S1872-2067(21)63872-X

### Negative inductive effect enhances charge transfer driving in sulfonic acid functionalized graphitic carbon nitride with efficient visible-light photocatalytic performance

Min Zhang, Yunfeng Li \*, Wei Chang, Wei Zhu \*, Luohong Zhang, Renxi Jin, Yan Xing  
Xi'an Polytechnic University, China; University of Notre Dame, USA; Northeast Normal University, China

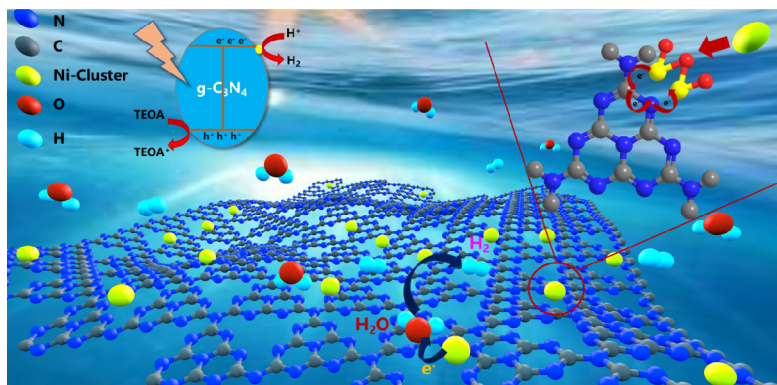


Sulfonic acid group-functionalized g-C<sub>3</sub>N<sub>4</sub> has been synthesized successfully. The driving force generated by the negative inductive effect of sulfonic acid groups significantly improves the charge transfer dynamics and inhibits their recombination, thus leading to excellent photocatalytic performance.

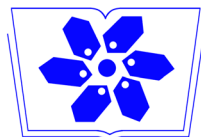
*Chin. J. Catal.*, 2022, 43: 536–545 doi: 10.1016/S1872-2067(21)63865-2

### Monodisperse Ni-clusters anchored on carbon nitride for efficient photocatalytic hydrogen evolution

Liang Jian, Huizhen Zhang, Bing Liu, Chengsi Pan, Yuming Dong \*, Guangli Wang, Jun Zhong, Yongjie Zheng, Yongfa Zhu \*  
Jiangnan University; Soochow University; Qingdao Geological Exploration Institute of China Metallurgical Geology Bureau; Tsinghua University



Monodisperse Ni-clusters were anchored on the CN surface for efficient photocatalytic hydrogen evolution. It has been proven that there is a stable interface interaction between monodisperse Ni-clusters and CN to construct the hybrid electronic structure of the Ni-cluster/CN system.



中国科学院科学出版基金资助出版



Chinese Journal of  
**Catalysis**

月刊 SCI 收录 2022 年 2 月 第 43 卷 第 2 期



## 第三届华人光催化材料学术研讨会专刊

客座主编: 余家国, 余长林, 余火根

## 目 次

### 编者语

177

第三届华人光催化材料学术研讨会专刊前言  
余家国, 余长林, 余火根

### 综 述

178

可用于环境修复的半导体光催化剂及其改性策略研究进展  
王慧杰, 李鑫, 赵小雪, 李春岩, 宋相海, 张鹏, 霍鹏伟, 李鑫

### 论 文

215

新型钼-铜纳米点析氢助催化剂: 优化界面氢脱附以实现高效光催化活性  
许家超, 高朵朵, 余火根, 王革, 朱必成, 王临曦, 范佳杰

226

焙烧温度对 ZnO 纳米棒光催化生产 H<sub>2</sub>O<sub>2</sub> 活性的影响  
江梓聪, 张勇, 张留洋, 程蓓, 王临曦

234

等离子体共振协同 S-scheme 电荷转移促进 W<sub>18</sub>O<sub>49</sub>/Cd<sub>0.5</sub>Zn<sub>0.5</sub>S 高效光催化产氢  
薛文华, 孙红莉, 胡晓云, 白雪, 樊君, 刘恩周

246

二维/二维 S-型 Bi<sub>3</sub>NbO<sub>7</sub>/g-C<sub>3</sub>N<sub>4</sub> 异质结光催化剂驱动选择性 CO<sub>2</sub> 还原制 CH<sub>4</sub>  
王楷, 冯雪真, 上官杨子, 吴晓勇, 陈洪

255

有机胺表面修饰的一维 CdSe<sub>0.8</sub>S<sub>0.2</sub>-DETA/二维 SnNb<sub>2</sub>O<sub>6</sub>S 型异质结及其可见光光催化 CO<sub>2</sub> 还原性能  
杨辉, 张金锋, 代凯

265

梯型 In<sub>2</sub>O<sub>3</sub>/ZnIn<sub>2</sub>S<sub>4</sub> 杂化体系的构建及其光催化固氮增效  
张锦, 潘梓豪, 杨颖, 王鹏飞, 裴晨阳, 陈伟, 黄国波

276

BiOBr/Ni<sub>2</sub>P/g-C<sub>3</sub>N<sub>4</sub> 体系中用 Ni<sub>2</sub>P 电子桥加速 S 型体系光生载流子分离  
陈男男, 贾雪梅, 何恒, 林海莉, 郭敏娜, 曹静, 张金锋, 陈士夫

288

相转移有机前驱体 BiOAc<sub>0.6</sub>Br<sub>0.2</sub>I<sub>0.2</sub> 固溶体合成表面富有氧空位的棒状 S 型 Bi<sub>4</sub>O<sub>5</sub>I<sub>2</sub>/Bi<sub>4</sub>O<sub>5</sub>Br<sub>2</sub> 异质结  
贾雪梅, 沈紫晨, 韩巧凤, 毕慧平

303

硫化钴改性石墨炔构建 S 型异质结高效光催化产氢  
靳治良, 李红英, 李俊柯

316

压力诱导相变原位构建 BiVO<sub>4</sub>/Bi<sub>0.6</sub>Y<sub>0.4</sub>VO<sub>4</sub> S 型异质结增强光催化全解水性能  
郭伟琦, 罗皓霖, 江治, 上官文峰

329

增强制氢性能的 ZnO@ZnS 空心微球 S 型异质结光催化剂  
蒋洁, 王国宏, 邵琰池, 王娟, 周双, 苏耀荣

339

1D/2D TiO<sub>2</sub>/ZnIn<sub>2</sub>S<sub>4</sub> S 型异质结光催化剂及其高效制氢性能  
李金懋, 吴聪聪, 李矜, 董兵海, 赵丽, 王世敏

350

构建 S 型异质结 COF/CdS 以增强太阳光产氢  
孙龙, 李铃铃, 杨娟, 范佳杰, 徐全龙

359

集成二维层状 CdS/WO<sub>3</sub> S 型异质结及金属化 Ti<sub>3</sub>C<sub>2</sub> MXene 基欧姆结高效光催化产氢  
白浚贤, 沈荣晨, 周康, 姜志民, 张鹏, 李鑫

370

原位制备具有增强光催化活性的 S 型 Bi<sub>2</sub>Se<sub>3</sub>/g-C<sub>3</sub>N<sub>4</sub> 光催化剂  
赫荣安, 欧斯娇, 刘烨莹, 刘宇, 许第发

379

二氧化铈-铈掺杂锰氧化物纳米复合物高效紫外-可见-红外光热催化净化乙酸乙酯  
张龙, 杨懿, 李远志, 武继春, 吴绍文, 谭鑫, 胡倩倩

391

氧空位修饰的暴露 $\text{TiO}_2\{001\}$ 的 $\text{Ru}/\text{TiO}_2$ 增强光热协同 $\text{CO}_2$ 甲烷化活性和稳定性

王可, 何仕辉, 林云志, 陈旬, 戴文新, 付贤智

403

一维硫化镉/二维二硫化钨纳米异质结用于超高活性光催化制氢

丁超, 赵呈孝, 成石, 杨小飞

410

$\text{C}_3\text{N}_5$ 光催化制氢性能的系统研究

彭聪, 韩利晓, 黄金铭, 汪圣尧, 张晓虎, 陈浩

421

利用掺杂诱导的金属-N活性位点和带隙调控提升石墨相氮化碳的光催化产氢性能

于晓慧, 苏海伟, 邹建平, 刘芹芹, 王乐乐, 唐华

433

硫化钴装饰 $\text{BiVO}_4$ 光阴极提升其光电化学水分解性能

周志明, 陈金金, 王擎龙, 蒋兴星, 申燕

442

轮型二十核铜取代多金属氧酸盐催化剂: 光催化制氢的机理和稳定性研究

冯业芹, 秦琳, 张峻豪, 符方玉, 李慧杰, 相华, 吕红金

451

铜铂双单原子负载晶化氮化碳及其增强光催化 $\text{CO}_2$ 还原性能

程蕾, 张鹏, 文岐业, 范佳杰, 向全军

461

$\text{Ti}_3\text{C}_2$  MXene助催化剂组装的介孔 $\text{TiO}_2$ 用以增强光催化甲基橙降解和产氢活性

李华鹏, 孙彬, 高婷婷, 李欢, 任永强, 周国伟

472

溶剂热合成可调控氧空位的 $\text{Bi}_2\text{MoO}_6$ 纳米晶及其光催化氧化制喹啉和抗生素降解

刘珍, 田坚, 余长林, 樊启哲, 刘兴强

485

固溶体内电场调控增强 $\text{Bi}_{24}\text{O}_{31}\text{Cl}_x\text{Br}_{10-x}$ 体相电荷流动和光催化活性

万俊, 杨玮洁, 刘佳庆, 孙凯龙, 刘琳, 付峰

497

前驱体改性法制备薄层多孔富氨基的石墨相氮化碳用于光催化降解RhB和光催化制氢

黄婷, 陈佳琪, 张莉莉, Alireza Khataee, 韩巧凤, 刘孝恒, 孙敬文, 朱俊武, 潘书刚, 汪信, 付永胜

507

追踪 $\text{SrTiO}_3/\text{CoP}/\text{Mo}_2\text{C}$ 纳米纤维中的电荷转移路径以增强光催化产生太阳燃料

王黎, 李雨坤, 吴超, 李鑫, 邵国胜, 张鹏

519

Cu纳米针上电场促进C-C耦合增强 $\text{CO}_2$ 电还原生成 $\text{C}_2$ 产物

李黄经纬, 周惠敏, 周亚姣, 胡俊华, Masahiro Miyauchi, 傅俊伟, 刘敏

526

具有增强电荷转移驱动的磺酸基功能化 $\text{g-C}_3\text{N}_4$ 光催化剂的设计合成及应用

张敏, 李云锋, 常薇, 朱炜, 张洛红, 金仁喜, 邢艳

536

单分散Ni簇锚定在CN上用于高效光催化析氢

蹇亮, 张会珍, 刘冰, 潘成思, 董玉明, 王光丽, 钟俊, 郑永杰, 朱永法

英文全文电子版(国际版)由Elsevier出版社在ScienceDirect上出版

<https://www.sciencedirect.com/journal/chinese-journal-of-catalysis>

[www.cjcatal.com](http://www.cjcatal.com)

在线投审稿网址

<https://mc03.manuscriptcentral.com/cjcatal>