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物理化学学报

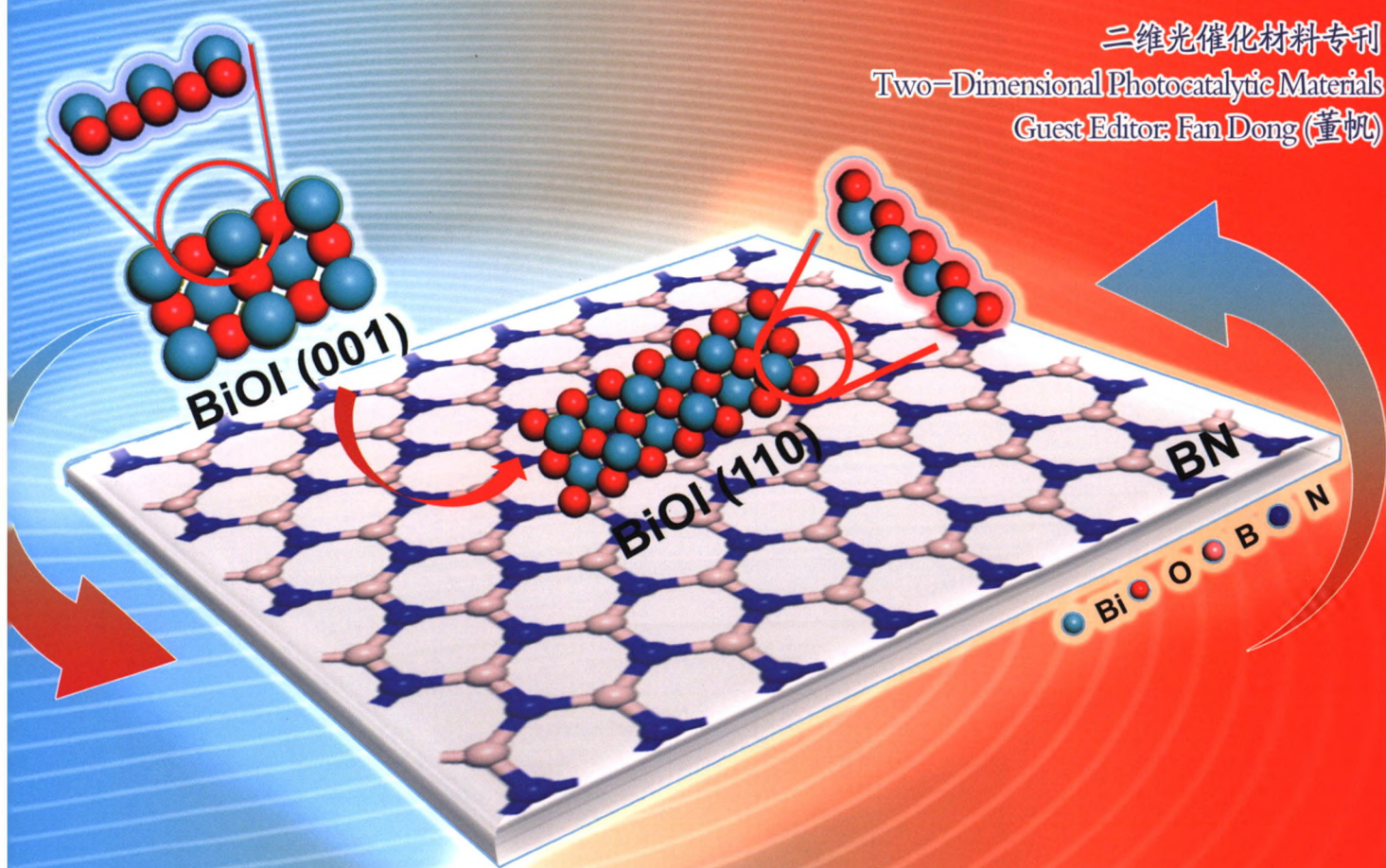
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二维光催化材料专刊

Two-Dimensional Photocatalytic Materials

Guest Editor: Fan Dong (董帆)



中国科学技术协会主管
中国化学会、北京大学主办
北京大学化学学院物理化学学报编辑部出版

COVER



The cover image presents that BN nanosheets induce the oxygen-rich {110} facets of BiOI to expose. In article No. 2009063, Zhou *et al.* demonstrated a novel strategy to tune exposed oxygen-rich {110} facets of BiOI by constructing 2D/2D BiOI/BN photocatalysts for efficient photocatalytic oxidation performance.

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..... 《物理化学学报》编辑部(Editorial Office of Acta Physico-Chimica Sinica) (2011021)

前言 PREFACE

二维光催化材料(Two Dimensional Photocatalytic Materials)..... 董帆(Fan Dong) (201002)

亮点 RESEARCH HIGHLIGHT

Ru单原子植入MOFs/Mn用于高选择性等离子体-催化氧化NO_x (High-Performance Single-Atom
Implanted Metal-Organic Framework/MnO₂ for NO_x Oxidation in Plasma) 董帆(Fan Dong) (2010074)
氧掺杂调控氮化硼中电子定向传输促进分子活化(Modulating Directional Electron Transfer on
Boron Nitride Nanosheets by Oxygen Modification for Effectively Molecule Activation) 朱永法(Yongfa Zhu) (2011005)
理论计算评价光催化剂VOCs降解性能: g-C₃N₄量子点/石墨烯(Evaluation Procedure of Photocatalysts for
VOCs Degradation Based on Density Functional Theory: g-C₃N₄ Dots/Graphene) 杨金龙(Jinlong Yang) (2011039)
富含缺陷的2D/2D异质结促进光催化清洁能源转化(Photocatalytic Clean Energy Conversion
Boosted by Vacancy-Rich 2D/2D Heterostructure) 董帆(Fan Dong) (2012010)

高活性氮化碳纳米片的制备策略

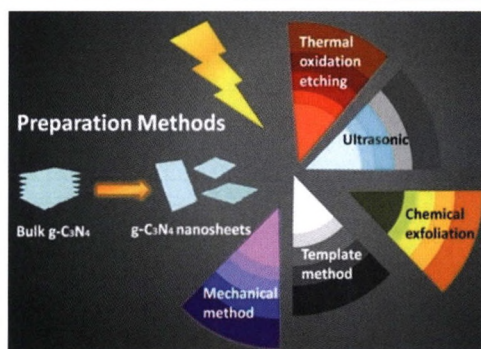
李开宁, 张梦曦, 欧小雨, 李睿娜, 李覃,
范佳杰, 吕康乐

Strategies for the Fabrication of 2D Carbon Nitride Nanosheets

Kaining Li, Mengxi Zhang, Xiaoyu Ou, Ruina Li,
Qin Li, Jiajie Fan, Kangle Lv

Acta Phys. -Chim. Sin. **2021**, 37 (8), 2008010

doi: 10.3866/PKU.WHXB202008010



This overview aims to inspire rational strategies to exfoliate and prepare g-C₃N₄ nanosheets.

铁基多相助催化剂光电化学水氧化研究进展

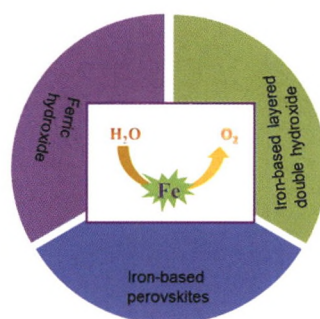
李艳, 胡星盛, 黄静伟, 王磊, 余厚德, 王其召

Development of Iron-Based Heterogeneous Cocatalysts for Photoelectrochemical Water Oxidation

Yan Li, Xingsheng Hu, Jingwei Huang, Lei Wang,
Houde She, Qizhao Wang

Acta Phys. -Chim. Sin. **2021**, 37 (8), 2009022

doi: 10.3866/PKU.WHXB202009022



Progress and prospects of iron-based heterogeneous catalysts for photoelectrochemical water oxidation were reviewed.

二维光催化材料电子结构和性能调控策略研究进展

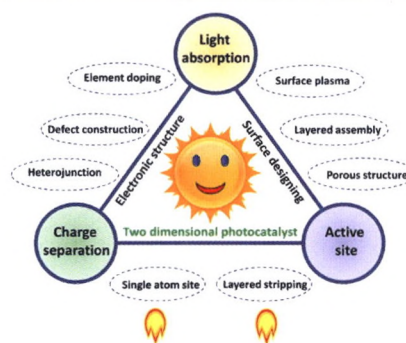
陈鹏, 周莹, 董帆

Advances in Regulation Strategies for Electronic Structure and Performance of Two-Dimensional Photocatalytic Materials

Peng Chen, Ying Zhou, Fan Dong

Acta Phys. -Chim. Sin. **2021**, 37 (8), 2010010

doi: 10.3866/PKU.WHXB202010010



The advances in surface design and electronic structure regulation strategies of two-dimensional photocatalytic materials are reviewed from the viewpoint of light absorption, charge separation, and active sites.

缺陷工程调控石墨相氮化碳及其光催化空气净化应用进展

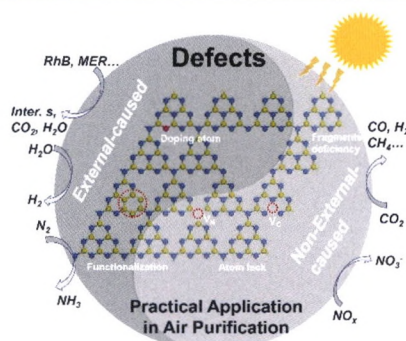
王薇, 黄宇, 王震宇

Defect Engineering in Two-Dimensional Graphitic Carbon Nitride and Application to Photocatalytic Air Purification

Wei Wang, Yu Huang, Zhenyu Wang

Acta Phys. -Chim. Sin. **2021**, 37 (8), 2011073

doi: 10.3866/PKU.WHXB202011073



Non-external-caused defects and external-caused defects were introduced into the g-C₃N₄ framework for optimized photocatalytic performance.

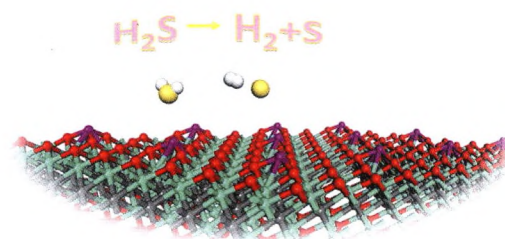
基于密度泛函理论下 H_2S 在单原子催化剂 $\text{V}/\text{Ti}_2\text{CO}_2$ 上的分解机理研究

周君慧, 敖志敏, 安太成

DFT Study of the Decomposition Mechanism of H_2S on V-Decorated Ti_2CO_2 Single-Atom Catalyst

Junhui Zhou, Zhimin Ao, Taicheng An

Acta Phys. -Chim. Sin. **2021**, 37 (8), 2007086
doi: 10.3866/PKU.WHXB202007086



H_2S , an extremely toxic gas, can be degraded into H_2 and sulfur on SACs at room temperature.

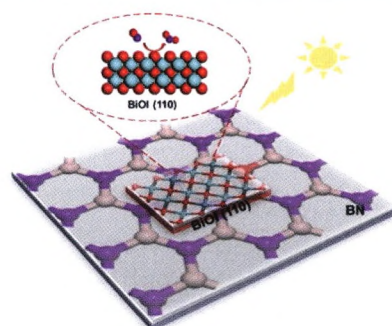
BN 诱导 BiOI 富氧{110}面的暴露并增强其可见光催化氧化性能

郑倩, 曹玥晗, 黄南建, 张瑞阳, 周莹

Selective Exposure of BiOI Oxygen-Rich {110} Facet Induced by BN Nanosheets for Enhanced Photocatalytic Oxidation Performance

Qian Zheng, Yuehan Cao, Nanjian Huang, Ruiyang Zhang, Ying Zhou

Acta Phys. -Chim. Sin. **2021**, 37 (8), 2009063
doi: 10.3866/PKU.WHXB202009063



The NO spontaneously combines with surface lattice oxygen over the BiOI oxygen-rich {110} facet induced by BN nanosheets thereby enhancing the photocatalytic oxidation performance.

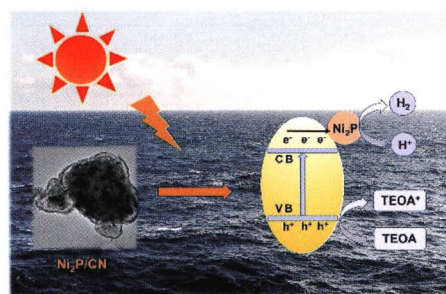
非贵金属助剂 Ni_2P 修饰类石墨碳氮化物光催化剂增强可见光光催化产氢性能

张鹏, 王继全, 李源, 姜丽莎, 王壮壮, 张高科

Non-Noble-Metallic Cocatalyst Ni_2P Nanoparticles Modified Graphite-Like Carbonitride with Enhanced Photocatalytic Hydrogen Evolution under Visible Light Irradiation

Peng Zhang, Jiquan Wang, Yuan Li, Lisha Jiang, Zhuangzhuang Wang, Gaoke Zhang

Acta Phys. -Chim. Sin. **2021**, 37 (8), 2009102
doi: 10.3866/PKU.WHXB202009102



The non-noble Ni_2P cocatalyst enhances the photocatalytic hydrogen evolution reaction if intimately connected to graphite-like carbonitride (CN) due to the improved carrier transfer at the $\text{Ni}_2\text{P}/\text{CN}$ nanocomposite.

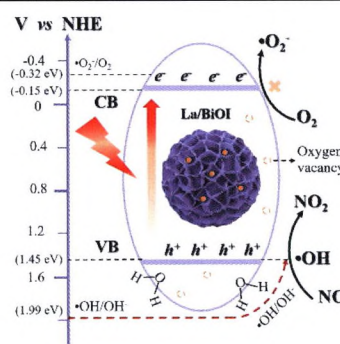
La 掺杂 BiOI 微球可见光下光催化氧化 NO 性能研究

李钱, 胡静, 周易, 王海强, 吴忠标

La-Doped BiOI Microspheres for Efficient Photocatalytic Oxidation of NO under Visible Light Illumination

Qian Li, Jing Hu, Yi Zhou, Haiqiang Wang, Zhongbiao Wu

Acta Phys. -Chim. Sin. **2021**, 37 (8), 2009100
doi: 10.3866/PKU.WHXB202009100



NO could be effectively oxidized to NO_2 over La/ BiOI microspheres with great stability, owing to the enhanced photoelectrochemical properties and the formation of abundant $\cdot\text{OH}$ radicals.

核壳结构 $\text{NH}_2\text{-UiO-66@TiO}_2$ 的制备及其可见光下的甲苯降解性能研究

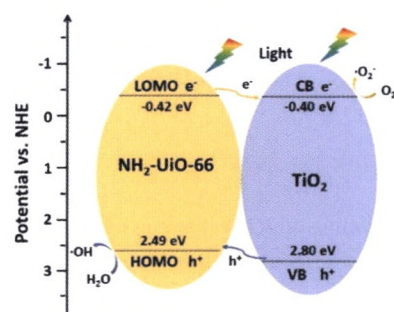
周易, 欧阳威龙, 王岳军, 王海强, 吴忠标

Core-Shell Structured $\text{NH}_2\text{-UiO-66@TiO}_2$ Photocatalyst for the Degradation of Toluene under Visible Light Irradiation

Yi Zhou, Weilong Ouyang, Yuejun Wang, Haiqiang Wang, Zhongbiao Wu

Acta Phys. -Chim. Sin. **2021**, 37 (8), 2009045

doi: 10.3866/PKU.WHXB202009045



The core-shell structured photocatalyst $\text{NH}_2\text{-UiO-66@TiO}_2$ exhibited outstanding activity for toluene degradation *via* efficient transfer of photogenerated carriers.

二维层状 $\text{NiO/g-C}_3\text{N}_4$ 复合材料在无铁光电类芬顿体系中有效去除环丙沙星的研究

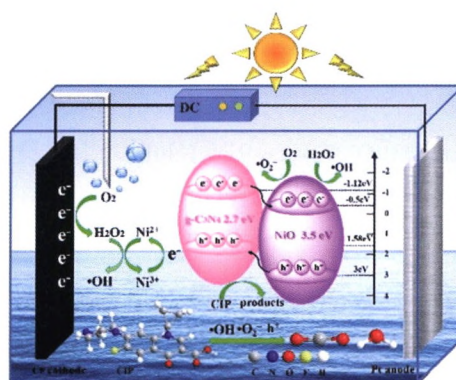
贾晓庆, 白晓宇, 吉喆喆, 李轶, 孙妍, 秘雪岳, 展思祥

Insight into the Effective Removal of Ciprofloxacin Using a Two-Dimensional Layered $\text{NiO/g-C}_3\text{N}_4$ Composite in Fe-Free Photo-Electro-Fenton System

Xiaoqing Jia, Xiaoyu Bai, Zhezhe Ji, Yi Li, Yan Sun, Xueyue Mi, Sihui Zhan

Acta Phys. -Chim. Sin. **2021**, 37 (8), 2010042

doi: 10.3866/PKU.WHXB202010042



A novel Fe-free photo-electro-Fenton system achieved the efficient degradation of CIP with two-dimensional layered $\text{NiO/g-C}_3\text{N}_4$ composites serving as catalysts.

磷酸根修饰的 Mn 掺杂介孔 TiO_2 在 VUV-PCO 体系高效催化氧化甲苯性能

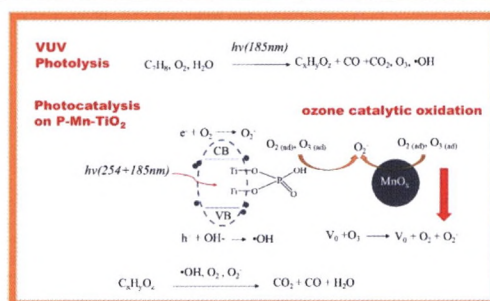
舒亚婕, 梁诗敏, 肖家勇, 涂志凌, 黄海保

Phosphate- and Mn-Modified Mesoporous TiO_2 for Efficient Catalytic Oxidation of Toluene in VUV-PCO System

Yajie Shu, Shimin Liang, Jiayong Xiao, Zhiling Tu, Haibao Huang

Acta Phys. -Chim. Sin. **2021**, 37 (8), 2010001

doi: 10.3866/PKU.WHXB202010001



P-Mn- TiO_2 was successfully fabricated and used for catalyzing the VUV-PCO process to promote high removal efficiency of toluene (90%) and ozone. Surface modification with H_3PO_4 and Mn facilitates effective O_2 and O_3 adsorption, which allows for the catalytic decomposition of O_3 and the photocatalytic degradation of VOCs.

二维/二维 $\text{FeNi-LDH/g-C}_3\text{N}_4$ 复合光催化剂用于促进 CO_2 光还原反应

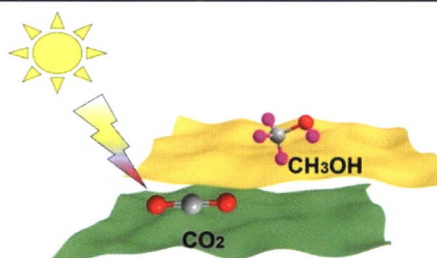
李瀚, 李芳, 余家国, 曹少文

2D/2D $\text{FeNi-LDH/g-C}_3\text{N}_4$ Hybrid Photocatalyst for Enhanced CO_2 Photoreduction

Han Li, Fang Li, Jiaguo Yu, Shaowen Cao

Acta Phys. -Chim. Sin. **2021**, 37 (8), 2010073

doi: 10.3866/PKU.WHXB202010073



The 2D/2D $\text{FeNi-LDH/g-C}_3\text{N}_4$ hybrid photocatalyst shows enhanced CO_2 photoreduction activity due to improved charge transfer and CO_2 adsorption abilities.

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