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Special Issue of Emerging Scientists

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COVER



Young scientists are the driving force of scientific research. This special issue, showcasing the latest original scientific and technological achievements of young scholars in the field of physical chemistry in China, encourages young scientists to publish more representative scientific results in the motherland, helping them grow and become more successful.

CONTENTS

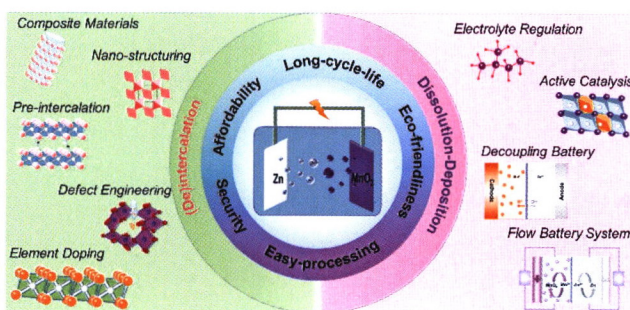
综述 REVIEW

水系锌二次电池  $MnO_2$  正极的晶体结构、  
反应机理及其改性策略

陈鲜红, 阮鹏超, 吴贤文, 梁叔全, 周江

**Crystal Structures, Reaction Mechanisms, and  
Optimization Strategies of  $MnO_2$  Cathode for  
Aqueous Rechargeable Zinc Batteries**

Xianhong Chen, Pengchao Ruan, Xianwen Wu,  
Shuquan Liang, Jiang Zhou



*Acta Phys. -Chim. Sin.* **2022**, 38 (11), 2111003  
doi: 10.3866/PKU.WHXB202111003

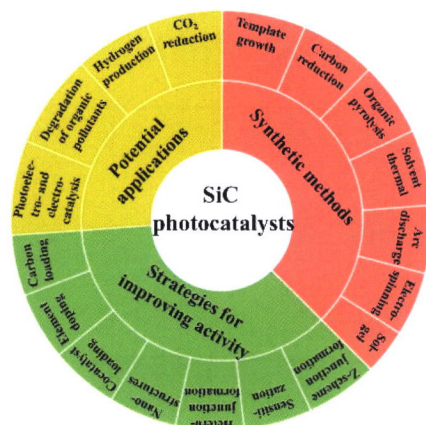
Recent researches of  $MnO_2$  in aqueous rechargeable zinc-manganese batteries along with its characteristics, reaction mechanisms and optimization strategies are summarized.

## 纳米 SiC 基光催化剂研究进展

何科林, 沈荣晨, 郝磊, 李佑稷, 张鹏,  
江吉周, 李鑫

### Advances in Nanostructured Silicon Carbide Photocatalysts

Kelin He, Rongchen Shen, Lei Hao, Youji Li,  
Peng Zhang, Jizhou Jiang, Xin Li



*Acta Phys. -Chim. Sin.* **2022**, 38 (11), 2201021

doi: 10.3866/PKU.WHXB202201021

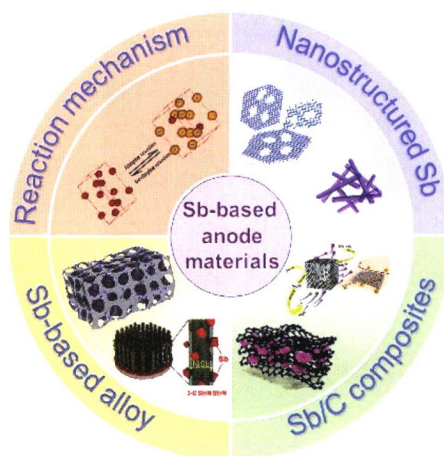
This review provides the latest advance for SiC photocatalysts and insights into improving the activity of SiC photocatalyst.

## 钠离子电池用高性能锑基负极材料的调控策略研究进展

李莹, 来雪琦, 曲津朋, 赖勤志, 伊廷锋

### Research Progress in Regulation Strategies of High-Performance Antimony-Based Anode Materials for Sodium Ion Batteries

Ying Li, Xueqi Lai, Jinpeng Qu, Qinzhi Lai,  
Tingfeng Yi



*Acta Phys. -Chim. Sin.* **2022**, 38 (11), 2204049

doi: 10.3866/PKU.WHXB202204049

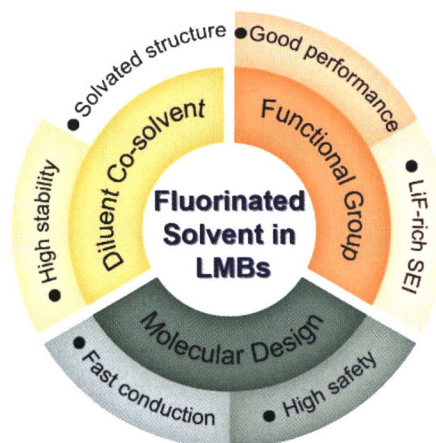
The major objective of this review is to explore the determining factors influencing the sodium storage performance of Sb-based anode materials, and then highlight promising strategies to improve reversible capacity and cycling stability.

## 氟代溶剂在锂金属电池中的应用

何子旭, 陈亚威, 黄凡洋, 揭育林, 李新鹏,  
曹瑞国, 焦淑红

### Fluorinated Solvents for Lithium Metal Batteries

Zixu He, Yawei Chen, Fanyang Huang, Yulin Jie,  
Xinpeng Li, Ruiguo Cao, Shuhong Jiao



*Acta Phys. -Chim. Sin.* **2022**, 38 (11), 2205005

doi: 10.3866/PKU.WHXB202205005

In this review paper, recent progress in fluorinated solvent-based electrolytes for lithium metal batteries is summarized.

## 锂离子电池快充石墨负极研究与应用

丁晓博, 黄倩晖, 熊训辉

### Research and Application of Fast-Charging Graphite Anodes for Lithium-Ion Batteries

Xiaobo Ding, Qianhui Huang, Xunhui Xiong

*Acta Phys. -Chim. Sin.* **2022**, 38 (11), 2204057

doi: 10.3866/PKU.WHXB202204057

### 金属硫化物基钾离子电池负极: 储存机制和合成策略

杜忆忱, 张壮壮, 徐一帆, 包建春, 周小四

### Metal Sulfide-Based Potassium-Ion Battery Anodes: Storage Mechanisms and Synthesis Strategies

Yichen Du, Zhuangzhuang Zhang, Yifan Xu, Jianchun Bao, Xiaosi Zhou

*Acta Phys. -Chim. Sin.* **2022**, 38 (11), 2205017

doi: 10.3866/PKU.WHXB202205017

### 铜基串联催化剂电催化 CO<sub>2</sub> 还原的研究进展

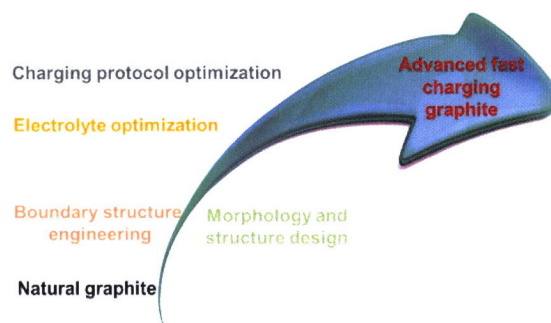
石永霞, 侯曼, 李俊俊, 李丽, 张志成

### Cu-Based Tandem Catalysts for Electrochemical CO<sub>2</sub> Reduction

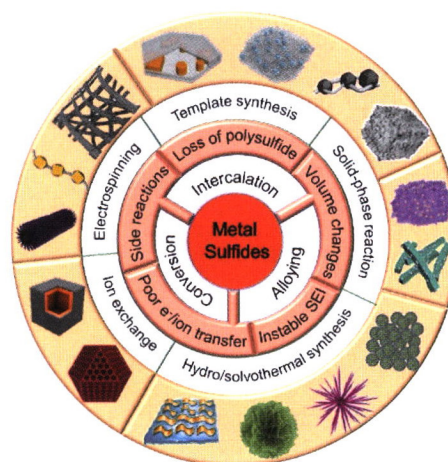
Yongxia Shi, Man Hou, Junjun Li, Li Li, Zhicheng Zhang

*Acta Phys. -Chim. Sin.* **2022**, 38 (11), 2206020

doi: 10.3866/PKU.WHXB202206020



This review highlights the shortcomings of applying commercial unmodified graphite as an electrode in lithium-ion batteries. It also discusses the advanced modification strategies of graphite aimed at achieving fast-charging capabilities. Finally, the review evaluates the commercialization prospects of the modification strategies.



This review focuses on the synthesis of metal sulfides for potassium-ion batteries using methods such as the template synthesis, hydro/solvothermal synthesis, solid-phase chemical synthesis, electrospinning synthesis, and ion-exchange synthesis.



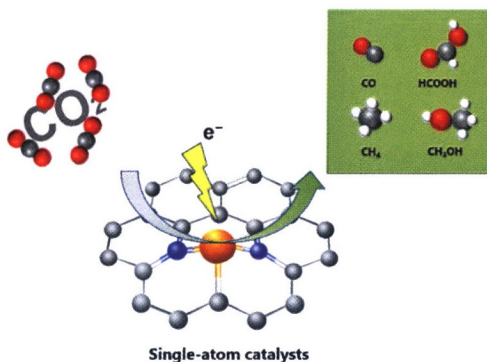
This review systematically summarizes the recent research progress of various Cu-based tandem catalysts for electrochemical CO<sub>2</sub> reduction reaction.

单原子配位结构及与载体相互作用的调控用于  
二氧化碳电催化还原

陈宇新, 王丽君, 姚志波, 郝磊瑞, 谭心怡,  
Justus Masa, Alex W. Robertson, 孙振宇

**Tuning the Coordination Structure of Single  
Atoms and Their Interaction with the Support for  
Carbon Dioxide Electroreduction**

Yuxin Chen, Lijun Wang, Zhibo Yao, Leiduan Hao,  
Xinyi Tan, Justus Masa, Alex W. Robertson,  
Zhenyu Sun



*Acta Phys. -Chim. Sin.* **2022**, 38 (11), 2207024  
doi: 10.3866/PKU.WHXB202207024

This review summarizes the recent advances in the preparation of tailored single-atom catalysts for carbon dioxide electroreduction.

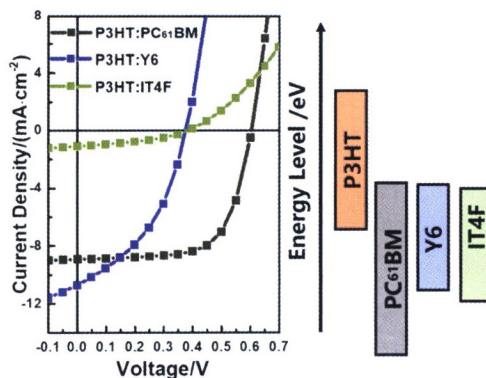
论文 ARTICLE

聚 3-己基噻吩: 非富勒烯太阳能电池中的量子  
效率损失和电压损失

徐小云, 吴宏波, 梁世洁, 唐正, 李梦阳,  
王静, 王翔, 闻瑾, 周二军, 李韦伟, 马在飞

**Quantum Efficiency and Voltage Losses in  
P3HT:Non-fullerene Solar Cells**

Xiaoyun Xu, Hongbo Wu, Shijie Liang, Zheng Tang,  
Mengyang Li, Jing Wang, Xiang Wang, Jin Wen,  
Erjun Zhou, Weiwei Li, Zaifei Ma



*Acta Phys. -Chim. Sin.* **2022**, 38 (11), 2201039  
doi: 10.3866/PKU.WHXB202201039

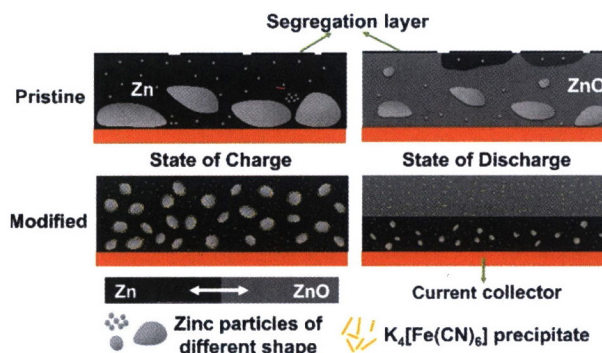
The performance of the P3HT solar cells is improved by the better aligned donor-acceptor energy levels and increased donor-acceptor distance.

碱性电解液中  $K_3[Fe(CN)_6]$  在锌阳极上的自发  
还原和吸附延长锌镍电池的循环寿命

沈沅灏, 王擎宇, 刘杰, 钟澄, 胡文彬

**Spontaneous Reduction and Adsorption of  
 $K_3[Fe(CN)_6]$  on Zn Anodes in Alkaline  
Electrolytes: Enabling a Long-Life Zn-Ni Battery**

Yuanhao Shen, Qingyu Wang, Jie Liu,  
Cheng Zhong, Wenbin Hu



*Acta Phys. -Chim. Sin.* **2022**, 38 (11), 2204048  
doi: 10.3866/PKU.WHXB202204048

Spontaneous reduction and adsorption of  $K_3[Fe(CN)_6]$  on the Zn anode in an alkaline electrolyte can inhibit the corrosion of the anode and increase the cycling life of the Zn-Ni battery.

《物理化学学报》征订启事 ..... (2204049 (27 of 27))

《大学化学》征订启事 ..... (2204057 (16 of 16))

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