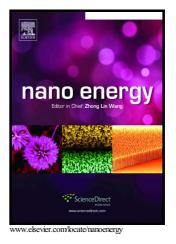
Author's Accepted Manuscript

Covalent Combination of Polyoxometalate and Graphitic Carbon Nitride for Light-Driven Hydrogen Peroxide Production

Shen Zhao, Xu Zhao, Hui Zhang, Jiang Li, Yongfa Zhu



 PII:
 S2211-2855(17)30218-5

 DOI:
 http://dx.doi.org/10.1016/j.nanoen.2017.04.017

 Reference:
 NANOEN1897

To appear in: Nano Energy

Received date: 2 March 2017 Revised date: 7 April 2017 Accepted date: 7 April 2017

Cite this article as: Shen Zhao, Xu Zhao, Hui Zhang, Jiang Li and Yongfa Zhu Covalent Combination of Polyoxometalate and Graphitic Carbon Nitride fo Light-Driven Hydrogen Peroxide Production, *Nano Energy* http://dx.doi.org/10.1016/j.nanoen.2017.04.017

This is a PDF file of an unedited manuscript that has been accepted fo publication. As a service to our customers we are providing this early version o the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain

Covalent Combination of Polyoxometalate and Graphitic Carbon Nitride for Light-Driven Hydrogen Peroxide Production

Shen Zhao^a, Xu Zhao^{a*}, Hui Zhang^b, Jiang Li^a, Yongfa Zhu^c

^aKey Laboratory of Drinking Water Science and Technology, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences, Beijing 100085, China ^bState Key Laboratory of Environmental Chemistry and Ecotoxicology, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences, Beijing 100085, China

Scri

^cDepartment of Chemistry, Tsinghua University, Beijing 100084, China

E-mail: zhaoxu@rcees.ac.cn

Abstract

The polyoxometalate (POM) cluster of $[PW_{11}O_{39}]^7$ (PW₁₁) has been successfully covalent combined with the three dimensionally ordered macroporous graphitic carbon nitride (3DOM g-C₃N₄) through the organic linker strategy. The characterization such as solid-state NMR and XPS results confirm the organosilicon agent of (triethoxysilyl)-propyl isocyanate can act as the linker to covalent combine the PW₁₁ cluster with 3DOM g-C₃N₄. The hybrid catalyst of 3DOM g-C₃N₄-PW₁₁ exhibits efficient catalytic performance (2.4 µmol·h⁻¹) for light-driven H₂O₂ production from H₂O and O₂ in the absence of organic electron donors. The ESR results suggest that one-electron reduction of O₂ to •OOH is indeed suppressed over 3DOM g-C₃N₄-PW₁₁. Furthermore, the Koutecky-Levich plot obtained from electrochemical rotating disk electrode (RDE) analysis of oxygen reduction reaction (ORR) for 3DOM g-C₃N₄-PW₁₁ reveals the value of electron transfer during the ORR process is 2.30, indicating the covalent combination can promote the two-electron O₂ reduction. In addition, the recycle experiment results reveal that the heterogeneous 3DOM g-C₃N₄-PW₁₁ is catalytic stable.

Graphical abstract

Download English Version:

https://daneshyari.com/en/article/5452198

Download Persian Version:

https://daneshyari.com/article/5452198

Daneshyari.com