## Author's Accepted Manuscript

Graphene-decorated 3D BiVO<sub>4</sub> photocatalysts with controlled size and shape for efficient visible-light-induced photocatalytic performance

Man Ou, Qin Zhong, Yanxiao Zhao, Yuxiang Xue, Fujiao Song



www.elsevier.com

PII: S0167-577X(16)31303-9

DOI: http://dx.doi.org/10.1016/j.matlet.2016.08.025

Reference: MLBLUE21309

To appear in: *Materials Letters* 

Received date: 2 May 2016 Revised date: 20 July 2016 Accepted date: 6 August 2016

Cite this article as: Man Ou, Qin Zhong, Yanxiao Zhao, Yuxiang Xue and Fujiac Song, Graphene-decorated 3D BiVO<sub>4</sub> photocatalysts with controlled size an shape for efficient visible-light-induced photocatalytic performance, *Material Letters*, http://dx.doi.org/10.1016/j.matlet.2016.08.025

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

## PTED MANU

Graphene-decorated 3D BiVO<sub>4</sub> photocatalysts with controlled size and shape for efficient visible-

light-induced photocatalytic performance

Man Ou<sup>a,b</sup>, Qin Zhong<sup>a,b</sup>\*, Yanxiao Zhao<sup>a,b</sup>, Yuxiang Xue<sup>a,b</sup>, Fujiao Song<sup>a,b</sup>

<sup>a</sup>School of Chemical Engineering, Nanjing University of Science and Technology, Nanjing, Jiangsu 210094,

P.R. of China

<sup>b</sup>Nanjing AIREP Environmental Protection Technology Co., Ltd, Nanjing, Jiangsu 210091, P.R. of China

\*Corresponding author: Qin Zhong, Email: zq304@mail.njust.edu.cn. Tel/Fax number: +86 25 84315517.

Abstract

Graphene decorated 3D double-layer half-open flower BiVO<sub>4</sub> composite (BVO-GS) was prepared via a facile solvothermal route. It was found that the size of the 3D BiVO<sub>4</sub> could be reduced from 4.5 μm to 2

µm with the addition of graphene oxide (GO). And the transportation and separation of the photo-generated

electrons-holes were also significantly improved. Photocatalytic performances of BiVO<sub>4</sub> and BVO-GS have

been evaluated by removing gaseous NO and RhB in liquid under visible light (VL) irradiation, where

BVO-GS sample displayed enhanced photoactivity. The conversion of NO (~ 400 ppm) was about 60% and

the RhB degradation ratio was about 90% for BVO-GS under VL irradiation. The boosted performance was

attributed to the synthesized effect of size, shape and high photo-generated electrons-holes. The present

study reveals that the role of graphene is not only a capping agent to controlling the size, but also a catalyst

promoter for the photocatalytic performance.

Keywords: graphene, BiVO<sub>4</sub>, photoactivity, size

1. Introduction

Photocatalysis is a promising green technology that is involved to solve the energy crisis and

environmental remediation [1-4]. Monoclinic BiVO<sub>4</sub> (m-BVO) has received considerable attention due to

its relatively narrow band gap (~ 2.4 eV), effective photocatalytic activity and good stability against photo-

corrosion under VL irradiation [5]. It is well known that the photocatalytic performance over

semiconductors is strongly dependent on their physical and chemical properties, such as size, morphology

and efficient migration of photo-generated electron-hole pairs [6-11]. Latest efforts have been made to

achieve that small size, three-dimensional (3D) morphology or efficient separation of photo-generated

electrons-holes of m-BVO is conductive to improve the photoactivity, respectively [12-14]. However, the

1

## Download English Version:

## https://daneshyari.com/en/article/8016129

Download Persian Version:

https://daneshyari.com/article/8016129

<u>Daneshyari.com</u>