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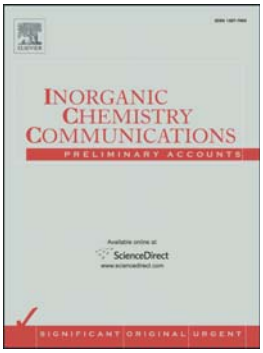

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PII: S1387-7003(16)30385-9
DOI: doi: 10.1016/j.inoche.2016.10.035
Reference: INOCHE 6472

To appear in: *Inorganic Chemistry Communications*

Received date: 30 September 2016
Revised date: 4 October 2016
Accepted date: 7 October 2016

Please cite this article as: Zhizhong Chen, Jianxiang Liao, Yuxin Chen, Jingcheng Zhang, Wenjie Fan, Yongchao Huang, Synthesis of oxygen deficient BiOI for photocatalytic degradation of methyl orange, *Inorganic Chemistry Communications* (2016), doi: 10.1016/j.inoche.2016.10.035

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ACCEPTED MANUSCRIPT

Synthesis of oxygen deficient BiOI for photocatalytic degradation of methyl orange

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Abstract: Oxygen defects are introduced into BiOI by a simple glycerol treatment. This deficient BiOI demonstrated 3.5 times higher photocatalytic performance than the untreated BiOI nanosheets for methyl orange (MO) degradation under visible light irradiation. Moreover, the deficient BiOI nanosheets have excellent cycling stability. The improved efficiency can be ascribed to the significantly enhanced separation efficiency of photogenerated and utilized more solar light.

Keywords: bismuth oxyiodide, photocatalysis, oxygen defects, visible light, methyl orange

The development of photocatalytic systems for industrial wastewater removing is an attractive research target in the field of environmental protection, which can finally mineralize the contaminants into CO_2 and H_2O [1-5]. Among the visible light semiconductors, bismuth oxyiodide as a promising semiconductor photocatalyst due to the band gap and stratified structure [6-10]. O_{2p} and I_{5P} states dominate the valence bands, whereas Bi_{6p} states devote to the conduction bands, which was calculated by the density functional theory (DFT) on the electronic structure of BiOI [11, 12]. This structure can effectively generate more photocatalytic electrons and holes, which is benefited to the photocatalytic performances. However, the high recombination efficiency of photogenerated electrons and holes prevents its practical application [13].

In order to enhance the catalytic efficiency of BiOI, many methods have been carried out, such as heterojunction [14-16], noble metal deposition [17] and doping [18, 19]. Introducing surface defects into semiconductors is an effective way to improve the photocatalytic performance of BiOI, which can enhance the separation efficiency of photogenerated carriers [20]. Additionally, previously reported simulation results anticipate that oxygen defects will impact the forbidden band of

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