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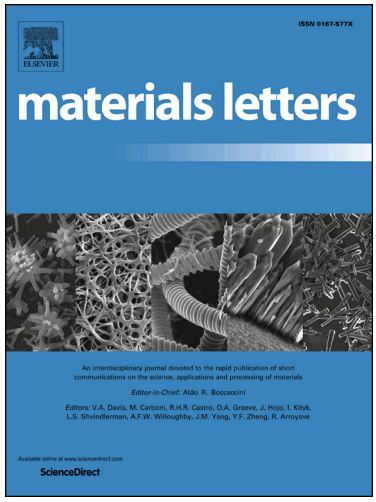

The Up-Conversion Effect Induced NIR-Photocatalytic Performance of $Bi_{2-x}Er_xWO_6$ Photocatalysts

Yuning Su, Guoqiang Tan, Chi Xu, Ting Liu, Ying Wang, Huijun Ren, Ao Xia

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The Up-Conversion Effect Induced NIR-Photocatalytic Performance of $Bi_{2-X}Er_XWO_6$ Photocatalysts

Yuning, Su, Guoqiang Tan*, Chi Xu, Ting Liu, Ying Wang, Huijun Ren, Ao Xia

School of Materials Science and Engineering, Shaanxi University of Science & Technology, Xi'an 710021, China

Email address: tan3114@163.com (G. Q. Tan), Tel.:+8613759878391

Abstract: $Bi_{2-X}Er_XWO_6$ photocatalysts were synthesized by a microwave solvothermal-calcination method. The Er^{3+} ions were doped into the crystal of Bi_2WO_6 and the photocatalysts show an up-conversion effect of the Er^{3+} 4f electrons: $^4I_{15/2}\rightarrow{}^4F_{7/2}$, $^4I_{15/2}\rightarrow{}^2H_{11/2}$, $^4I_{15/2}\rightarrow{}^4S_{3/2}$ and $^4I_{15/2}\rightarrow{}^4F_{9/2}$. The Er^{3+} ions absorb NIR light and convert it into visible light so that extra photons and electrons-holes are generated. The degradation rates of the $Bi_{2-X}Er_XWO_6$ photocatalyst reach 96% within 270 min and 95% within 30 min under the simulated sunlight and NIR light, which confirms the enhancement of the degradation performance by the up-conversion effect.

Keywords: Bi_2WO_6, Er^{3+} doping, up-conversion, NIR, semiconductors, functional

1. Introduction

In recent years, environmental pollution became a serious social issue. Organic pollutants degrading with semiconductors has been valued by the researchers for low energy consumption and environment friendliness [1-3]. With advantages of the desirable energy band structure, the favorable photoresponse range, and non-toxicity, Bi_2WO_6 [4] has been one of the most promising photocatalysts.