

Accepted Manuscript

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PII: S0022-3697(17)30737-0

DOI: [10.1016/j.jpcs.2017.06.021](https://doi.org/10.1016/j.jpcs.2017.06.021)

Reference: PCS 8104

To appear in: *Journal of Physics and Chemistry of Solids*

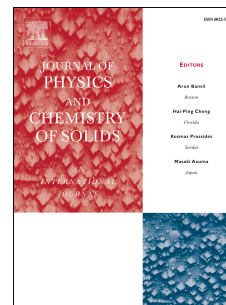
Received Date: 26 April 2017

Revised Date: 29 May 2017

Accepted Date: 15 June 2017

Please cite this article as: H. Lahmar, M. Benamira, F.Z. Akika, M. Trari, Reduction of chromium (VI) on the hetero-system $\text{CuBi}_2\text{O}_4/\text{TiO}_2$ under solar light, *Journal of Physics and Chemistry of Solids* (2017), doi: 10.1016/j.jpcs.2017.06.021.

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Reduction of Chromium (VI) on the Hetero-system CuBi₂O₄/TiO₂ under Solar LightH. Lahmar¹, M. Benamira^{2*}, F.Z Akika², and M. Trari¹¹*Laboratory of Storage and Valorization of Renewable Energies, Faculty of Chemistry (USTHB), 16111 Algiers, Algeria.*²*Laboratory of Interaction Materials and Environment (LIME), University of Mohamed Seddik Ben Yahia, 18000 Jijel, Algeria.***Corresponding author: m_benamira@univ-jijel.dz***Abstract**

The CuBi₂O₄/TiO₂ heterojunction was tested with success for the photo-catalytic reduction of chromate ions under sunlight. CuBi₂O₄, prepared by nitrate process, was characterized photo-electrochemically. The oxide is stable against photo corrosion by consumption of holes in presence of oxalic acid. The light absorption promotes electrons in the conduction band of the sensitizer (CuBi₂O₄) with a very negative potential (-1.74 V_{SCE}) to participate in the exchange of the electron with HCrO₄⁻. The enhanced activity is due to electron injection of activated CuBi₂O₄ into TiO₂-CB (-0.97 V_{SCE}). The band gap of the semiconductor CuBi₂O₄ is 1.50 eV with a direct optical transition. This compound is a *p*-type semiconductor with a flat band potential of -0.39 V_{SCE} and activation energy of 0.18 eV. The electrochemical impedance spectroscopy was undertaken to study the semiconductor/electrolyte interfacial phenomena. The photactivity on the heterojunction is strongly enhanced. A remarkable performance is obtained in less than 4 h for a concentration of 30 mg in (Cr (VI)) at pH ~ 4 and a dose of 1 mg/ml; a 98% reduction has been obtained. The kinetic of chromate photoreduction is well described by the Langmuir-Hinshelwood model. The chromate elimination obeys to a pseudo-first order kinetic with an apparent rate constant of 0.014 min⁻¹.

Keywords: Hetero-system CuBi₂O₄/TiO₂; Chromate reduction; solar light; Semiconductor photocatalysis; Langmuir-Hinshelwood.

Introduction

The growth of population and agro-industrial activities are increasing pressure on water reserves. The water treatment seems to be an inevitable solution for the environmental

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