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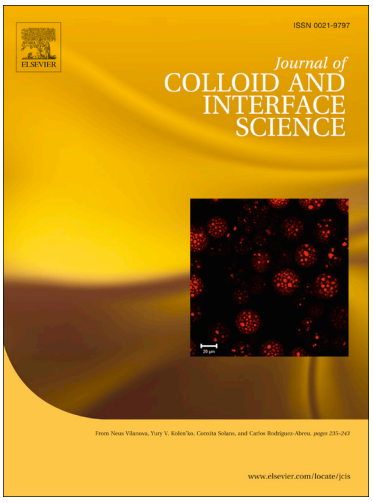

Controlled Hydrothermal Synthesis of Bismuth Oxychloride/Bismuth Oxybromide/Bismuth Oxyiodide Composites Exhibiting Visible-Light Photocatalytic Degradation of 2-Hydroxybenzoic Acid and Crystal Violet

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PII: S0021-9797(18)30490-9
DOI: https://doi.org/10.1016/j.jcis.2018.04.097
Reference: YJCIS 23562

To appear in: *Journal of Colloid and Interface Science*

Received Date: 25 January 2018
Revised Date: 23 April 2018
Accepted Date: 25 April 2018

Please cite this article as: C-W. Siao, H-L. Chen, L-W. Chen, J-L. Chang, T-W. Yeh, C-C. Chen, Controlled Hydrothermal Synthesis of Bismuth Oxychloride/Bismuth Oxybromide/Bismuth Oxyiodide Composites Exhibiting Visible-Light Photocatalytic Degradation of 2-Hydroxybenzoic Acid and Crystal Violet, *Journal of Colloid and Interface Science* (2018), doi: https://doi.org/10.1016/j.jcis.2018.04.097

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Abstract

This paper presents an unprecedented systematic synthetic study of a controlled hydrothermal method for the preparation of bismuth oxychloride/bismuth oxybromide/bismuth oxyiodide ternary composites ($BiO_xCl_y/BiO_mBr_n/BiO_pI_q$). The pH, temperature, and KCl:KBr:KI molar ratio for the reactions were adjusted to control the compositions and morphologies of $BiO_xCl_y/BiO_mBr_n/BiO_pI_q$ composites. Scanning electron microscopy-energy dispersive X-ray spectroscopy, transmission electron microscopy, X-ray diffraction, ultraviolet–visible diffuse reflectance spectroscopy, Brunauer–Emmett–Teller specific surface areas, photoluminescence spectroscopy, and X-ray photoelectron spectroscopy, and electron paramagnetic resonance spectroscopy were applied to the products. The photocatalytic activities of dispersions were examined by monitoring the 2-hydroxybenzoic acid (HBA) and crystal violet concentrations. Various scavengers