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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

Ciao-Wei Siao, Hung-Lin Chen, Li-Wen Chen, Jia-Lin Chang, Tsung-Wen Yeh, Chiing-Chang Chen

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Degradation of 2-Hydroxybenzoic Acid and Crystal Violet**

Ciao-Wei Siao ^a, Hung-Lin Chen ^b, Li-Wen Chen ^a, Jia-Lin Chang ^a, Tsung-Wen Yeh ^a,
Chiing-Chang Chen ^{a*}

^a Department of Science Education and Application, National Taichung University of Education, 403, Taiwan

^b Department of Chemistry, National Central University, Taoyuan 320, Taiwan

* Author to whom correspondence should be addressed

E-mail: ccchen@mail.ntcu.edu.tw

Fax: +886-4-2218-3560

Tel: +886-4-2218-3406

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 ($\text{BiO}_x\text{Cl}_y/\text{BiO}_m\text{Br}_n/\text{BiO}_p\text{I}_q$). The pH, temperature, and KCl:KBr:KI molar ratio for the reactions were adjusted to control the compositions and morphologies of $\text{BiO}_x\text{Cl}_y/\text{BiO}_m\text{Br}_n/\text{BiO}_p\text{I}_q$ 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

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