Fe₂O₃/TiO₂ Nanocomposite for Photocatalytic Degradation of Antibiotics

Chunli Liu, Yuefa Jia and GuoDong Gong
Department of Physics and Oxide Research Center, Hankuk University of Foreign Studies, Yongin 17035, Korea
Corresponding authors: Tel:+82-31-330-4733, +86 21 66137276. E-mail address: chunliliu@hufs.ac.kr (Chunli Liu).

The resulting water pollution by the use of antibiotics in a wide range of human activities has been receiving special attention in recent years. Moreover, due to the stable naphthacene ring structure of antibiotic and inhibition of microorganisms, antibiotics are hardly removable by conventional water treatment processes. Meanwhile, photocatalytic technology has been described as one of the most promising way to disposal of antibiotics. In this paper, Fe₂O₃/TiO₂ nanocomposite were successfully synthesized by co-precipitation method using Fe(NO₃)₃ ⋅ 9H₂O and Ti(SO₄)₂ as raw materials. Structural and textural features of the mixed oxide samples were characterized by X-ray diffractometer, field emission scanning electron microscopy and energy-dispersive X-ray. The effects of initial concentration of oxytetracycline (OTC), different competitive ions and organics on the photocatalytic degradation rate of OTC by the Fe₂O₃/TiO₂ nanocomposite were analyzed under UV and visible light irradiation. The results indicate that the optimized initial concentration of OTC was 50 mg/L to achieve the best photocatalytic efficiency. Cu²⁺, NH₄⁺, C₃H₈O and EDTA in the aqueous suspension were found to suppress the degradation rate of OTC, whereas the effect of NO₃⁻ and H₂C₂O₄ can be ignored.