

Photocatalytic Oxidation of Organic Pollutants using Bi₂O₃/TiO₂ Modified Natural Fiber

Ashiqur Rahman, Jiang Long Yu

Contact information: Department of Chemical Engineering, School of Engineering, Faculty of Engineering and Built Environment, University of Newcastle NSW, 2308 Australia

The surface of the jute fibre was modified by using Bi₂O₃/TiO₂ composite to prepare photocatalytic fiber. Maleic acid was used as an organic binder, and the coating process was conducted with heat-treatment at 240 °C. At first, the Bi₂O₃/TiO₂ composite was synthesized by incorporating TiO₂ nanoparticles onto a Bi₂O₃ phase. Subsequently, the photocatalytic fiber was prepared by incorporating the Bi₂O₃/TiO₂ composite onto the surface of the fiber. The Bi₂O₃/TiO₂ composite-modified fiber was characterized by field-emission scanning electron microscopy (FESEM), energydispersive X-ray spectroscopy (EDX), X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), and UV-visible spectroscopy. The synthesized composite exhibited notably high photocatalytic activity under visible light irradiation of λ up to 420 nm, whereby it could decompose organic pollutants in the aqueous and gaseous phases. Because of increasing environmental concerns, this photocatalytic system could be an important candidate for decomposing organic pollutants.