

The zinc ferrite decorated unexfoliated graphitic carbon nitride for effective antibiotic degradation under visible light

Abstract

The antibiotic pollutant treatment in wastewater using conventional method remains a challenge. One of the most fluoroquinolone antibiotics family used by human and animal cure is ciprofloxacin (CIP). CIP has exhibited as a recalcitrant compound in nature with concentration from ng to mg. To overcome this issue, recent technologies have applied such as photocatalysis technology for water decontamination. Furthermore, photocatalyst materials that used in this research were zinc ferrite and graphitic carbon nitride. A simple hydrothermal-coprecipitation method has succeed to synthesis zinc ferrite. While, unexfoliated graphitic carbon nitride (ZFO@ue-CN) was synthesized by calcination at 550 °C for 4 h under air condition. A heterostructure approach combining zinc ferrite and unexfoliated graphitic carbon nitride (ZFO@ue-CN) has been investigated as a potential solution. In this study, a ZFO@ue-CN was constructed by calcination method under atmosphere condition at 400 °C for 2 h. The ZFO@ue-CN has been characterized involving structural, morphological, and optical. Furthermore, ZFO@ue-CN exhibited excellent degradation performance with over 88% removal of ciprofloxacin. The heterojunction formation of ZFO@ue-CN nanocomposite provide more efficient electron transfer compared to single material. Combination between metal oxide@ue-CN can open up the new platform for simple material preparation, nevertheless it can keep the photodegradation performance. This result also emphasizes that the ZFO@ue-CN nanocomposites has prominent application for wastewater treatment.

Keywords

Antibiotic; Ciprofloxacin; Heterojunction; Unexfoliated Graphitic Carbon Nitride; Zinc Ferrite