

Improved photocatalytic performance of ZnO through AgCu bimetal coupling for the photodegradation of nitrobenzene

ABSTRACT

A ZnO semiconductor with bimetals (Ag and Cu) coupled in the matrix was successfully prepared using a microwave irradiation technique under a very low synthetic temperature and power of 120°C and 240 W, respectively. The phase, structural, morphological, and elemental compositions of the synthesized AgCu-ZnO photocatalyst were investigated using transmission electron microscopy, field emission scanning electron microscopy, X-ray diffraction and energy dispersed X-ray and X-ray fluorescence spectroscopy. The band gap energy of the photocatalyst was estimated from the absorption data obtained in UV-Vis spectroscopic analysis. The photodegradation efficiency of the AgCu-ZnO photocatalyst immobilised on a glass plate was evaluated using nitrobenzene (NB) as the model organic pollutant. The immobilized AgCu/ZnO photocatalyst effectively degraded 99% of 20 ppm NB at an optimum catalyst loading of 0.75 g after 2 h of visible light irradiation.

Keyword: Photodegradation; AgCu/ZnO photocatalyst; Immobilization; Nitrobenzene