

Microwave synthesis of magnetically separable ZnFe₂O₄-reduced graphene oxide for wastewater treatment

ABSTRACT

A magnetically separable ZnFe₂O₄-reduced graphene oxide (rGO) nano-composite was synthesised via a microwave method. Field emission scanning electron microscopy images of the nano-composite showed a uniform dispersion of nanoparticles on the rGO sheets. The performance of the nano-composite in wastewater treatment was assessed by observing the decomposition of methylene blue. The nano-composite showed excellent bifunctionality, i.e. adsorption and photocatalytic degradation of methylene blue, for up to five cycles of water treatment when illuminated with light from a halogen bulb. In contrast, water treatment with the nano-composite without illumination and the illuminated rGO, with no decoration of nanoparticles, diminished significantly after the first treatment. The reclamation of the ZnFe₂O₄-rGO nano-composite from treated water could be easily achieved by applying an external magnetic field.

Keyword: Graphene; Nanoparticles; Microwave; Photocatalysis; Wastewater treatment