

Hydrothermally prepared graphene-titania nanocomposite for the solar photocatalytic degradation of methylene blue

ABSTRACT

Reduced graphene oxide/titania (rGO/TiO₂) nanocomposites were prepared by hydrothermal method at different reaction temperatures and characterized by powder X-ray diffraction, transmission electron microscopy, micro-Raman spectroscopy, X-ray photoelectron spectroscopy, and photoluminescence spectroscopy techniques, respectively. The photocatalytic properties of the nanocomposites were investigated toward the degradation of methylene blue under natural sunlight. The rGO/TiO₂ shows better photocatalytic activity due to the extended visible light absorption, excellent adsorptivity, and effective electron transfer process than the other controlled photocatalysts. In addition, rGO/TiO₂ shows good sustainability after subjecting it to five consecutive cycles of photodegradation. This enhanced photocatalytic performance and good sustainability toward dye removal makes this rGO/TiO₂ nanocomposite as a potential candidate for wastewater treatment in textile and dyeing industries.

Keyword: Graphene; Methylene blue; Nanocomposite; Photocatalysis; Titania; Water purification