

Photocatalytic degradation performance driven by UV and Visible irradiation of reduced graphene oxide– Fe₃O₄ nanocomposite

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Abstract

Contamination in our aquatic system occurs mainly due to the presence of organic dyes dumped by leather, textile, pharmaceutical industries and heavy metal ions concentration (such as lead, mercury, arsenic, zinc, cobalt, chromium etc.). These taints are proving massive threat to human health by spreading into our food chain system. Our present work overviews incessant research interest to synthesis of highly efficient graphene based nanocomposite as photocatalyst and absorbent for removal of contamination from aquatic system. Reduced graphene oxide–Fe₃O₄ (rGO–Fe₃O₄) nanocomposite was synthesized by one-step solvothermal route. The as-synthesized nanocomposite was characterized by X-ray powder diffraction, scanning electron microscope, field emission scanning electron microscope, Raman spectroscopy, Fourier transform infrared spectroscopy and UV-VIS spectroscopy for confirmation of rGO–Fe₃O₄ formation. FE-SEM analysis shows the presence of Fe₃O₄ nanoparticles, distributed uniformly and anchored onto the wrinkled graphene sheets. The photocatalytic degradation performance of rGO–Fe₃O₄ nanocomposite was investigated under UV and Visible irradiation for methyl blue aqueous solution. UV-visible spectroscopy confirmed that the photo-decomposition of methyl blue from aqueous solution. In addition, the role of substituent Fe₃O₄ in nanocomposites in terms of adsorption for As(V) and As(III) were analyzed by Atomic absorption spectroscopy. Hence, rGO–Fe₃O₄ shown promising nanocomposite as photocatalyst and absorbent for treatment of contaminated water.

Keywords: Graphene oxide, Nanocomposite, Photocatalysis, Organic dyes, UV-irradiation

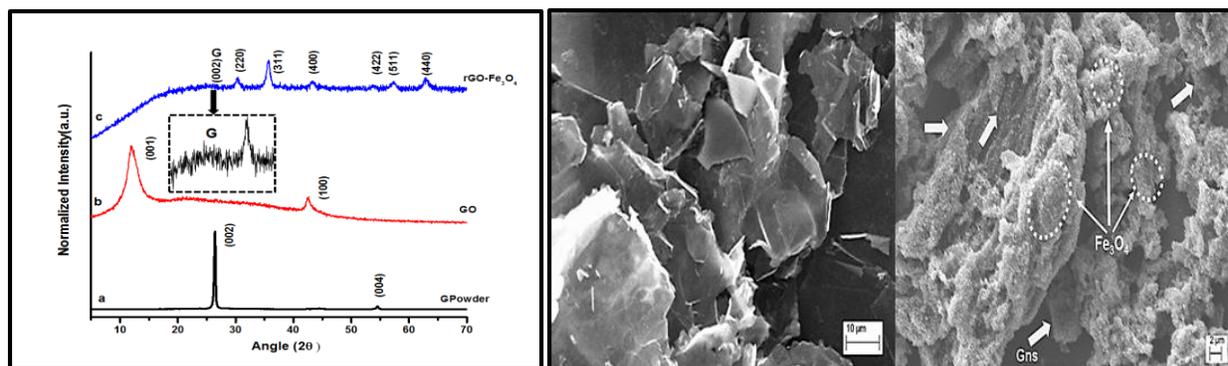


Fig. (a) XRD of rGO-Fe₃O₄ nano composite (b) SEM of graphene oxide and rGO-Fe₃O₄ nano composite