

INTISARI

Green Synthesized Nanokomposit Fe₃O₄/rGO sebagai Fotokatalis Limbah Rhodamine B

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Pada penelitian ini berhasil dilakukan proses *green synthesis* serta diketahui struktur kristal, sifat magnetik, dan tingkat absorpsi nanokomposit Fe₃O₄/rGO, juga pengaruh massa katalis terhadap degradasi limbah *rhodamine b* (RhB). Metode yang digunakan untuk membuat nanokomposit Fe₃O₄/rGO adalah *green synthesis* menggunakan ekstrak *Moringa oleifera* (MO) dan *Amaranthus viridis* (AV). Karakterisasi hasil penelitian dilakukan menggunakan *X-Ray Diffractometer* (XRD), *Vibrating Sample Magnetometer* (VSM), dan Spektrofotometer *UV-Visible* (UV-Vis). Hasil dari karakterisasi XRD menunjukkan bahwa nanokomposit Fe₃O₄/rGO memiliki struktur kristal *cubic inverse spinel* dengan ukuran kristalit $8,83 \pm 1,30$ nm dan parameter kisiya $7,90 \pm 1,43$ Å. Sifat magnetik material berdasarkan karakterisasi VSM adalah mendekati superparamagnetik dengan magnetisasi saturasi 21,7 emu/g. Dari hasil analisis UV-VIS diketahui bahwa nanokomposit Fe₃O₄/rGO memiliki panjang gelombang serapan 308-343 nm dengan energi celah pita sebesar $2,454 \pm 0,010$ eV. Melalui uji fotokatalitik diperoleh hasil degradasi limbah RhB paling maksimal pada massa 0,07 g dengan waktu penyinaran 180 menit dengan degradasi 98,2%.

Kata kunci: fotokatalis, Fe₃O₄/rGO, *green synthesis*, *rhodamine b* (RhB)

ABSTRACT

Green Synthesized Fe₃O₄/rGO Nanocomposites as Rhodamine B Waste Photocatalyst

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In this research, the green synthesis process was successfully carried out and the crystal structure, magnetic properties, and absorption rate of Fe₃O₄/rGO nanocomposites were known, as well as the effect of catalyst mass on the degradation of rhodamine b waste. The method used to make Fe₃O₄/rGO nanocomposite is green synthesis using Moringa Oleifera (MO) and Amaranthus Viridis (AV) extracts. Characterization of the results was carried out using X-Ray Diffractometer (XRD), Vibrating Sample Magnetometer (VSM), and UV-Visible Spectrophotometer (UV-Vis). The results of XRD characterization show that the Fe₃O₄/rGO nanocomposite has a cubic inverse spinel crystal structure with a crystallite size of $8,83 \pm 1,30$ nm and a lattice parameter of $7,90 \pm 1,43$ Å. The magnetic properties of the material based on VSM characterization are close to superparamagnetic with a saturation magnetization of 21.7 emu/g. UV-VIS analysis showed that Fe₃O₄/rGO nanocomposite has an absorption wavelength of 308-343 nm with a band gap energy of $2,454 \pm 0,010$ eV. Through photocatalytic tests, the maximum degradation of RhB waste was obtained at a mass of 0.07 g with an irradiation time of 180 minutes with 98.2% degradation.

Keywords: photocatalyst, Fe₃O₄/rGO, green synthesis, rhodamine b