

Photocatalytic Degradation of Methylene Blue Dye by Nanocomposite Based on Mg-Al Layered Double Hydroxides.

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With the increasing development of industries, water pollution by organic pollutants such as dyes has become a serious environmental crisis [1]. The purpose of this research is to design and synthesize an environmentally friendly nanocomposite based on layered double hydroxide (LDH) to enhance the separation of charge carriers and improve the photocatalytic performance for the decomposition of the cationic dye methylene blue (MB) under visible light irradiation. Composite prepared via hydrothermal and co-precipitation methods. Various analyses including Fourier transform infrared spectroscopy (FT-IR), field emission scanning electron microscopy (FE-SEM), transmission electron microscopy (TEM), X-ray diffraction (XRD), energy dispersive X-ray (EDX), ultraviolet-visible diffuse reflectance spectroscopy (UV-Vis DRS), Dynamic Light Scattering (DLS) and Zeta Potential and photoluminescence (PL) were conducted to characterize the synthesized samples. Additionally, various electrochemical studies such as electrochemical cyclic voltammetry (CV), electrochemical impedance spectroscopy (EIS), transient photocurrent (TPC), and linear scanning voltammetry (LSV) were performed to further investigate the synthesized materials and study the fate of electrons generated under light irradiation.

The effect of absorption, amount of catalyst and pH on the photocatalytic efficiency of pollutant degradation was investigated and the optimal reaction conditions were determined. Through Scavenger tests, the active agents involved in the photodegradation of MB were identified, and a photocatalytic degradation mechanism for MB was proposed. The synthetic Mg-Al LDH-based composite appears to be very promising for use in a variety of commercial domains and industries in the future. They can also be employed to photodegrade other organic contaminants.

Keywords: Photocatalyst, Layered Double Hydroxide, Methylene Blue

References

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