

**MODIFICATION AND CHARACTERIZATION OF
HETEROJUNCTION SrTiO₃/g-C₃N₄ FOR
PHOTODEGRADATION OF REACTIVE RED 4
DYES**

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This Final Year Project Report entitled “Modification and Characterization of Heterojunction SrTiO₃/g-C₃N₄ for Photodegradation of Reactive Red 4 Dyes” was submitted by Athirah Ainiyah Binti Azman in partial fulfilment of the requirements for the Degree of Bachelor of Science (Hons.) Chemistry with Management, in the Faculty of Applied Sciences, and was approved by

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ABSTRACT

MODIFICATION AND CHARACTERIZATION OF HETEROJUNCTION SrTiO₃/g-C₃N₄ FOR PHOTODEGRADATION OF REACTIVE RED 4 DYES

A heterojunction SrTiO₃/g-C₃N₄ photocatalyst with different mass ratios was prepared by using calcination synthesis. In this process, two conditions were used which are dry and wet methods. RR4 dye was used as a model pollutant to measure the photocatalytic activity of prepared SrTiO₃/g-C₃N₄ at various ratios. Fourier Transform Infrared spectroscopy (FTIR) and Ultraviolet-Visible diffuse reflectance spectra (UV-Vis/DRS) were used for the characterization study. In FTIR, Sr-O and Ti-O bonds were observed at 858 and 596 cm⁻¹ respectively. The -OH peak for SrTiO₃ was observed at 1637 cm⁻¹. Ti-OH peak was observed at around 3443–3447 cm⁻¹. The vibration observed at 805 cm⁻¹ indicates the s-triazine ring, and the strong peak observed at 1200-1700 cm⁻¹ indicates the g-C₃N₄ hetero ring stretching vibration. In UV-Vis/DRS, the absorption edge of pure SrTiO₃ was about 380 nm and the absorption edge of g-C₃N₄ was about 457 nm. The absorption edge of the 10:90 SrTiO₃/g-C₃N₄ presents a bathochromic shift. The bandgap energy for raw g-C₃N₄, SrTiO₃, and 10:90 SrTiO₃/g-C₃N₄ was approximately 2.7, 3.2, and 2.75 eV, estimated using $E = hc/\lambda$ ($hc = 1240$). The redshift bandgap energy shifting of the 10:90 SrTiO₃/g-C₃N₄ sample is caused by a substantial chemical interaction between SrTiO₃ and g-C₃N₄, which results in a heterojunction effect for visible light absorption. For photocatalytic degradation, all SrTiO₃, g-C₃N₄ and prepared SrTiO₃/g-C₃N₄ samples have shown photocatalytic degradation under RR4 dye with more than 42% decolourization in 1 h of light irradiation. The modified photocatalyst with mass ratio 10:90 SrTiO₃/g-C₃N₄ under dry method show higher photocatalytic activity as compared to pure SrTiO₃ and g-C₃N₄. Ethanol solvent used in wet method was not suitable media used for SrTiO₃ and g-C₃N₄ in creating the SrTiO₃/g-C₃N₄ heterostructure.