Efficient Visible Light Removal of Organic Pollutants in Water Using Novel Synthesis of g-C3N4-CdS Nanocomposite by Pulsed Laser Ablation in Liquid

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In 2050, it is estimated that approximately 5.7 billion people will suffer due to the lack of clean water. Many studies have been developed to treat the water from various contaminants. This includes using TiO2 for the degradation of organic pollutants in water. However, it has been proven as a more effective photocatalyst under the ultraviolet region than the visible region. Therefore, the aim of this project is to synthesize an effective visible light nanocomposite using a novel method. For the first time, an efficient visible light-driven graphitic carbon nitride-cadmium sulfide (g-C3N4-CdS) nanocomposite was synthesized by using the pulsed laser ablation in liquid technique. The synthesized samples of the nanocomposite were characterized by using: Uv-Vis, XRD, SEM, TEM, FTIR, XPS, and PL. They showed that g-C3N4 -CdS nanocomposite has a band gap of 2.58 and its absorbance within the visible region has increased compared to g-C3N4. Moreover, different samples of g-C3N4-CdS with different concentrations of CdS (10%, 20%, and 30%) have been studied to test its photocatalytic performance. The 20% sample has shown the best degradation rate of the organic methylene blue dye by 100% within 2 hours. The nanocomposite has excellent stability after repeating the experiment with the same composite under the same conditions. In the future, it is expected that the synthesized nanocomposite photocatalyst will provide an effective and stable application in the field of water purification.

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