

CARBON QUANTUM DOTS: GREEN MICROWAVE-ASSISTED SYNTHESIS, PROPERTIES AND APPLICATION IN ROSE BENGAL DYE REMOVAL

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Abstract

Carbon Quantum Dots (CQDs) are an emerging class of carbon nanomaterials that have attracted growing research attention due to their unique physicochemical properties, including tunable photoluminescence, high stability, water solubility, and biocompatibility. ^[1] There environmentally friendly and low-cost synthesis routes, such as microwave-assisted methods, make them attractive candidates for practical applications in catalysis, sensing, and wastewater treatment. ^[2, 3] Among common water pollutants, organic dyes such as Rose Bengal, Methylene Blue, and Rhodamine B are particularly problematic due to their high stability and toxicity. ^[4, 5] In the present work, pristine CQDs were synthesized by the microwave-assisted method, which represents a simple, rapid and green synthesis approach that has proven to be suitable for the preparation of CQDs. ^[6] The obtained nanoparticles demonstrated dual functionality in the removal of Rose Bengal dye: 28% removal by adsorption in the dark and an additional 29% degradation under UV irradiation, giving a total efficiency of 57%. These results confirm the synergistic effect of adsorption and photocatalysis, as well as the potential of pristine CQDs for wastewater treatment.

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References

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