

Title : Synthesis and characterization of graphene quantum dots under heat by electrochemical process.

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ABSTRACT

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This research focuses on the synthesis, characterization, and potential applications of graphene quantum dots (GQDs), with a particular emphasis on their optical and electronic properties to achieve high-quality GQDs with tunable characteristics. In this study, an electrochemical synthesis process was used to synthesize GQDs, employing an EE pencil rod as the electrode. The precursor solution consisted of 0.1 M citric acid with varying KCl concentrations of 0.15 M, 0.25 M, 0.30 M, 0.35 M, and 0.45 M, with synthesis conducted at temperatures of 50°C and 80°C.

The results indicate that GQD sizes remain consistent across all conditions, as determined by the absorption band edge from the Tauc plot, which falls within the range of approximately 3.2–3.6 eV. Photon emission varies depending on synthesis conditions, with the highest photon emission observed at 0.15 M KCl and 50°C, reaching approximately 250,000 photon counts per second. Additionally, hydrodynamic size is influenced by temperature, particularly when KCl concentration exceeds 0.3 M, leading to a significant increase in particle size.

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