

Facile and Green Electrochemical Synthesis of Graphene Quantum Dots with Tunable Surface Properties

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Abstract

Graphene quantum dots (GQDs) have received much attention nowadays for their particle size-dependent optoelectrical properties, high chemical stability, and low toxicity. In this study, a simple and a green approach for fabricating graphene quantum dots via an electrochemical route by using a graphite-based electrode system is presented. This approach favours and achieves a fine control over the exfoliation and cutting of graphene layers at low temperature and under mild reaction conditions without the use of any toxic and strong chemical agents. Moreover, through adjustments and controls over important electrochemical parameters like potential, electrolyte, and time, an excellent regulation and optimization over the particle size and surface chemistry of GQDs can be obtained. GQDs synthesized via this approach have an excellent particle dimension at the nanoscale and high-water solubility. GQDs synthesized via an electrochemical approach also have a highly crystalline structure consisting of plenty of oxygen containing functional groups on the surface, which may have a significant impact on their various applications.

References

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