

# Green Synthesis and Characterization of Graphene Quantum Dots from Key Lime Juice

## Abstract

Graphene quantum dots (GQDs) are one of the members of graphene family with unique properties such as quantum confinement effect, photoluminescence effect, and strong conductivity. This work prepared the GQDs using lime juice obtained from the waste of locally grown key limes as the precursor. The hydrothermal method was used in the preparation of the GQDs. The fluorescence effect of the GQDs was observed under a UV lamp irradiation while other characterization was conducted using high-resolution transmission electron microscopy (HRTEM), atomic force microscopy (AFM), X-ray powder diffraction (XRD), and Raman spectroscopy. The GQD preparation was successful with the emission of a strong blue color when the GQD was put under a 365 nm UV light irradiation. It was found that the particle size of the prepared GQDs was in the range of 0.7–2.8 nm with an average diameter of  $1.3 \pm 0.5$  nm. The characterization results proved the formation of GQDs as one of the graphene nanomaterials.

## Keywords

Biomass; Fluorescence; Graphene; Graphene quantum dots; Hydrothermal