Researchers at the University of South Florida have developed a novel synthesis method for graphene quantum dots (GQDs) that is both fast and facile.

GQDs have exhibited great potential for use in a range of fields, including optics, electronics, and biomedicine. The biomedical applications of GQDs represent a relatively new, yet fast growing sector; some applications include bioimaging, biosensing, and drug delivery. GQDs are a promising alternative to traditional fluorophore probes due to their high resistance to photobleaching and exceptional resistance to chemical degradation. However, the difficult synthesis of GQDs limits their applications. While progress has been made in effectively synthesizing GQDs, there are still many drawbacks to current methodologies. One such drawback is that certain methods use graphene oxide (GO) as the starting material, but GO must first be synthesized from graphite which requires extensive time and multiple steps while producing only a small amount of GQDs. Additionally, this method does not produce GQDs with monodisperse and narrow size distributions.

Our inventors have developed a quick, inexpensive, and simple approach to synthesize water-soluble GQDs via an oxidation process which cuts GQDs directly from graphite. This one-step process takes as little as 90 minutes to complete while yielding a high amount of product. The GQDs produced have an average particle size of 1-20nm as well as a monodisperse size distribution. Tests with live GQD-labeled cells have demonstrated their bioimaging ability along with their long-term stability. This novel synthesis method is promising for the simple production of GQDs that are applicable to a wide range of fields.

**ADVANTAGES:**

- Inexpensive, high-yield approach
- Produces small, monodisperse GQDs
- Yields GQDs with low cytotoxicity and high biocompatibility
- Applicable to a wide range of fields

**Fluorescent Graphene Quantum Dots for Biomedical Imaging**

The Fluorescence Emission Spectra of GQD Using This Method in Acidic Conditions at Various Temperatures

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