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Fabrication of an optical sensor for the detection of iron(II) ions using the green synthesized CQDs extracted from *Urtica dioica*

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Abstract

Carbon Quantum Dots (CQDs), due to their wide range of sources and their features such as fluorescence emission, have shown many different incredible applications in the past years. In this study, hydrothermal method, as a reliable and low cost method, was used for green synthesis of CQDs from *Urtica dioica*. For the hydrothermal process, 1.5 g of the plant was powdered and mixed with 30 ml of water. After that, the solution was sonicated for 30 min at the room temperature (25 °C). The solution was then transferred into a hydrothermal reactor and was placed and heated in an oven at 250 °C for 6 h. The resulting solution was then allowed to cool down to room temperature. The synthesized CQDs were purified in 3 steps, first by Whatman filter paper, after that, they were centrifuged at 20000 rpm for 20 min, and at last, by 0.22µm syringe filter. The synthesized CQDs were then used as a probe for metal detection against 10 mM of Cu(II), Hg(II), Pb(II), Fe(II), and Fe(III). Fluorescence quenching studies revealed that these CQDs can be used as an optical sensor for detecting trace amounts of iron(II) ions. **Keywords:** Graphene quantum dots, Optical sensor, Photoluminescence, Hydrothermal