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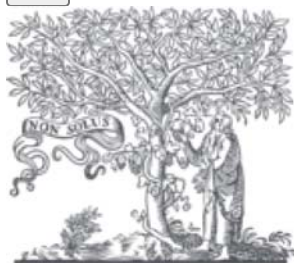
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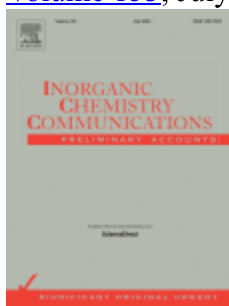
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Short communication

Synthesis of N, S co-doped carbon quantum dots (N,S-CQDs) for sensitive and selective determination of mercury (Hg^{2+}) in *Oreochromis niloticus* (Tilapia fish)

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Highlights

- •

A green-emitting N,S-CQDs fluorescent probe was developed for sensing of Hg²⁺ ions.

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The synthesis was achieved hydrothermally using CA, glutamine and Na₂S as precursors.

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The N,S-CQDs showed selectivity towards Hg²⁺ with a LOD of 28.9 nM.

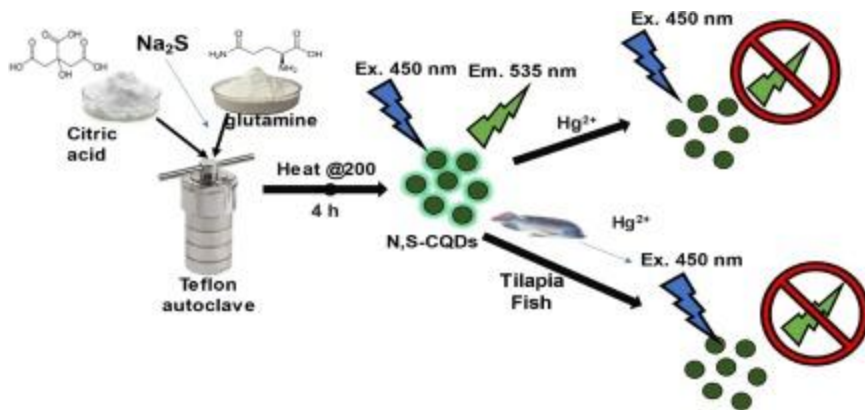
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Application as nanoprobe in *Oreochromis niloticus* showed excellent reliability.

Abstract

This study reported the synthesis of green-emitting N,S-doped carbon quantum dots (N,S-CQDs) through a one-step, facile, and fast hydrothermal technique using citric acid, glutamine, and Na₂S as the carbon, nitrogen, and sulphur sources respectively. The fluorescence efficiency of the developed nanosensor was investigated by varying the duration of synthesis (4, 5, and 6 h). Characterization of the N-CQDs was achieved using Fourier-Transform Infra-red Spectroscopy (FTIR), High-resolution transmission electron microscope (HRTEM), ultraviolet–visible spectroscopy (UV–Vis), and X-Ray diffraction analysis (XRD). The as-synthesized N,S-CQDs are small (average size of 3.45 ± 0.86 nm), spherical, and displayed green emission (535 nm) with a fluorescent quantum yield (QY) of 10.35%. FTIR analysis reveals carboxylic, hydroxyl, and conjugated amide functional groups. The fluorometric study showed that the developed nanosensor was selective and sensitive towards Hg²⁺ ions in the midst and absence of interfering ions with a detection limit (LOD) of 28.9 nM. The static quenching mechanism was proposed based on lifetime and UV results. Furthermore, it was used as a nanoprobe for Hg²⁺ determination in *Oreochromis niloticus* with recoveries of 96.7–108.6% (RSD < 4.1%), indicating the as-synthesized N,S-CQDs have potentials as a nanoprobe for Hg²⁺ determination in sea foods.

Graphical abstract



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Keywords

Carbon quantum dots
 Tilapia
 Nanoprobe
 Hg^{2+}
 Glutamine
 Green emission

Data availability

Data will be made available on request.

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