

## Cd<sup>2+</sup> ion adsorption and reuse of spent adsorbent with N-doped carbon nanoparticles coated on cerium oxide nanorods nanocomposite for fingerprint detection

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### Abstract

This work provides a novel approach to prepare nitrogen-doped carbon nanoparticles (CNPs) coated on a cerium oxide nanorods nanocomposite (N-CNPs/CeO<sub>2</sub>NRs/nC) for the uptake of cadmium (Cd<sup>2+</sup>) ion and reusing the spent adsorbent, Cd<sup>2+</sup>-CNPs/CeO<sub>2</sub>NRs/nC for latent fingerprint detection (LFP). N-CNPs were prepared by a thermal method with urea and cabbage powder as precursors. N-CNPs/CeO<sub>2</sub>NRs/nC was developed with N-CNPs and CeO<sub>2</sub>NRs with a hydrothermal method and characterized by various instrument methods like UV-visible, FT-IR, XRD, BET, XPS, SEM, and TEM. The N-CNPs/CeO<sub>2</sub>NRs/nC had a greater surface area (9.96 m<sup>2</sup>/g) than N-CNPs (0.64 m<sup>2</sup>/g). The synthesized N-CNPs/CeO<sub>2</sub>NRs/nC proved to be a good sorbent material to remove Cd<sup>2+</sup> from water at a maximum pH 8 and dosage 10 mg/L. The adsorption was spontaneous and endothermic at 25 °C. In addition, Cd<sup>2+</sup>-N-CNPs/CeO<sub>2</sub>NRs/nC has shown to be sensitive and selective for LFP identification on several porous substrates. It is therefore a good labeling agent for latent fingerprint identification in forensic science.

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### Biography

BG Fouda-Mbanga completed his graduation in the Department of Chemical Sciences in the University of Johannesburg, Johannesburg, South Africa.