Synthesis of Carbon Dots from *Momordica Charantiafruit* as a Platform for Cadmium (Ii) Sensing and Antibacterial Activity

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ABSTRACT

Introduction: Carbon dots (CDs) are a new class of fluorescent nanomaterials thathave less the 10 nm particle size. The applications of CDs are drug delivery, synthetic chemistry, metal sensing, disease detection, and biosensing.

Objective: The current study aims to synthesize the CDs from *Momordicacharantia* fruits, characterize them, and assess their antibacterial activity.

Methodology: The hydrothermal method was used for the synthesis of CDs. UV visible spectroscopy was used for the confirmation ofCDs. X-ray Diffraction (XRD), Scanning Electron Microscopy (SEM), and Fourier-Transform-infrared (FTIR) techniques were used to characterize the synthesized CDs.

Results: The limit of detection (LOD) and limit of quantification (LOQ) of CDs for the sensing of Cd(II) in water samples were reported to be $0.5x10^{-6}$M and 1.8x10-6 M, respectively. The CDs exhibited good antibacterial activity against the tested gram-negative bacterial strain *Escherichiacoli (E. coli*)and zones of inhibition ranging from 2,3 mm, 5.6 mm, 10.5 mm, 14.2 mm, 17.00 mm, 21.3 mm, 27.0 mm, and 23.00 mm were reported at 500/mL concentrations of CDs. The CDs were inactive against *Streptococcus mutans, Klebsiella pneumoniae and Pseudomonas aeruginosa*bacterial strains.

Conclusions: The synthesized CDs can be utilized for antibacterial activity against *Escherichia coli*and Cd(II) sensing.

Keywords: Carbon dots, Antibacterial activity, XRD, FTIR, SEM