Potential forensic applications of carbon nanodots

T Sowmyya

Forensic Science Unit, Department of Chemistry, University College of Science, Osmania University, Hyderabad – 500007, Telangana, India

[dr.sowmyya@osmania.ac.in](mailto:dr.sowmyya@osmania.ac.in)

**Abstract**.

Nanotechnology is a flourishing branch of research due to the incredible properties nanomaterials exhibit over their massive counterparts. Carbon nanodots are the members of the carbon nanoparticle family with prominent properties like hydrophilicity, low toxicity, biocompatibility, increased stability and ease of functionalization. They are excellent replacement to metal based quantum dots which are highly toxic. Carbon nanodots are being used in the fields of medicine, environmental science, drug delivery and forensic science. Applications of carbon nanodots can be seen in bio imaging, bio sensing, cancer diagnosis and treatment, biological activities, solar cells and as photo catalysts. Forensic science is the science behind crime investigation and evidence analysis. Development of novel, rapid, on site testing materials for accurate, specific and sensitive detection of forensic evidences is required for delivery of justice to the victims of crime. Carbon nanodots have shown promising applications in the field of forensic science as well [1]. Use of carbon nanodots as invisible ink for anti-counterfeiting application of currency and security documents [2] and use of these nanomaterials in development of latent fingerprints are some forensic applications. Carbon nanodots based detection of food contaminants, heavy metal poisons, pesticides, illicit drugs [3] and explosives are other forensic applications [4]. Carbon nanodots are showing a future direction in development of on field testing kits for forensic evidences.

References:

[1] Yuan C, Wang M, Li M, Sun P, Gao R and Tang J 2022 Construction, Mechanism, and Forensic Application of Green-Light-Excited Fluorescent Carbon Dots/Diatomite Composites *ACS Sustain. Chem. Eng.* **10** 14294–308

[2] Dinake P, Phokedi G N, Mokgadi J, Mokibe T, Tlhako M, Botlhomilwe M A, Kelebemang R, Motswetla O and Present B 2022 An Innovative Microwave-Assisted One-Step Green Synthetic Approach of Biowaste Derived Fluorescent Carbon-Dot Invisible Ink for Currency Anti-Counterfeiting Applications *Nano* **17**

[3] Yen Y-T, Lin Y-S, Chen T-Y, Chyueh S-C and Chang H-T 2019 Carbon dots functionalized papers for high-throughput sensing of 4-chloroethcathinone and its analogues in crime sites *R. Soc. Open Sci.* **6** 191017

[4] Verhagen A and Kelarakis A 2020 Carbon Dots for Forensic Applications: A Critical Review *Nanomaterials* **10** 1535