National Institute of Technology Rourkela

Defence Seminar

Seminar Title	: Green Synthesis of Carbon Quantum Dots and Investigation of their Physical Properties for Various Applications
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Venue	: MC 126, Physics & Astronomy Seminar Room (https://meet.google.com/mbg-wpkx-ekg)
Date and Time	: 12 Jun 2025 (4.00PM)
Abstract	: In recent years, as an alternative to metal-based semiconductor quantum dots (QDs), carbon quantum dots (CQDs), a new class of carbon nanomaterials with a particle size of less than 10 nm, have received increasing attention among researchers because of their significant advantages in terms of low toxicity, excellent biocompatibility, low cytotoxicity, excitation wavelength dependent photoluminescence (PL) behavior, excellent water solubility, and physicochemical properties. The CQDs have excellent fluorescent properties such as broad excitation spectra, narrow and tunable emission spectra, and higher photostability against photobleaching and blinking than other fluorescent semiconductor quantum dots. Due to these outstanding properties, they have great potential applications in the fields of optoelectronics, bio-imaging, drug delivery, biosensing, catalysis, energy storage, etc. It is desirable that the method should be remarkably green, sustainable, eco-friendly, and effective in terms of technological and economic perspectives. In this research work, we propose a green, simple, eco-friendly, and low-cost approach for the synthesis of CQDs utilizing various natural biowaste as carbon precursors without using any surface passivating agents and investigate their physical and chemical properties. The synthesized CQDs using various natural green biowaste precursors through sustainable methods have shown promising potential for applications in diverse fields, including heavy metal ion sensing, supercapacitors, anticorrosion coatings, antifungal agents, and rice plant growth enhancement. This research underscores the potential of green synthesis routes to produce CQDs with desirable properties for various technological and environmental applications, paving the way for sustainable nanotechnology advancements.