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Notice for the PhD Viva Voce Examination

Ms Aishwarya Joji Mathew, Registration Number: 2290007, PhD Scholar at the Department of Chemistry, School of Sciences, CHRIST (Deemed to be University) will defend her PhD thesis at the public viva-voce examination on Tuesday, 05 May 2026 at 10.30 am in Room No. 044, Ground Floor, R&D Block, CHRIST (Deemed to be University), Bengaluru - 560029, Karnataka, India.

Title of the Thesis	:	**Carbon Dots and Their Rationally Designed Composites for Sensing Applications**
Discipline	:	**Chemistry**
External Examiner - I	:	**Dr Anitha C Kumar** Head and Professor School of Chemical Sciences Mahatma Gandhi University Kottayam - 686560 Kerala
External Examiner - II	:	**Dr Biswarup Chakraborty** Associate Professor Department of Chemistry Indian Institute of Technology Delhi Hauz Khas - 110016 New Delhi
Supervisor	:	**Dr Vinod T P** Associate Professor Department of Chemistry School of Sciences CHRIST (Deemed to be University) Bengaluru - 560029 Karnataka

The members of the Research Advisory Committee of the Scholar, the faculty members of the Department and the School, interested experts and research scholars of all the branches of research are cordially invited to attend this open viva–voce examination.

Registrar (Academics)

Place: Bengaluru
Date: 17 April 2026

ABSTRACT

Modification of carbon dots (CDs) is essential to improve their optical properties, and selective response to analytes. Rational modification of CDs can broaden their potential for fluorescence-based sensing applications. Carbon dot-based composites offer promising pathways to integrate the distinctive optical and surface characteristics of CDs into robust substrates, resulting in enhanced functionality and multifunctional performance. The usage of novel and green precursors can introduce diverse functionalities and heteroatom dopants into CDs. Although several modification strategies have been developed, challenges related to reproducibility and scalability persist. Therefore, developing novel modification approaches is crucial for achieving consistent lab-to-lab and batch-to-batch performance of CDs. In one of the research works presented in this thesis, CDs were synthesized from an unreported natural precursor, *Averrhoa bilimbi*, and the resultant CDs were utilized for the selective detection of cholesterol and chromium (VI) ions (Chapter 3). Additionally, CDs were prepared using another green precursor, the leaves of *Strobilanthes alternata* (Red-Flame Ivy) and employed to differentiate between Fe(II) and Fe(III) ions via fluorescence spectroscopy (Chapter 4). The selective fluorescence response of CDs toward specific analytes is typically not pre-designed. In another work reported herein, a rational ion-imprinting approach was adopted for the synthesis of CDs capable of detecting Cd(II) ions in aqueous solutions (Chapter 5). Furthermore, ion-imprinting was introduced on CDs to achieve the selective detection of Pb(II) ions (Chapter 6), enabling the development of highly efficient, rapid, and sensitive metal ion sensors. Building upon this, electrospun membranes were used as a support matrix to immobilize the ion-imprinted CDs, facilitating enhanced selectivity for Pb(II) ion detection (Chapter 7). The research results presented in the thesis are expected to inform and inspire further investigations and applications related to CDs.

Keywords: *Carbon dots, fluorescence sensing, ion-imprinting, selectivity, metal ions, electrospun membranes*

Publications:

1. **A. J. Mathew**, T. P. Vinod, and Y. Nair, "Ion-Imprinted Carbon Dots: Rationally Designed Fluorescent Probes for the Detection of Selected Metal Ions from Aqueous Solutions," *Nanoscale Adv.*, 2025, doi: 10.1039/D5NA00892A.
2. **Aishwarya Joji Mathew**, Vinod T. P. "Ion-Imprinting in Carbon Dots for the Detection of Cadmium (II) Ions", 202441082217, 2024
3. **Aishwarya Joji Mathew**, Varsha Lisa John, Vinod T. P. "Ion-Imprinted Carbon Dots derived from Paper Precursors for the detection of Cadmium (II) Ions", 202541005464, 2025.
4. Varsha Lisa John, Aiswarya P.S., **Aishwarya Joji Mathew,** Vinod T. P. "Fluorescence- based sensing of Cholesterol and Chromium (VI) using Carbon dots derived from Averrhoa Bilimbi fruit", 202441073071, 2024.