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# Notice for the PhD Viva-Voce Examination

Ms Manju Manuel, Registration Number: 2270120, 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 Saturday, 29 November 2025 at 10.00 am in Room No. 628, 6th Floor, R&D Block, CHRIST (Deemed to be University), Bengaluru – 560029, Karnataka, India.

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| **Title of the Thesis** | : | **Electrochemical Sensor Systems for the Detection of Sweeteners in Food Samples** |
| **Discipline** | : | **Chemistry** |
| **External Examiner - I** | : | **Dr Pannuru Venkatesu**<br>Professor<br>Department of Chemistry<br>University of Delhi<br>New Delhi - 110007<br>Delhi |
| **External Examiner - II** | : | **Dr Nishanth K G**<br>Principal Scientist<br>Centre for Sustainable Energy Technologies<br>CSIR-National Institute for Interdisciplinary Science and Technology (NIIST)<br>Thiruvananthapuram - 695019<br>Kerala |
| **Supervisor** | : | **Dr Suvardhan K**<br>Associate Professor<br>Department of Chemistry<br>School of Sciences<br>CHRIST (Deemed to be University)<br>Bengaluru - 560029<br>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:** 12 November 2025

# ABSTRACT

Sweet-tasting compounds are classified into two categories: nutritive and non-nutritive sweeteners (NNS). The non-nutritive sweeteners are widely used in the food industry due to their high sweetness, low caloric value, and cost-effectiveness. Conventional techniques for NNS detection, such as HPLC, gas chromatography, UV-Vis, and capillary electrophoresis, are limited by high cost, lack of portability, and inability to provide real-time analysis. To overcome these challenges, this study developed eco-friendly electrochemical sensors using graphite electrodes derived from discharged batteries. The graphite was converted into reduced graphene oxide (rGO) through a green synthesis process and further modified with nanocomposites, including metal-organic frameworks, metal/metal oxide nanoparticles, activated carbon, conducting polymers, and ionic liquids. Electrochemical techniques (CV, EIS, DPV) were employed to evaluate sensor performance, supported by Density Functional Theory (DFT), Monte Carlo simulations, and molecular docking studies. Key parameters such as pH, scan rate, potential window, analyte concentration, linear range, detection limit, selectivity, and reproducibility were optimized, demonstrating promising applications in food quality control.



**Keywords:** *Non-nutritive sweeteners, Electrochemical sensors, Graphite electrodes, Nanocomposites, Green synthesis, Recycled batteries, Food analysis, Sustainable analytical methods.*


**Publications:**


1. **Manju Manuel** and Suvardhan Kanchi, "Construction of a waste-derived graphite electrode integrated IL/Ni-MOF flowers/$Co_3O_4$ NDs for specific enrichment and signal amplification to detect aspartame," *Colloids Surfaces A Physicochem. Eng. Asp.*, vol. 705, no. P1, p. 135648, 2025, doi: 10.1016/j.colsurfa.2024.135648.
2. **Manju Manuel** and Suvardha Kanchi, "Ni – Co MOF Flowers / ZnO NRs Mediated Electrochemical Sensor for Rapid and Ultrasensitive Detection of Neotame in Food," *J. Electrochem. Soc.*, vol. 171, no. 12, p. 127516, 2024, doi: 10.1149/1945-7111/ada0ed.
3. **Manju Manuel**, K. Suvardhan, and V. Losetty, "Exploring a GE/Nafion/Co-MOF nanosheets/CuO NPs/GOx powered electrochemical biosensor for ultrasensitive detection of Rebaudioside A," *Nanoscale Adv.*, 2025, doi.org/10.1039/D5NA00591D.