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Notice for the PhD Viva Voce Examination

Ms Ananya S Agnihotri, Registration Number: 2090184, 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 Wednesday, 25 June 2025 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	:	**Functionalized Metal Oxide Nanoparticles Based Electrochemical Sensors for the Detection and Quantification of Pharmaceuticals**
Discipline	:	**Chemistry**
External Examiner - I	:	**Dr Mucherla Raghasudha** Associate Professor Department of Chemistry NIT, Warrangal Hanamkonda - 506004 Telangana
External Examiner - II	:	**Dr Arun Isloor** Professor Department of Chemistry NITK, Surathkal Srinivasnagar Post Mangalore - 575025 Karnataka
Supervisor	:	**Dr Nidhin M** 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: 16 June 2025

ABSTRACT

Metal oxide nanoparticles (MONPs) have emerged as key materials in electrochemical sensors, offering solutions to challenges like lower detection limits in pharmaceutical assays. Their exceptional selectivity, sensitivity, stability, and simple synthesis make them ideal for pharmaceutical applications. MONPs, integrated onto glassy carbon electrodes (GCE), enable efficient detection of pharmaceutical drugs by serving as transducer hosts.

Advancements in synthesis techniques, such as template-assisted and hydrothermal methods, have produced self-assembled nanospheres, enhancing sensor performance. Surface functionalization and MONP-based nanocomposites further reduce aggregation, improving sensor efficiency. Comprehensive characterizations, including X-ray diffraction, FTIR, SEM, TEM, and electrochemical impedance spectroscopy (EIS), reveal optimized properties like low charge transfer resistance and increased surface area.

Optimizing parameters like electrolyte pH, scan rate, analyte concentration, and potential window has enabled high-performance electrochemical sensing. Differential pulse voltammetry validated the MONPs/GCE sensor's remarkable sensitivity, wide linear range, and detection limits down to nano levels. This innovative sensor effectively detects pharmaceutical drugs with high recovery rates, demonstrating its potential as a sustainable tool for pharmaceutical analysis.

Keywords: *Magnetic nanoparticles, pharmaceutical drugs, electrochemical sensing, glassy carbon electrode, differential pulse voltammetry*

Publications:

1. **Agnihotri, A. S.,** Maria, C. A., Varghese, A., Mane, P., Chakraborty, B., & Nidhin, M. (2022). *Surfaces and Interfaces*, *35*,102406. https://doi.org/10.1016/j.surfin.2022.102406
2. **Agnihotri, A. S.,** Varghese, A., & Nidhin, M. (2021). *Applied Surface Science Advances*, *4*, 100072. https://doi.org/10.1016/j.apsadv.2021.100072
3. **Agnihotri, A. S.**, Fatima, Z., Hameed, S., & Nidhin, M. (2021). *ChemistrySelect*, *6*(22), 5466-5473. https://doi.org/10.1002/slct.202101250
4. **Agnihotri, A. S.,** Nidhin, M., Rison, S., Akshaya, K. B., & Varghese, A. (2021). *Applied Surface Science Advances*, *6*, 100181. https://doi.org/10.1016/j.apsadv.2021.100181