CHRIST
(DEEMED TO BE UNIVERSITY)
BANGALORE · INDIA

Notice for the PhD Viva Voce Examination

Ms Ann Maria C G (Registration Number: 1940078), PhD scholar at the School of Sciences, CHRIST (Deemed to be University), Bangalore will defend her PhD thesis at the public viva-voce examination on Thursday, 29 August 2024 at 2.15 pm in Room No. 044, Ground Floor, R & D Block, CHRIST (Deemed to be University), Bengaluru - 560029.

Title of the Thesis	:	**Molecularly Imprinted Nanomaterials for the Electrochemical Sensing of Environmental Pollutants**
Discipline	:	**Chemistry**
External Examiner (Outside Karnataka)	:	**Dr Nishanth K G** Senior Scientist National Institute for Interdisciplinary Science and Technology Thiruvananthapuram Kerala - 695019
External Examiner (Within Karnataka)	:	**Dr Nagaswarupa H P** Professor and Chairman Department of Studies in Chemistry Davanagere University, Shivagangothri Davanagere – 577007 Karnataka
Supervisor	:	**Dr Nidhin M** Assistant 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

Place: Bengaluru
Date: 20 August 2024

ABSTRACT

Integrating molecularly imprinted nanoparticles, environmental contaminants are detected electrochemically on a glassy carbon electrode that caters as the transducer host. The modification of electrodes using different noble nanoparticles resulted in enhanced electrooxidation of analytes. The allocation of chitosan as a reducing and stabilizing agent in the green synthesis of noble metal nanoparticles enhances the sensor's efficiency. Different characterizations like UV-visible spectroscopy, Fourier Transform Infra Red Spectroscopy, Transmission Electron Microscopy, and Dynamic Light Scattering analysis further confirm the synthesized nanoparticles' morphology, stability, and size. The different experimental conditions needed for effective detection, like electrolytes, potential window, scan rate, and pH, were optimized with utmost careful examination.

The morphological characterization of the electrodes were executed utilizing Scanning Electron Microscopy and Optical profilometry, whereas the electrochemical characterization was performed using Electrochemical Impedance Spectroscopy. The Nyquist plot showcased the low resistance and high charge transfer of modified imprinted electrodes with enhanced surface area. Using Differential Pulse Voltammetry, the sensor was validated with nano to femto-level detection limits and a wide linear range with good sensitivity. The imprinting factor displays the superior electroactivity of imprinted sensors compared to non-imprinted sensors. The molecularly imprinted electrode effectively detected environmental pollutants in different water samples. Hence, all the works point to the exceptional approach of imprinted nanomaterials in electrochemical detection with its simplicity and facile preparation. It may be used to develop a susceptible voltammetric sensor for researching environmental pollutants.

Keywords: Glassy Carbon Electrode; Molecularly Imprinted Polymers; Electrochemical sensors; Environmental pollutants; Noble metal nanoparticles

Publications:

1. **C. G. Ann Maria,** A. Varghese, and M. Nidhin, "Recent Advances in Nanomaterials Based Molecularly Imprinted Electrochemical Sensors," Crit. Rev. Anal. Chem., vol. 53, no. 1, pp. 88-97, 2021, doi: 10.1080/10408347.2021.1937925.
2. **C. G. Ann Maria,** A. S. Agnihotri, A. Varghese, and M. Nidhin, "Ion-imprinted chitosan-stabilized biogenic silver nanoparticles for the electrochemical detection of arsenic (iii) in water samples," New J. Chem., vol. 47, no. 11, pp. 5179–5192, 2023, doi: 10.1039/d2nj04804c.
3. **C. G. Ann Maria,** A. S. Agnihotri, T. Fatima, S. Hameed, G. Krishnamoorthy, and M. Nidhin, "Unlocking the Antimicrobial, Antifungal, and Anticancer Power of Chitosan-Stabilized Silver Nanoparticles," Bionanoscience, vol. 13, no. 4, pp. 1933–1943, 2023, doi: 10.1007/s12668-023-01218-7.

Patent Published:

1. **Ann Maria. C. G,** Nidhin M, 'Ion Imprinted Chitosan stabilized biogenic silver nanoparticles for the electrochemical detection of arsenic in water samples', Publication Date: 04-04-2022, Patent Office: IN, Application No: 202241014988.
2. Nidhin M, Alok Malaviya, **Ann Maria C G,** Kondapalli Vamsi Krishna, 'Electrochemical detection of 2,4-dichlorophenol using cordycepin mediated silver nanoparticles', Publication Date: 08-03-2024, Patent Office: IN, Application No: 202441015737

Book Chapter:

1. Ananya S Agnihotri, **Ann Maria C G,** and Nidhin M,"Nanobiosensors: An efficient tool for the detection of bacterial pathogens", Nanotechnology for Infectious Diseases, pp. 475-495, Springer nature, 2022. https://doi.org/10.1007/978-981-16-9190-4