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Notice for the PhD Viva Voce Examination

Mr Ditto Abraham Thadathil (Registration Number: 2090187), PhD scholar at the School of Sciences, CHRIST (Deemed to be University), Bangalore will defend his PhD thesis at the public viva-voce examination on Saturday, 25 May 2024 at 10.30 am in Room No. 044, Ground Floor, R & D Block, CHRIST (Deemed to be University), Bengaluru - 560029.

Title of the Thesis	:	**Electrochemical Synthesis of Carbocyclic and Heterocyclic Motifs**
Discipline	:	**Chemistry**
External Examiner (Outside Karnataka)	:	**Dr K V Radhakrishnan** Professor Organic Chemistry Section National Institute for Interdisciplinary Science and Technology Trivandrum- 695019 Kerala
External Examiner (Within Karnataka)	:	**Dr Balakrishna Kalluraya** Professor Department of Chemistry Mangalore University Mangalagangothri Mangalore - 574199 Karnataka
Supervisor	:	**Dr Anitha Varghese** 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: 21 May 2024

ABSTRACT

Electro-organic synthesis has gained widespread attention due to the advantages such as green catalyst, atom economy, good selectivity and excellent yields. The use of tailor-made modified electrodes helps in refining the electronic and surface properties which could be harnessed for synthesis of important heterocyclic and carbocyclic motifs. The fabrication of modified electrode is done by employing a carbon fiber paper substrate as the base followed by electropolymerization of a desired monomer. The functional group in the monomer is utilized for covalently immobilizing the desired catalyst such as enzyme, organometallic, transition-metal and organocatalyst over the electrode. The developed electrocatalyst is employed in the electrochemical synthesis of heterocyclic and carbocyclic motifs.

The electrochemical characterization studies for the electrodes were determined using electrochemical active surface area, electrochemical impedance spectroscopy and electron transfer kinetics studies. The surface morphology of the fabricated electrode was differentiated in contrast to the other electrode by utilizing Scanning electron microscopy and Optical Profilometry. The other characterization of the electrode includes X-ray photoelectron spectroscopy, Fourier Transform Infrared analysis for the structural confirmations. The fabricated modified electrode was then employed for the electrochemical organic transformation by carrying out several optimization reactions. The screening studies was carried out by employing different supporting electrolyte, solvents and electrochemical studies. The completion of the electrochemical organic synthesis was observed by Thin-layer chromatography and desired product was isolated either using column chromatography or just by solvent evaporation after workup. The structural confirmation of the synthesized heterocyclic and carbocyclic motifs was done by using ^{1}H, ^{13}C and other nuclei Nuclear Magnetic resonance spectroscopy, High resolution mass spectrometry, and Fourier Transform Infrared Spectroscopy. In addition, detailed study of the electrochemical reaction mechanism was employed to find the plausible route for the electrochemical organic transformation.

Keywords: Electrocatalysis, Carbon fiber paper, bioenzymatic, anchored organometal, anchored transition-metal, anchored organocatalyst

Publications:

1. **Ditto Abraham Thadathil**, Anitha Varghese, C. V. S. Ahamed, K. A. Krishnakumar, S. S. Varma, R. S. Lankalapalli, and K. V. Radhakrishnan, "Enzyme based bioelectrocatalysis over laccase immobilized poly-thiophene supported carbon fiber paper for the oxidation of D-ribofuranose to D-ribonolactone," Molecular Catalysis, vol. 524, pp. 112314, 2022. doi: 10.1016/j.mcat.2022.112314.
2. **Ditto Abraham Thadathil**, M. Bharath, Anitha Varghese, and M. Ghosh, "Anchored ferrocene based heterogeneous electrocatalyst for the synthesis of benzimidazoles," Electrochimica Acta, vol. 435, pp.141399, 2022. doi: 10.1016/j.electacta.2022.141399.
3. **Ditto Abraham Thadathil**, Anitha Varghese, and K. V. Radhakrishnan, "Electrochemical Strategies for Selective Fluorination of Organic Compounds," Journal of The Electrochemical Society, vol. 168, pp. 075503, 2021. doi: 10.1149/1945-7111/ac148f.
4. **Ditto Abraham Thadathil**, Anitha Varghese, and K. V. Radhakrishnan, "The Renaissance of Electro-Organic Synthesis for the Difunctionalization of Alkenes and Alkynes: A Sustainable Approach," Asian Journal of Organic Chemistry, vol. 10, pp. 2820-2847, 2021. doi: 10.1002/ajoc.202100447.