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Notice for the PhD Viva Voce Examination

Mr Arun Varghese (Registration Number: 2170241), 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 Monday, 25 November 2024 at 2.30 pm in Room No. 044, Ground Floor, R & D Block, CHRIST (Deemed to be University), Bengaluru - 560029.

Title of the Thesis	:	**Energy and Environmental Applications of Polymer Based Mixed Metal Oxide Nanocomposites**
Discipline	:	**Chemistry**
External Examiner - I	:	**Dr Unnikrishnan G** Professor Department of Chemistry National Institute of Technology, Calicut NIT Campus Post Kerala - 673601
External Examiner - II	:	**Dr M Sathish** Principal Scientist Central Electrochemical Research Institute Karaikudi Tamil Nadu - 630003
Supervisor	:	**Dr Sunaja Devi K R** 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 November 2024

ABSTRACT

The dependence of human lives on fossil fuels is very inevitably high for the development of society. This leads to the exploitation of these non-renewable sources, which brings forth society, which is another major issue that has to be tackled. In this study, we have focused on addressing the energy and environmental needs of society using different catalysts. The various polymers used in this study are polyaniline, polypyrrole, poly (3,4-ethylenedioxythiophene), and chitosan. These polymers are mixed with different metal oxides, and the synergy between the polymers and metal oxides provides efficiency towards the mentioned applications. Several electrochemical studies like cyclic voltammetry, galvanostatic charge-discharge studies, electrochemical impedance spectroscopy, linear sweep voltammetry, and potentiodynamic techniques are employed to analyze the efficacy of the composites towards supercapacitance, water splitting, and corrosion inhibition studies. The batch adsorption studies are executed for water purification studies. The synthesized multifunctional composites can be used as potential candidates for addressing the energy and environmental needs of our society in a sustainable manner.

Keywords: Polymer composites; Metal oxide; Supercapacitors; Electrocatalytic water splitting; Adsorption; Corrosion inhibition.

List of Publications

1. **Arun Varghese,** Sunaja Devi K R, Tailoring a multifunctional PEDOT/Co_3O_4-CeO_2 composite for sustainable energy applications, Advanced Sustainable Systems. (2024), 2300575. https://doi.org/10.1002/adsu.202300575.
2. **Arun Varghese**, Sunaja Devi K R, Dephan Pinheiro, Mothi Krishna Mohan, Molecular architecture of PANI/V_2O_5/MnO_2 composite designed for hydrogen evolution reaction, Surfaces and Interfaces. 41 (2023) 103221. https://doi.org/10.1016/j.surfin.2023.103221.
3. **Arun Varghese**, Sunaja Devi K.R., Sandra Mathew, B Saravanakumar, Dephan Pinheiro, Rational designing of PANI based mixed metal oxide composite for high-performance supercapacitor, Materials Today Proceedings. 2023, (in press). https://doi.org/10.1016/j.matpr.2023.12.003.
4. **Arun Varghese**, Sunaja Devi K R, Dephan Pinheiro, Rational design of PANI incorporated PEG capped CuO/TiO_2 for electrocatalytic hydrogen evolution and supercapattery applications, International Jouranl of Hydrogen Energy. 48, (76), (2023), 29552-29564. https://doi.org/10.1016/j.ijhydene.2023.04.114.
5. **Arun Varghese**, Sunaja Devi K R, Dephan Pinheiro, Adsorptive removal studies of Rhodamine B by PEG capped polyaniline/TiO_2/CuO composite. Mater Today Communications, 35 (2023) 105739. https://doi.org/10.1016/j.mtcomm.2023.105739.
6. **Arun Varghese**, Sunaja Devi K R, Fathima Kausar, Dephan Pinheiro, Evaluative study on supercapacitance behavior of polyaniline/polypyrrole – metal oxide based composites electrodes: a review. Materials Today Chemistry, 29 (2023) 101424. https://doi.org/10.1016/j.mtchem.2023.101424