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Notice for the PhD Viva Voce Examination

Ms Jayalakshmi M, Registration Number: 2090190, 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, 22 July 2026 at 11.00 am in Room No. 044, Ground Floor, R&D Block, CHRIST (Deemed to be University), Bengaluru - 560029, Karnataka, India.

Title of the Thesis : **Synthesis of Heterocyclic Compounds Using Organocatalyst and Transition Metal Oxide Catalysed Functional Group Interconversions**

Discipline : **Chemistry**

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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: 13 July 2026

ABSTRACT

Green chemistry is developing chemicals and procedures that prevent or greatly reduce the production and use of hazardous molecules. For a number of reasons, including decreased solvent consumption, energy efficiency, atom economy, and waste reduction, multi-component reactions fit very well within the framework of green chemistry. Their ability to integrate multiple synthetic steps into a single reaction process makes them ideal candidates for sustainable chemistry, agrochemical industries, and materials science. Organocatalysis offers a sustainable, efficient, and selective way to create heterocyclic structures. When it comes to the synthesis of heterocycles, organocatalysts have been increasingly used to promote these reactions, as they provide several advantages, including high yields, mild reaction conditions, and selectivity. Reactions involving oxidative transformations driven by visible light are chemical processes where substrates undergo oxidation when exposed to visible light. The use of photocatalysts allows these reactions to take place under gentle, light-activated conditions. This approach provides a more environmentally friendly and sustainable option compared to traditional synthetic techniques. Nanocomposites based on transition metals exhibit significant potential as catalysts for enabling oxidation processes activated by visible light. The combination of transition metals with other materials creates highly effective photocatalysts for a variety of applications, from environmental remediation to energy production. Continued research is likely to improve their performance and make them more commercially viable. In the first two working chapters, 10-CSA (Camphor sulfonic acid), a Bronsted acid organocatalyst under solvent-free reactions via multicomponent reactions, catalyzes the production of oxygen-containing heterocyclic analogs, pyranocoumarins, and benzoxanthenes. The next two chapters include transition metal oxide catalyst preparation by a green method using leaf extract of Hibiscus rosa-sinensis as a stabilizing agent. The synthesized MoO2/BiOCl nanocomposite was confirmed from FTIR, SEM/EDAX, TEM, XRD, and XPS analytical techniques. To demonstrate the potential of the prepared photocatalyst, it was employed for oxidative transformation reactions under visible light conditions involving functional group interconversion of aryl amines to aromatic nitro compounds and benzyl alcohol analogs to various substituted aromatic aldehydes. 1H and 13C NMR or LC-MS/GC-MS have been used to characterize all constructed organic molecules.

Keywords: Multicomponent reaction, Solvent-free, Organocatalysis, Pyrancoumarins, Benzoxanthenes, Visible light, Oxidation, Photocatalyst

Publications:

1. **Jayalakshmi M**, Jyothis Devasia, Sampath Chinnam, Aatika Nizam, Ganga Periyasamy, Pankaj Wadhwa, and Suresh Babu Naidu Krishna, "10-camphor sulfonic acid: A simple and efficient organocatalyst to access anti-SARS-COV-2 Benzoxanthene derivatives," Mol. Catal., vol. 572, no. July 2024, p. 114691, 2025, doi: 10.1016/j.mcat.2024.114691.
2. **Jayalakshmi M**, and Aatika Nizam, "Facile green synthesis of MoO2/BiOCl nanocomposite using Hibiscus rosa-sinensis leaf extract and its application in visible-light-driven oxidative transformations," J. Organomet. Chem., vol. 1029, no. February 2025, doi: 10.1016/j.jorganchem.2025.123566.