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Notice for the PhD Viva Voce Examination

Ms Gowri Soman, Registration Number: 2270129, 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 Tuesday, 09 December 2025 at 9.00 am in Room No. 628, 6th Floor, R&D Block, CHRIST (Deemed to be University), Bengaluru - 560029, Karnataka, India.

Title of the Thesis : **Functionalized Porous Carbon Nanospheres Towards Enhanced Energy Storage Devices**

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: 01 December 2025

ABSTRACT

Porous carbon nanospheres (CNS) derived from biomass were developed using four agro-waste sources—Arachis hypogaea inner skin, Magnolia champaca pods, Tectona grandis leaves, and Bougainvillea spectabilis flowers—to achieve sustainable energy storage solutions. These abundantly available and renewable wastes serve as cost-effective carbon precursors, addressing environmental disposal issues while advancing circular economy goals. The study explores four distinct modification approaches: acid and amide functionalization, boron doping, and polypyrrole integration into CNS. Comprehensive characterization through TGA, FTIR, FESEM, TEM, XRD, Raman, BET, and XPS confirmed the structural and surface modifications. Electrochemical analyses revealed significant enhancement in specific capacitance, with Bougainvillea-derived CNS achieving up to 658.5 F g−1. Symmetric supercapacitor devices fabricated in CR2032 coin cell and solid-state configurations exhibited high energy and power densities along with near 100% coulombic efficiency. Overall, the work underscores the scalability and eco-friendly nature of biomass-derived CNS, transforming biowaste into efficient "waste-to-wealth" energy materials

Keywords: *Biomass-derived CNS, Specific capacitance, Energy Density, Power density, Coulombic Efficiency etc.*

Publications:

1. **Gowri Soman**, Vandana Molahalli, Kaifee Sayeed, Kavita Pandey, Bhavana B. Kulkarni, Gurumurthy Hegde, "Acid functionalized Arachis hypogaea skin-based carbon nanosphere as efficacious material for enhanced energy storage," Journal of Energy Storage, vol. 111, p. 115373, Mar. 2025, doi: 10.1016/j.est.2025.115373.
2. **Gowri Soman**, Kaifee Sayeed, Kavita Pandey, Uraiwan Sirimahachai, Gurumurthy Hegde, "Amide- enriched pod-based carbon nanospheres for enhancing supercapacitor performance: A value-added approach for solid state supercapacitors," Journal of Energy Storage, vol. 121, p. 116590, Jun. 2025, doi: 10.1016/j.est.2025.116590.