



Notice for the PhD Viva Voce Examination

Ms Felicia Aswathy W, Registration Number: 2071203, PhD Scholar at the Department of Physics and Electronics, School of Sciences, CHRIST (Deemed to be University) will defend her PhD thesis at the public viva-voce examination on Wednesday, 21 January 2026 at 10.00 am in Room No. 044, Ground Floor, R&D Block, CHRIST (Deemed to be University), Bengaluru - 560029, Karnataka, India.

Title of the Thesis : **Green Synthesis of Platinum Nanoparticles for Biomedical Applications**

Discipline : **Physics**

External Examiner - I : **Dr M S Muthu**
Professor
Department of Pharmaceutical Engineering
and Technology
Indian Institute of Technology (BHU)
Varanasi - 221005
Uttar Pradesh

External Examiner - II : **Dr Sarita G Bhat**
Professor
Department of Biotechnology
Cochin University of Science and Technology
Cochin - 682022
Kerala

Supervisor : **Dr Anila E I**
Professor
Department of Physics and Electronics
School of Sciences
CHRIST (Deemed to be University)
Bengaluru – 560029
Karnataka, India

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.

Place: Bengaluru
Date: 09 January 2026


Registrar (Academics)

ABSTRACT

Noble metal nanoparticles are extensively investigated in the field of nanomedicine. Gold and silver nanoparticles are the most commonly studied materials, proving promising candidature in the domain. Pt metal nanoparticles are the new members of this area and are the least investigated. Pt NPs have been investigated for several fields of application including catalysis, energetics, photonics, etc., but in the medical field, they have just started the journey. The anticancer property of a platinum-based coordinate molecule which is currently available in the market called cisplatin is the motivation to investigate the therapeutic potentials of Pt NPs. The growing demand for eco-friendly and biocompatible materials in the biomedical field has spurred interest in developing nanomaterials with minimal side effects. In this research work, we studied the anticancer, analgesic, and anti-inflammatory characteristics of Pt nanoparticles synthesized by green routes. We synthesized four different platinum samples by changing the capping agents like PEG, Chitosan, and aloe vera extracts.

Finally, we synthesized purely biogenic platinum nanoparticles using aloe vera methanolic extract as the reducing and capping agent. Characterization techniques such as powder X-ray diffraction (XRD), Raman spectroscopy, Fourier transform infrared spectroscopy (FTIR), electron microscopic techniques (TEM, SEM), X-ray photoelectron spectroscopy (XPS), ultraviolet-visible spectroscopy, etc. were used. The anticancer, analgesic, and anti-inflammatory properties of the nanoparticle were tested using widely accepted in vitro and in vivo studies such as cytotoxicity studies (MTT assay, Dual staining, DCFH-DA assay), in vitro anti-inflammatory assays (protein denaturation inhibition assay, and DPPH assay), and in vivo animal studies (Eddy's hot plate model and Carrageenan-induced paw edema model). All the experiments came up with outstanding results suggesting excellent anticancer and anti-inflammatory potentials for the Pt NPs than the currently available standard drugs in the market.

Keywords: *Platinum nanoparticle; Biocompatible; Natural polymer; Phytochemicals; Anti-inflammatory property; Anticancer property; Analgesic property.*

Publications:

1. **F.A. Waliaveettil**, A. Aravind, E.I. Anila, Synthesis of Chitosan Stabilised Platinum Nanoparticles and their Characterization, *J. Mines, Met. Fuels* 71 (2023) 917–921.
2. **F.A. Waliaveettil**, E.I. Anila, A comprehensive review on antibacterial, anti-inflammatory and analgesic properties of noble metal nanoparticles, Part. & Particle Syst. Charact. 41 (2023) 2300162.
3. **F.A. Waliaveettil**, J. Jose, E.I. Anila, Chitosan stabilized platinum nanoparticles: Synthesis, characterization and cytotoxic impacts on human breast cancer cells, *Mater. Chem. Phys.* 326 (2024) 129864.
4. **F.A. Waliaveettil**, J. Jose, E.I. Anila, Assessing Anticancer Properties of PEGylated Platinum Nanoparticles on Human Breast Cancer Cell lines using in-vitro Assays, *Biomed. Phys. Eng. Express* 10 (2024) 065019.
5. **F.A. Waliaveettil**, J. Jose, E.I. Anila, PEGylated Platinum Nanoparticles : A Comprehensive Study of Their Analgesic and Anti-Inflammatory Effects, *ACS Appl. Bio Mater.* 8 (2025) 628–641.
6. **F.A. Waliaveettil**, D.A. Nayana, B.M. Philip, M. George, J. Alex, S. Lekshmi, E.I. Anila, D. Sajan, Synthesis and third-order nonlinear optical properties of PEGylated platinum nanoparticles, *Mater. Sci. Eng. B* 318 (2025) 118331.
7. **F.A. Waliaveettil**, E.I. Anila, Chitosan stabilized platinum nanoparticles : In vitro and in vivo screening for analgesic and anti-inflammatory applications, *Int. J. Biol. Macromol.* 307 (2025) 142103.
8. R. Raphael, **F.A. Waliaveettil**, E.I. Anila, In vitro cytotoxicity studies of Ga₂O₃ microstructures on L929 and MCF - 7 cell lines using MTT assay, *MRS Commun.* 14 (2024) 1359–1363.
9. J. Alex, S. Silambarasan, A. K Jose, **F.A. Waliaveettil**, T. Maiyalagan, A. Aravind, D. Sajan, Cerium-doped Co₃O₄ spinel structures synthesized by modified combustion route as an excellent material for electrochemical applications, *Ceram. Int.* 51 (2025) 3185–3197.