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Notice for the PhD Viva Voce Examination

Ms Juhi P J (Registration Number: 2071704), PhD scholar at the School of Sciences, CHRIST (Deemed to be University), Bangalore will defend her PhD thesis at the public viva-voce examination on Monday, 11 November 2024 at 11.30 am in Room No. 044, Ground Floor, R & D Block, CHRIST (Deemed to be University), Bengaluru - 560029.

Title of the Thesis	:	**Photocatalytic Degradation of Textile Dyes Using *Artemisia stelleriana* Besser Mediated Nanoparticles**
Discipline	:	**Botany**
External Examiner (Outside Karnataka)	:	**Dr Santosh Kumar** Associate Professor Department of Chemistry Harcourt Butler Technical University Kanpur -208002 Uttar Pradesh
External Examiner (Within Karnataka)	:	**Dr D Kotresha** Associate Professor Department of Studies in Botany Davangere University Shivagangotri, Davanagere - 577007 Karnataka
Supervisor	:	**Dr Joseph K S** Assistant Professor Department of Life Sciences 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.

Place: Bengaluru
Date: 06 November 2024

Registrar

ABSTRACT

Artemisia stelleriana is widely used as an ornamental plant and belongs to the family Asteraceae. In the current study, *A. stelleriana*-mediated Zinc oxide nanoparticles (AS-ZnONPs), Silver nanoparticles (AS-AgNPs) and Silver/Zinc oxide bimetallic nanoparticles (AS-Ag/ZnONPs) were synthesised using one-pot method. The UV-Vis spectral analysis revealed characteristic peaks at 358 nm for AS-ZnONPs, 425 nm for AS-AgNPs, and 357 nm and 473 nm for AS-Ag/ZnONPs. Fourier transform infrared spectroscopy (FTIR) analysis identified phytoconstituents taking part in nanoparticle synthesis, manifesting the presence of alkaloids, phenols, saponins, and flavonoids. The synthesised AS-ZnONPs, AS-AgNPs, and AS-Ag/ZnONPs have a crystalline nature and were confirmed using X-ray diffraction (XRD) analysis. The crystallite sizes of the AS-ZnONPs, AS-AgNPs, and AS-Ag/ZnONPs were 22.54 nm, 18.67 nm, and 10.4 nm, respectively. Spherical-shaped Ag nanoparticles and hexagonal, cylindrical, and spherical-shaped ZnO nanoparticles were synthesized from the leaf extract of A. stelleriana. The average size of the synthesised nanoparticles was 37.6 nm and 71.2 nm for AS-ZnONPs and AS-AgNPs, respectively. On the other hand, spherical-shaped AS-Ag/ZnONPs were synthesized with an average size of 35.3 nm. The photocatalytic degradation activity of AS-ZnONPs showed 93.44%, 47%, 94.76%, 99.9%, and 74.82% degradation for Reactive Blue 220 (RB220), Reactive Blue 222A (RB222A), Reactive Red 120 (RR120), Reactive Yellow 145 (RY145) and Reactive Yellow 86 (RY86) dyes respectively after 320 min of UV light exposure. AS-ZnONPs showed positive results for all five dyes and a better percentage of degradation was observed in a 5 ppm concentration of dye treated with 1 mg/mL concentration of AS-ZnONPs.

In the case of AS-AgNPs, RB220 and RB222A dyes showed positive results but no degradation was observed in the remaining three dyes. After 320 min of UV light exposure, AS-AgNPs showed 95.98%, and 100% degradation of RB220 and RB222A dyes respectively. AS-Ag/ZnONPs are excellent photocatalysts for the degradation of RB220, RB222A, RY145 and RY86 but no positive results were seen for RR120 dye degradation when treated with AS-Ag/ZnONPs. After exposure to UV light, AS-Ag/ZnONPs exhibited 99.9% degradation of RB220 and complete degradation of RB222A, RY145 and RY86. A higher percentage of degradation was observed in a 5 ppm concentration of dye treated with a 1 mg/mL concentration of AS-Ag/ZnONPs. *Vigna radiata* and *Artemia salina* exposed to treated dye solutions exhibited less toxic effects when compared to untreated dye solutions. Reusability was checked using XRD data of *A. stelleriana* mediated nanoparticles (AS-NPs) utilized in the dye degradation and the results concluded that the AS-NPs were stable and reusable.

Keywords: Artemisia stelleriana, nanoparticles, dyes, degradation, toxicity

Publications:

1. **Juhi Puthukulangara Jaison**, and Joseph Kadanthottu Sebastian. "*Artemisia stelleriana*-mediated ZnO nanoparticles for textile dye treatment: a green and sustainable approach." Water Practice and Technology 18, no. 4 (2023): 911-921.
2. **Juhi Puthukulangara Jaison**, and Joseph Kadanthottu Sebastian. "Photocatalytic and antioxidant potential of silver nanoparticles biosynthesized using *Artemisia stelleriana* leaf extracts." Water Practice & Technology 18, no. 11 (2023): 2664-2674.