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Harnessing ZnO nanoparticles for antimicrobial and photocatalytic activities

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Abstract

Zinc oxide nanoparticles (ZnO NPs) have proven record of exhibiting multifunctional properties and thus utilized for diversified applications. ZnO NPs were successfully synthesized by chemical and green routes. The *Syzygium cumini* plant leaf extract was used to synthesize green ZnO NPs. The chemical and green ZnO NPs were characterized by using advanced technical tools to explore their bonding, structural and morphological features. The PXRD (Powder X-Ray Diffraction) patterns confirmed the hexagonal phase of ZnO with wurtzite structure. The scanning and transmission electron microscopic (SEM and TEM) analysis revealed rectangular flake like structures for chemical ZnO whereas spherical structures were found for green ZnO NPs. Maximum antibacterial activity was observed against *Pseudomonas aeruginosa* bacterial strain with zone of inhibition of 14.5 mm followed by 5 mm for *Klebsiellaoxytoca* and 4 mm for *Escherichia coli* for green ZnO NPs. The percentage of inhibition was found to be 85, 29 and 50 for *Pseudomonas aeruginosa*, *Klebsiellaoxytoca* and *Escherichia coli* bacterial strains. The percentage of inhibition of mycelial growth observed during antifungal testing was varied from 5% to 70%. The photocatalytic efficiency of 98 % for Acid Red 88 dye degradation was recorded for ZnO NPs. Green ZnO NPs exhibited better antibacterial and antifungal activities, in addition to superior photocatalytic behaviour.

Keywords:

Green ZnO NPs, Syzygium cumini, Antibacterial activity, Antifungal activity, Dye degradation

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