

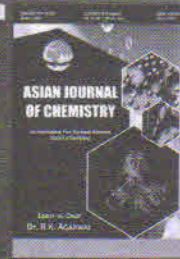


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Green Synthesis of ZnO Nanoparticles Mediated by *Eleutherine bulbosa*: Multifunctional Properties for Biomedical and Environmental Applications

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In this work, zinc oxide nanoparticles (ZnO NPs) were prepared using an eco-friendly aqueous extract of *Eleutherine bulbosa* bulbs and were characterised by spectral and morphological techniques. The XRD confirmed sharp peaks with a crystallite size of 27.21 nm. Morphological studies showed flake-like structures in SEM and predominantly spherical particles in HR-TEM. TGA demonstrated good thermal stability with a weight loss from 96% to 65%. Functionally, the ZnO NPs exhibited strong antioxidant activity ($IC_{50} = 44.15 \mu\text{g/mL}$) and potent anticancer effects against human breast cancer cells ($IC_{50} = 21.12 \mu\text{g/mL}$). Photocatalytic activity was also significant, achieving 80% methylene blue degradation under UV light within 100 min.

Keywords: Green synthesis, *E. bulbosa*, Antioxidant activity, Anticancer activity, Photocatalysis.