



## Synthesis and Characterization of Biogenic Silver Nanoparticles and Its Antimicrobial Analysis

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### ABSTRACT

The sustainable green chemistry biosynthesis process for the generation of toxic free, biocompatible and environment-friendly nanoparticles constitutes major role in the present nanotechnology research. The present study described the importance and significance of biosynthesis of AgNPs. The advantages of using a plant extract mediated synthesis of AgNPs include toxicity free and quick synthesis method, economic viability, cost effective and ease in handling large scale synthesis. *Curcuma caesia* Roxb. (Black turmeric) is a perennial herb having bluish black color rhizomes and it is having huge medicinal properties. The formation of brownish orange color indicated the synthesis of AgNPs by using rhizomes of *Curcuma caesia* dry powdered rhizomes with AgNO<sub>3</sub> solution and this was easily detected and characterized by UV-Visible Spectroscopy, Fourier Transform Infrared (FT-IR) Spectroscopy, XRD, TEM, EDS etc. The formed biogenic silver nanoparticles were optimized by pH, time, temperature, concentration of silver nitrate, concentration ratio of leaf extract and AgNO<sub>3</sub>. AgNPs show effective antibacterial and antifungal activity. The synthesized biogenic AgNPs are more susceptible to Gram negative bacteria than Gram positive bacteria. They could thus be an efficient alternative to conventional antibiotics and may be used as an antibacterial agent.

### Graphical Abstract



Photograph showing change in color before and after adding aqueous *Curcuma caesia* extract to AgNO<sub>3</sub>

**Keywords:** Green synthesis, *Curcuma caesia*, UV-Visible spectroscopy, FTIR, XRD, TEM, Biogenic AgNPs.