

## Biogenic Synthesis, Characterization and Functionalization of Gold and Silver Nanoparticles Using *Pleurotus pulmonarius* Exopolysaccharides for Antimicrobial Application

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### ABSTRACT

Greenly synthesized gold and silver nanoparticles (AuNPs and SNPs) from *Pleurotus pulmonarius* (PP) exopolysaccharide (EPS) was characterized and functionalized with antibiotic. The antimicrobial potential of the nanoparticles (PPEPSAuNPs and PPEPSSNPs) and functionalized NPs (FPPEPSAuNPs and FPPEPSSNPs) against some pathogenic bacteria were evaluated. PP produced EPS ranged from 257.85 - 3305.65 mg/L. The PPEPS was used as oxidizing, reducing and capping agent. Uv-visible spectroscopy, FTIR, SEM was used to analyze the nanoparticles. Colour change from pale yellow to purple and from pale yellow to dark brown indicate the formation of PPEPSAuNPs and PPEPSSNPs with a strong absorption bands at 500 nm and 400 nm. Functional groups such as hydroxyl, carboxyl and aldehydes among others contributes to the reduction, capping and stabilization of the NPs. SEM shows a polymorphic with size ranged from 0.1 – 3.2  $\mu\text{m}$  and aggregate particles with size of 0.2 – 2.8  $\mu\text{m}$  for PPEPSAuNPs and PPEPSSNPs. The PPEPSAuNPs and PPEPSSNPs had antimicrobial activity against the tested pathogens with a zone of inhibition in the range of 12 - 29 mm. The antibacterial activities of FPPEPSAuNPs and FPPEPSSNPs were in the range of 25 - 40 mm and 22 – 40 mm with highest activity against *Pse. aeruginosa*. Functionalization enhanced the activity of the nanoparticles. In conclusion, EPS from PP can be efficiently used for nanoparticles biosynthesis with antibacterial potential and functionalization enhanced the antibacterial property of the nanoparticles. The nanoparticles and functionalized nanoparticles can be considered for use in pharmaceutical application.

**Keywords:** Exopolysaccharides; Mushroom; Gold and silver nanoparticle, Antibacteria potential; Functionalizatio; Pathogenic bacteria.

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