

**One-Step Biosynthesis of Gold Nanoparticles Using Natural Reductive
Extracts**

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Abstract

The green chemical synthesis of nanoparticles was extensively employed in the promotion of the fabrication of nanoparticles. In the present work, a single-step biosynthetic eco-friendly method was utilised to synthesise Au NPs using leave aqueous extracts of *Piper nigrum* (PN), *Ziziphus spinachristi* (ZSC), and *Eucalyptus globulus* (EUCGLO). The extract played the role of the reducing and capping agents where the volume ratios of aqueous extract (100 ppm) to the aqueous solution of $\text{HAuCl}_4 \cdot 4\text{H}_2\text{O}$ (0.001 M) were 1:10, 2:10 and 3:10 for all extracts. X-ray powder diffraction (XRD), field emission scanning electron microscopy (FESEM), and ultraviolet-visible spectroscopy (UVVis) were performed to characterise the nanoparticles. The surface Plasmon resonance was located at 530, 540, and 533 ± 2 nm for the synthesised Au NPs using the aqueous extract of PN, ZSC, and EUCGLO, respectively. The intensive peaks of XRD patterns indicated the crystalline nature (fcc structure) of the synthesised gold nanoparticles with an average size of 21 ~ 40 nm. The morphology of the Au NPs was carried out by FESEM. The results showed a decline in the spherical shape of the synthesised Au NPs with a mean diameter ranged from $23.7 \sim 33.7 \pm 2$ nm.

Keywords:

***Piper nigrum* (PN), *Ziziphus spina-christi* (ZSC), *Eucalyptus globulus* (EUCGLO), gold nanoparticles (Au NPs)**