UNLOCKING THE POTENTIAL OF TWO FOILAGE ASSISTED SILVER NANO PARTICLES: BIO SYNTHESIS, CHARACTRISATION, BIO POTENTIAL ACTIVITY

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ABSTRACT:

In this study Silver nanoparticles have gained significant attention due to their unique physiochemical properties and broad-spectrum of antimicrobial activity. Ag nanoparticles were synthesized using aqueous extracts of papaya (Carica papaya) and guava (Psidium guajava) leaves as natural reducing and stabilizing agents. The bioactive compounds present in these extracts facilitated the reduction of silver nitrate ($AgNO_3$) to Ag nanoparticles under controlled conditions. The synthesized nanoparticles were characterized using UV-Vis spectroscopy to measure the absorption and transmission of ultraviolet(UV) and visible light by a substance.

KEY WORDS :AgO, Nanoparticles, UV-Vis, Absorbance, Psidium guajava, Carica Papaya

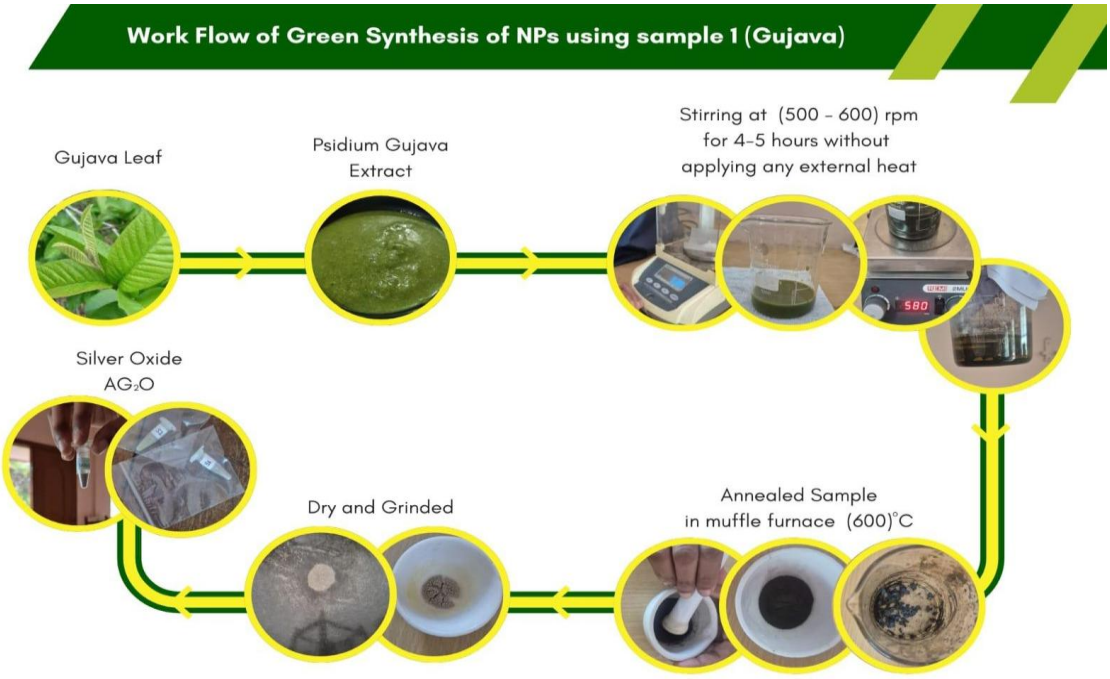
INTRODUCTION

Ag/AgO nanoparticles (AgNPs) are gaining attention due to their unique properties and diverse applications, ranging from antimicrobial and anticancer therapies to wound healing and biosensors. They are characterized by their small size (1-100 nm), large surface area, and high reactivity, leading to enhanced physical, chemical, and biological characteristics. Their aim is to

- To synthesis silver nanoparticles mediated by the leaves of Psidium gujava.
- To find the absorption and emission of the material.

METERIALS AND METHODS

The beaker is first carefully cleansed with an ethanol, 100ml leaf extract of *Psidium gujava* is added to 1mol of silver nitrate ($AgNO_3$) and kept in a magnetic stirrer. Until the precipitate is produced, the mixture is then agitated at a speed of 700 rpm. The sample is filtered and dried to 120° C in a hot air oven. Again the sample is made to put in a muffle furnace at 600°C. The resulting precipitate is finely powdered. As a result, Grey silver nanoparticles are produced. Prepared nanoparticles are characterized by EDAX, XRD, SEM FTIR, UV-VIS spectrometer analysis and Antibacterial activity



RESULT AND DISCUSSION

Fig 1, 2 shows the UV-Vis spectra of *Psidium guajava* and *Carica papaya* nanoparticles, synthesized via eco-friendly methods using two different leaf extracts. Psidiumguajava exhibited ultraviolet absorption peaks at ~200–450 nm, while *Carica papaya* showed peaks at ~200–300 nm. The spectra exhibit a broad absorption band in the UV- Vis region, attributed to valence band to conduction band and electronic transitions within the nanoparticles. Particle size mainly affects the absorption of synthesized AgO nanoparticles [54].

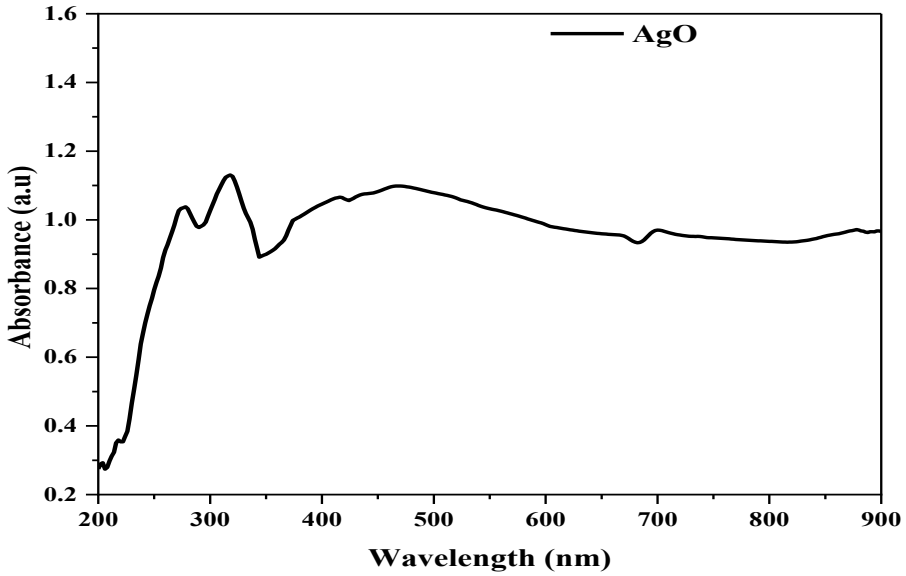


Figure 1 UV-vis spectra of AgO prepared by *Psidium guajava*

The band gap energy represents the minimum energy for electron excitation across the band gap [1]. The optical band gap energy (Eg) of the AgO using *Psidium guajava* and *Carica papaya* were determined by Tauc plot using the formula

$$(\alpha h\nu)^n = A(h\nu - Eg),$$

where α is the absorption coefficient, hν is the photon energy, A is a constant, and n depends on the transition type. By plotting $(\alpha h\nu)^2$ against hν (Fig. 4.3) and extrapolating the linear portion to $(\alpha h\nu)^2 = 0$, the band gap energies for *Psidium guajava* were found to be 2.57 eV

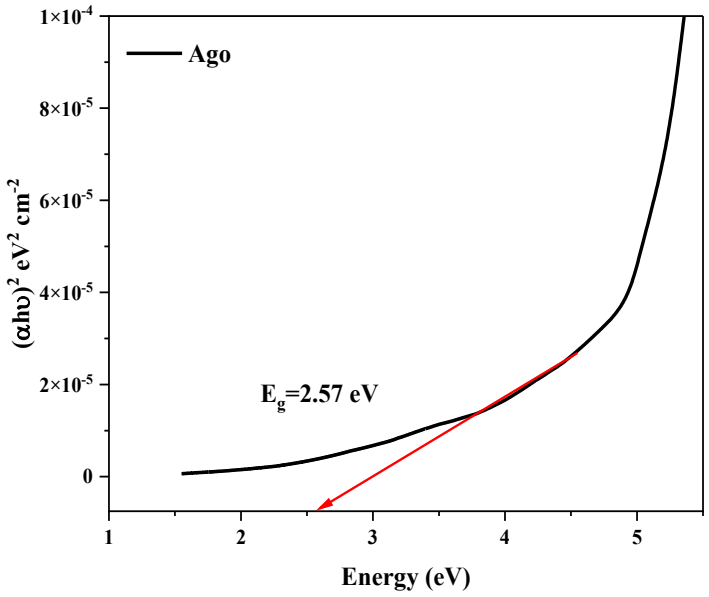


Figure 2 Energy Bandgap of AgO using *Psidium guajava*

CONCLUSION

The study of silver nanoparticles synthesized from Psidium guajava extracts reveals superior physiochemical properties [2].The obtained spectra from UV-Vis spectroscopy reveals a sharper SPR peak (~400 nm) in AgO prepared by Psidium guajava confirming well-formed nanoparticles.

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