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Bio-waste mediated green synthesis of silver nanoparticles for biomedical and environmental applications: Waste-to-Wealth Approach.

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Introduction

- **Nanoparticles** being the key component of nanotechnology, are small particles ranging at the nanometer scale exhibiting significant physical and chemical properties, **applied both medically and environmentally.**
- A **green synthesis approach** is advantageous because it yields non-toxic nanomaterials while minimizing negative environmental impact.
- Therefore, the purpose is to create **durable and flexible** nanocomposite **films** from silver nanoparticles which were synthesized in this case from **banana peels, chikoo peels, and lemon peels.**
- This is aimed at evaluating the potential applications of these nanoparticles as **antibacterial and catalytic agents** by utilizing readily available organic waste materials.

Method

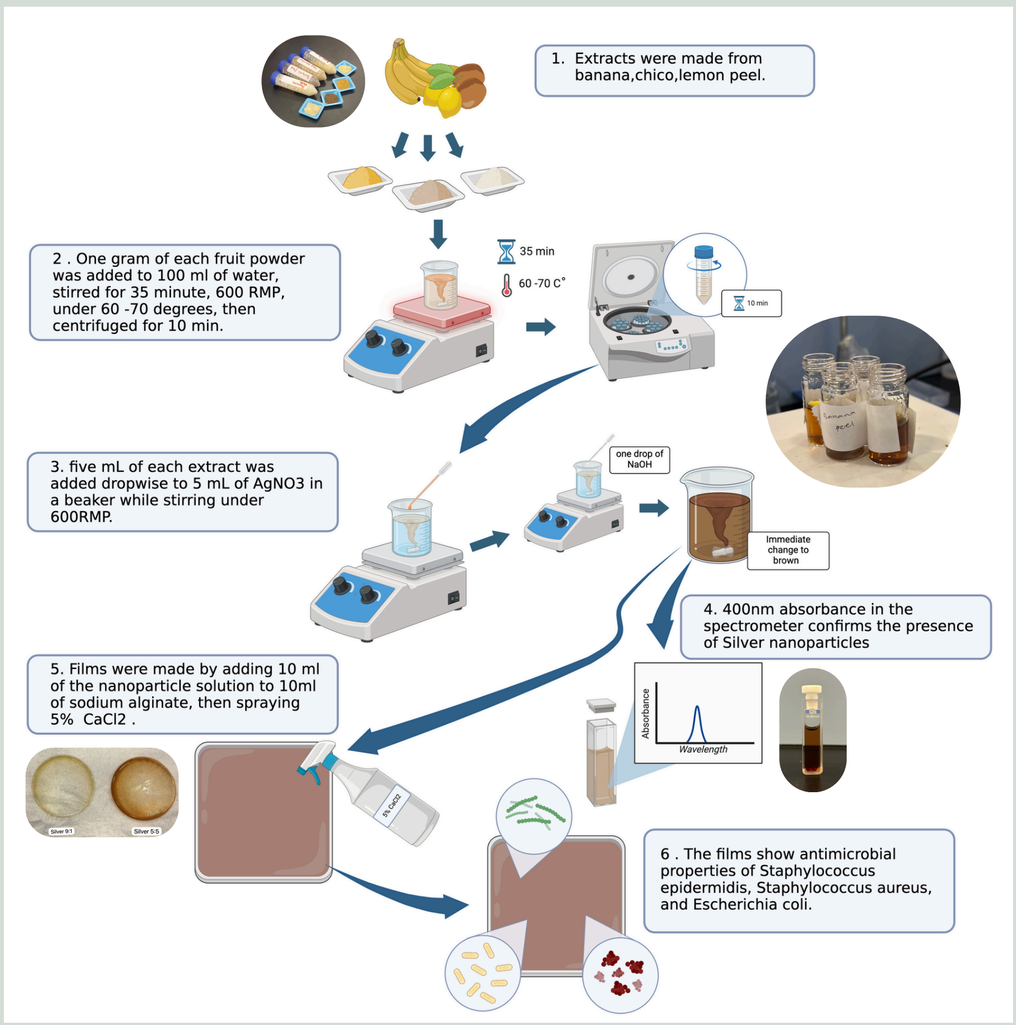
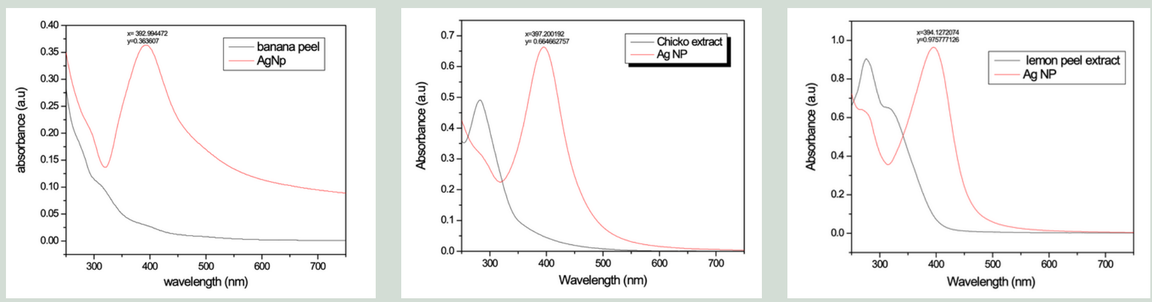


Figure 1:

- Preparation method of AgNPs using: Banana peel, Chiko extract, and lemon peel

Results



(A) (B) (C)

Figure 2:

strong plasmon resonance (SPR) peak at around 400 nm confirming the presence of AgNPs.
(A): Banana peel AgNPs, absorbance peak=392.99nm
(B): Chicko peel AgNPs, absorbance peak= 397.20nm
(C): Lemon peel AgNPs, absorbance peak= 394.12nm

Figure 3:

- Antimicrobial effect against Staphylococcus epidermidis by Ag film.

Conclusion

- The green synthesis of silver nanoparticles from biowaste produced promising outcomes.
- This includes the development of flexible films that can be further improvised to enhance their effectiveness, sustainability, and application potential.
- Ongoing research is focused on the reusability of these nanocomposite films and their prospective applications in the medical field by promoting fibroblast cell proliferation, in addition to the antibacterial properties exhibited through this project.

References

- Dubey RK, Shukla S, Hussain Z. Green Synthesis of Silver Nanoparticles; A Sustainable Approach with Diverse Applications. Zhongguo Ying Yong Sheng Li Xue Za Zhi. 2023 Dec 21;39:e20230007. doi: 10.62958/j.cjap.2023.007. PMID: 38763765.
- Illustrations were made using biorender