

SILVER-ZINC OXIDE NANOCOMPOSITE DECORATED CELLULOSE NANOCRYSTALS FOR GROWTH INHIBITION OF WATERBORNE PATHOGENS

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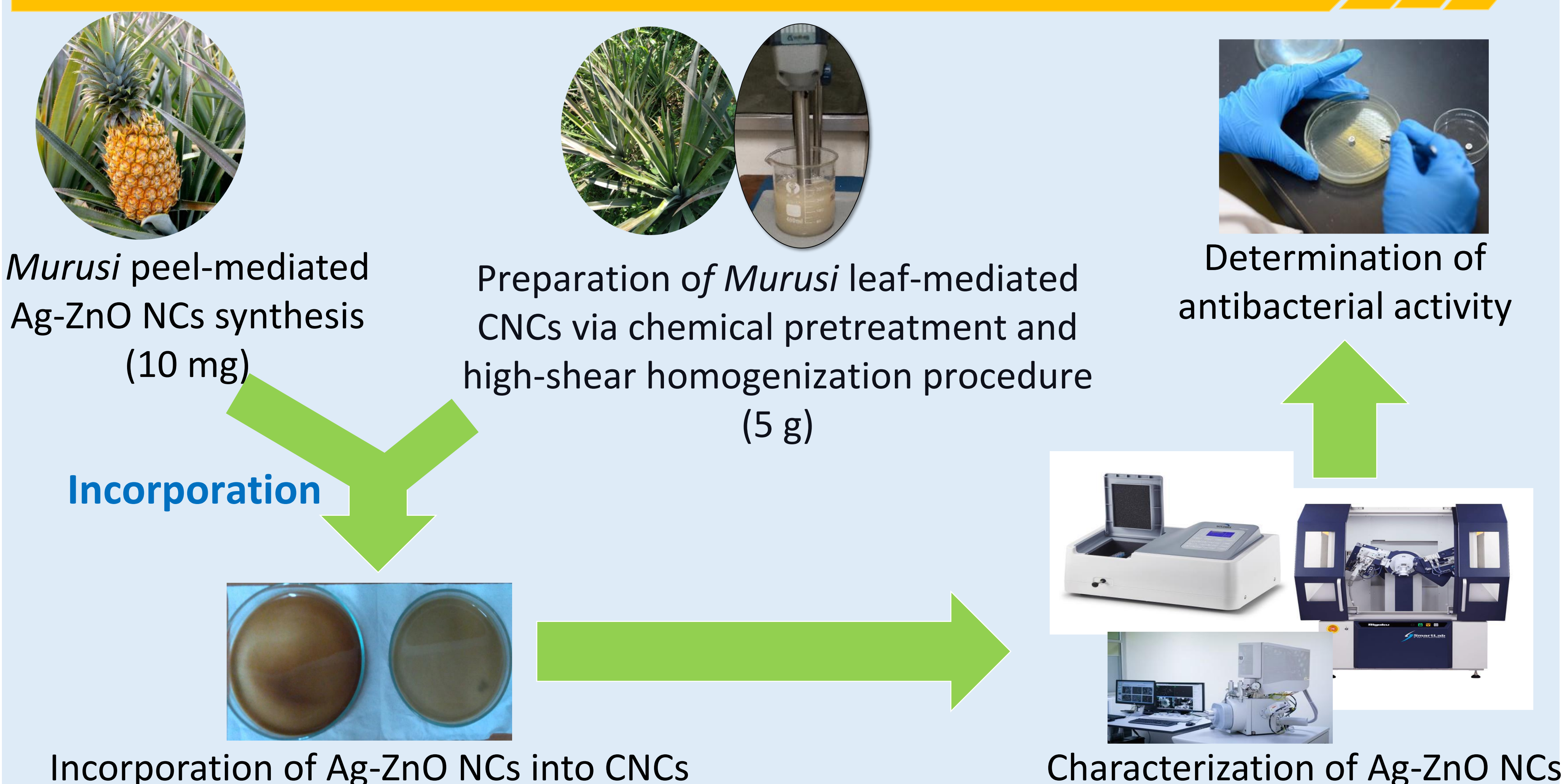
Introduction

- Waterborne diseases pose a significant global health risk
- Green nanotechnology adds sustainable value to agricultural waste by transforming it into a valuable resource
- Application of cellulose nanocrystals (CNCs) in wastewater treatment, as filters and membranes, is considered eco-friendly and utilizes renewable materials

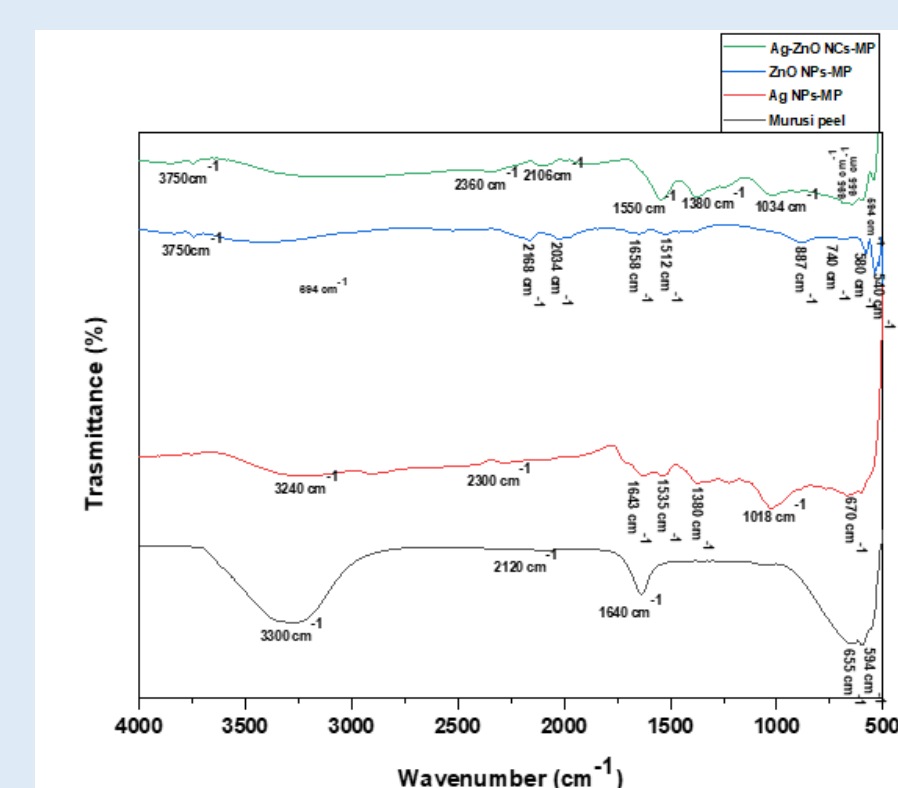
Objective

To biosynthesis of Ag-ZnO nanocomposites integrated with CNCs derived from agro-waste of *Murusi* pineapple variety and assess their effectiveness against waterborne pathogens

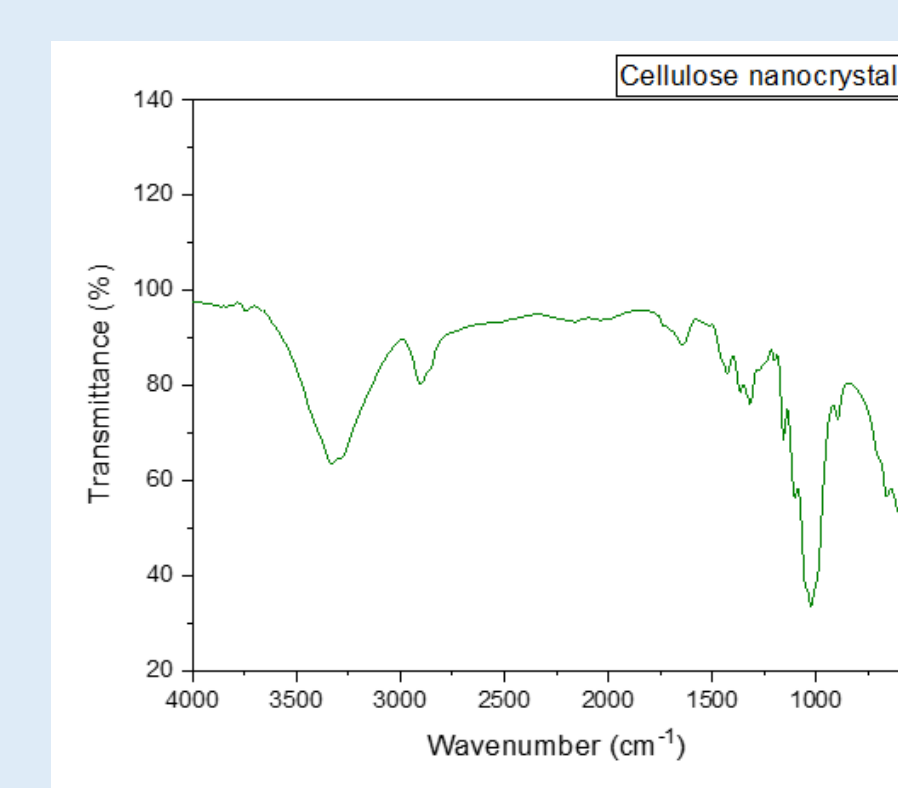
Methodology



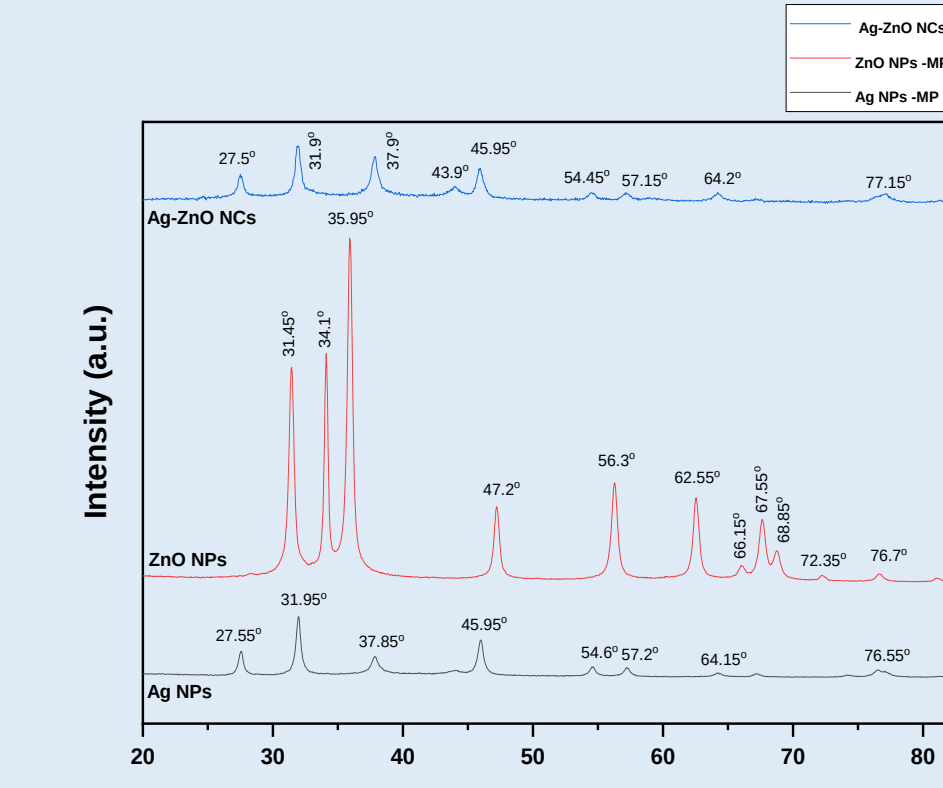
Results



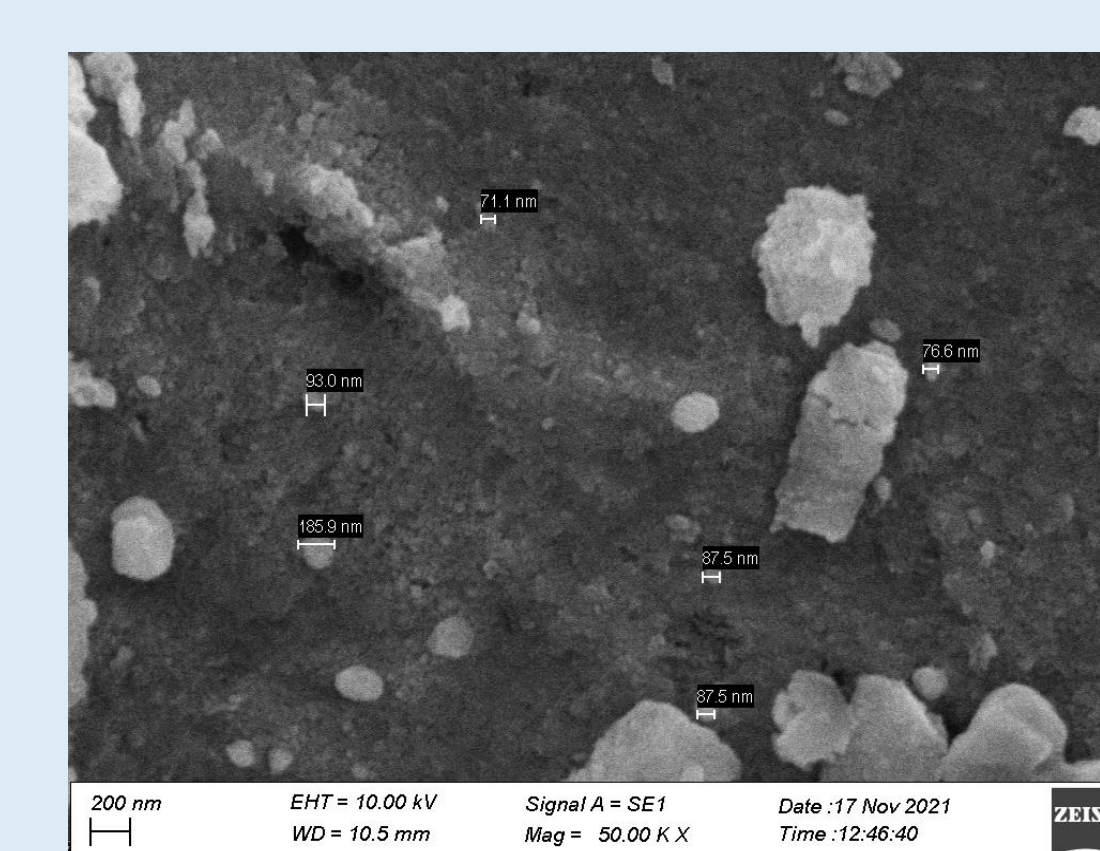
FTIR spectra confirm the involvement of phytochemicals for the synthesis of Ag-ZnO NCs



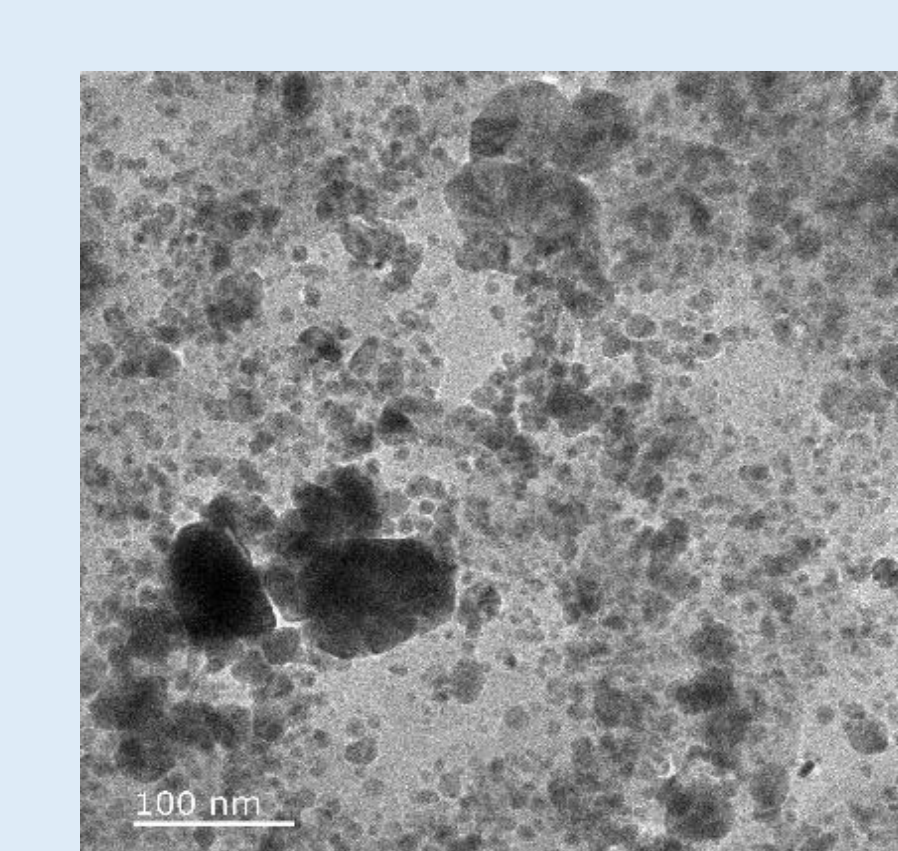
FT-IR confirmation of the pure CNCs formation



Formation of both the FCC cubic structure of Ag and the wurtzite structure of ZnO in Ag-ZnO NCs confirmed by XRD analysis

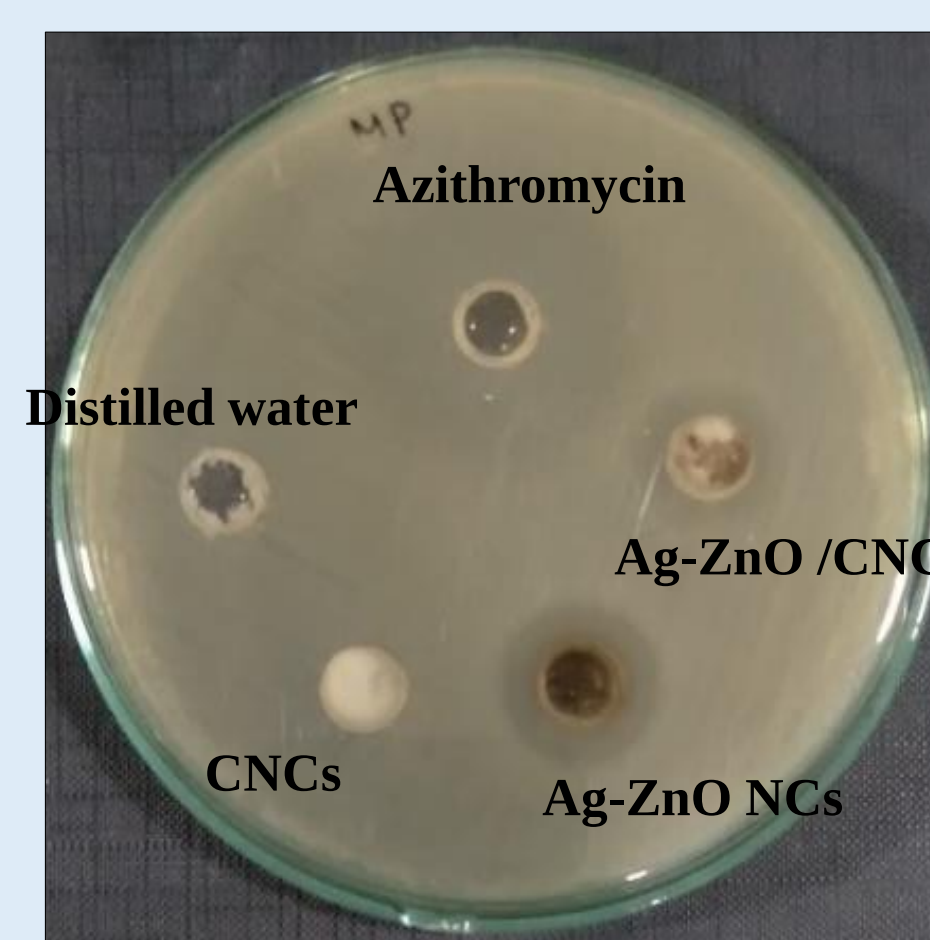


SEM analysis of Ag-ZnO NCs indicating agglomerated form

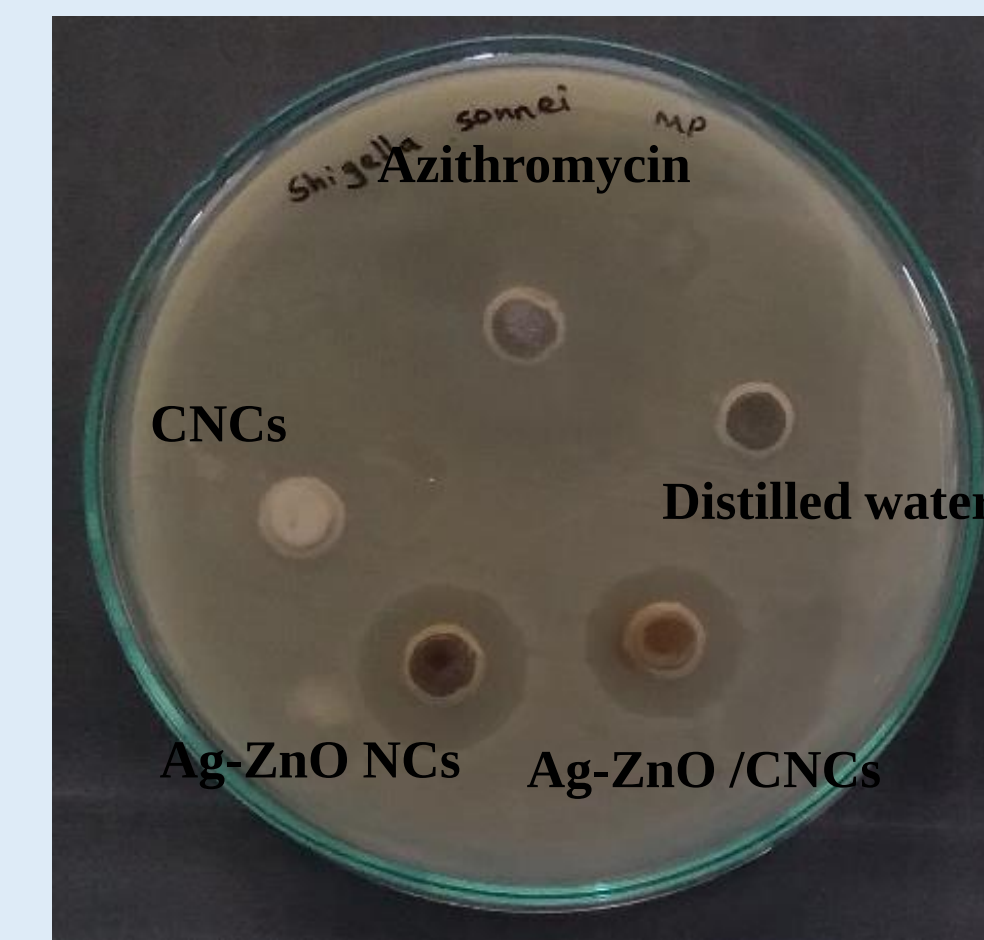


Particle size of Ag-ZnO NCs from TEM ranged from 20 - 100 nm

Antibacterial activity



Salmonella typhi



Shigella sonnei

Bacteria	samples		
	Ag-ZnO NCs (mm) (1000 ppm: 100 μ L)	Ag-ZnO NCs/CNCs (mm) (100 μ L)	Positive control (mm) (2000 ppm: 100 μ L)
<i>Salmonella typhi</i> (100 μ L)	15 $\pm$ 1.0	14 $\pm$ 1.5	30
<i>Shigella sonnei</i> (100 μ L)	21 $\pm$ 2.5	19 $\pm$ 2.0	30

Conclusion

- Inhibition was not significantly different ($p \geq 0.05$) between Ag-ZnO NCs and the Ag-ZnO/CNCs composite against waterborne pathogens
- The study highlighted the eco-friendly applications of Ag-ZnO/CNCs for suppressing the growth of waterborne pathogens in wastewater
- The research demonstrates the successful synthesis of Ag-ZnO/CNCs using agricultural waste from *Murusi*
- The application of Ag-ZnO/CNCs has the potential for diverse applications in inhibiting bacterial growth

References

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