

Profiling and Characterization of Silver, Zinc Oxide and Silver/ Zinc Oxide Hybrid Nanoparticles for Antimicrobial Properties

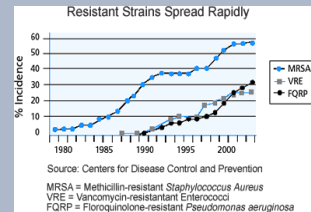
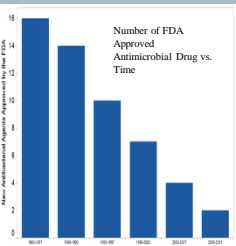
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INTRODUCTION

Short Abstract: In this study we have synthesized Ag, ZnO and Ag/ZnO hybrid nanoparticles using microwave synthesis method and tested for their antimicrobial properties.

Motivation: Studies show an increase in infection of drug resistant pathogens, however there has been a steady decrease in the number of FDA approved antimicrobial drugs for treatment of infection.



Goal: Make a new hybrid nanoparticle material possessing antimicrobial activity to be used as an alternative therapy or additive therapy to antibiotic use.

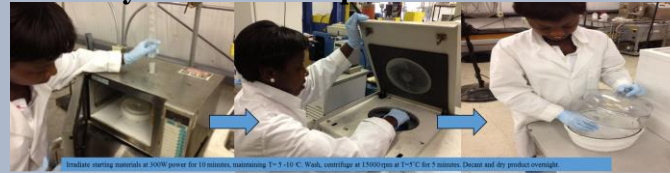


ACKNOWLEDGMENTS

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METHODS

Microwave Synthesis Technique:



Antimicrobial Testing Techniques:

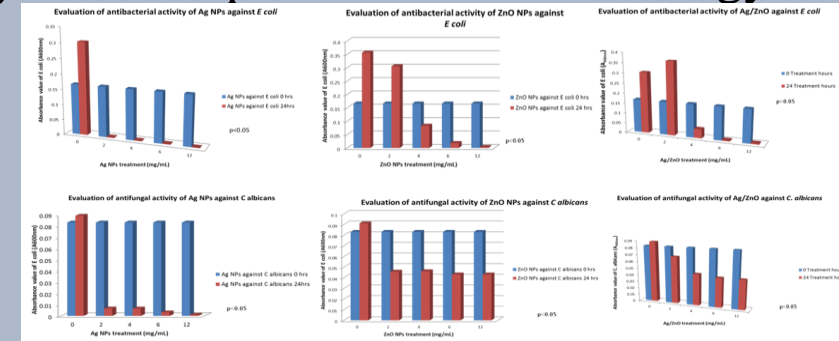
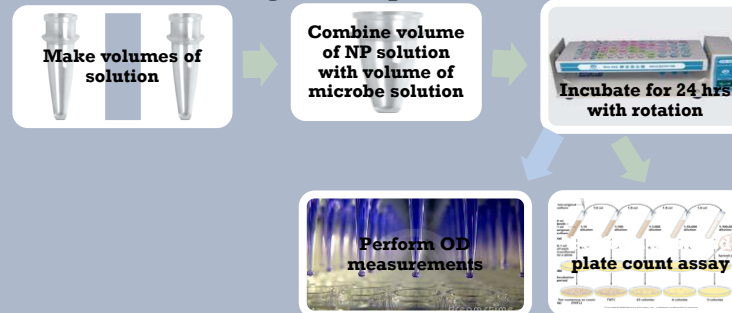


Table 1: Comparison of % inhibitory activity of Ag, ZnO and Ag/ZnO NPs against *E. coli*

Concentration	Ag/ZnO hybrid NPs	Ag NPs	ZnO NPs
2 mg/mL	0%	99%	0%
4 mg/mL	73%	100%	50%
6 mg/mL	97%	100%	76%
12 mg/mL	99%	100%	81%

Table 2: Comparison of % inhibitory activity of Ag, ZnO and Ag/ZnO NPs against *C. albicans*

Concentration	Ag/ZnO hybrid NPs	Ag NPs	ZnO NPs
2 mg/mL	16%	92%	0%
4 mg/mL	45%	92%	45%
6 mg/mL	50%	96%	78%
12 mg/mL	50%	100%	96%

RESULTS

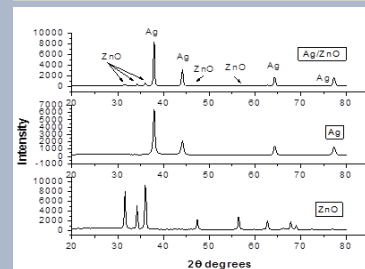


Figure 1 XRD diffractogram of the Ag, ZnO and Ag/ZnO

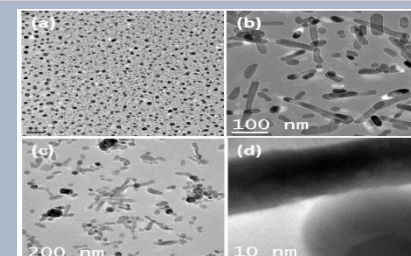


Figure 2 is TEM micrographs of a) Ag b) ZnO, c) Ag/ZnO NPs at low magnification and d) Ag/ZnO NPs at high magnification.

CONCLUSION

The microwave synthesis technique is successfully used to synthesize Ag, ZnO and Ag/ZnO hybrid nanoparticle in 10 minutes time. However, Ag/ZnO NPs failed to excel the individual inhibitory activities of silver as an antibacterial agent or zinc oxide as an antifungal agent. Nevertheless, these results suggest that hybrid Ag/ZnO NPs have antimicrobial activities that may be used as alternatives when treating multiple or unknown infections because of their dual antifungal and antibacterial properties.