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ZnO NPs -BASED ADVANCED MATERIALS AND THEIR POTENTIAL BIOAPPLICATIONS

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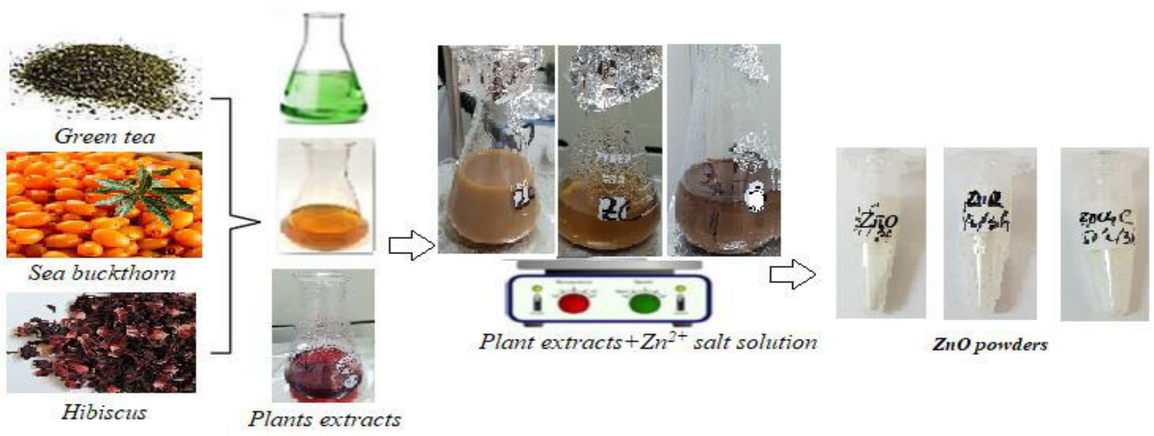
INTRODUCTION & AIM

Zinc oxide (ZnO) is considered one of the most versatile oxide nanoparticles, mainly because of its particularities regarding its biocompatibility, photosolubility, and low toxicity, and is listed by the USFDA as a generally recognized as safe (GRAS) material.

The applicative capacity of ZnO is strongly influenced by the synthesis method (with both large-scale chemical and physical methods being reported), which involves polluting reagents, toxic solvents, and surfactants, which have an influence on the size, morphology, and physicochemical properties.

In this context, our research aimed to find alternative ways to synthesize ZnO particles via green methods (biosynthesis) using active constituents from plant extracts (i.e., aqueous solutions of *Hibiscus, Green Tea, Sea buckthorn,* etc.) with reducing, capping, and stabilizing effects.

METHOD



CONCLUSION

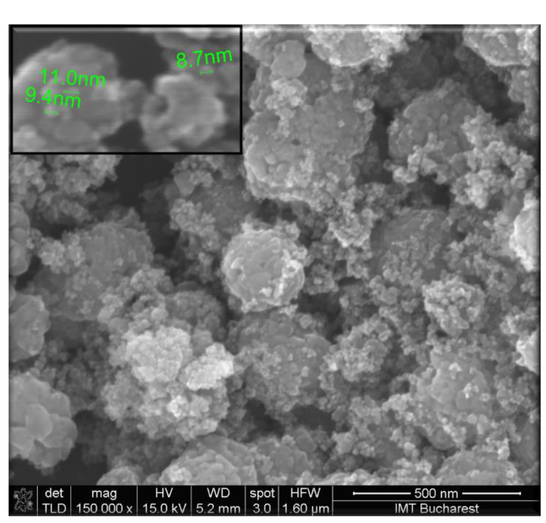
The decrease in toxicity through the use of eco-friendly methods and the multifunctional properties make these particles ideal candidates for applications in biomedical fields, such as targeted drug/gene delivery systems, antimicrobial coatings, antioxidant and anti-inflammatory activities, bioimaging, tissue engineering, skin protection applications, development of cancer therapies, biosensors, etc.

These synthesized ZnO NPs have demonstrated their effectiveness in inhibiting bacterial growth and their better bioactivity and biocompatibility as a result of the functional groups derived from the phytochemical substances present on their surface according to the FTIR results, which highlighted the formation of reactive oxygen species and the direct interaction of the particles with bacterial surfaces.

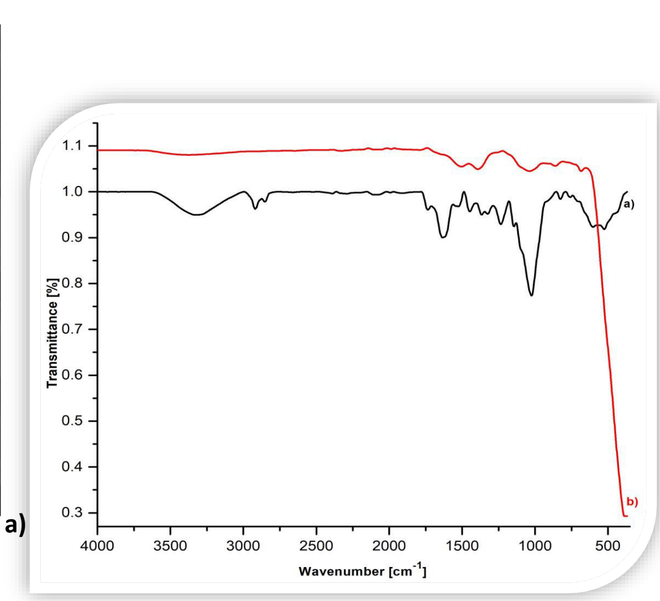
FTIR analysis for all samples exhibits a high-intensity band in the range 500–400 cm^{-1}, which can be attributed to the vibration mode of the Zn-O bonds.

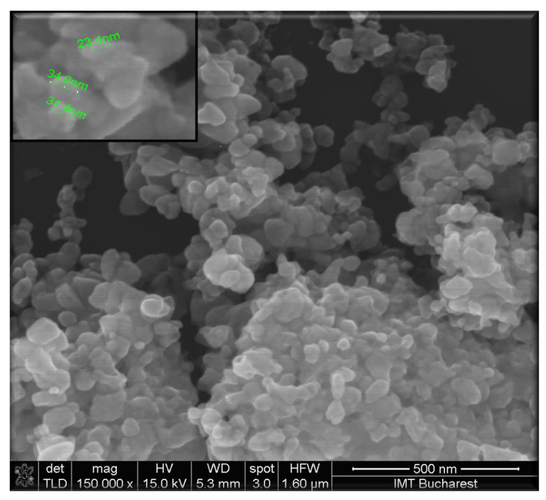
Morphological analysis shows the spherical shape of the particles, with particle sizes below 50 nm, depending on the extract used.

RESULTS & DISCUSSION



a)





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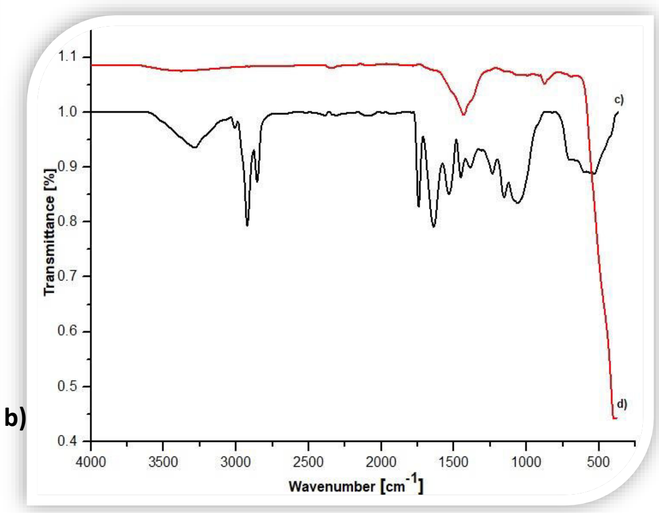
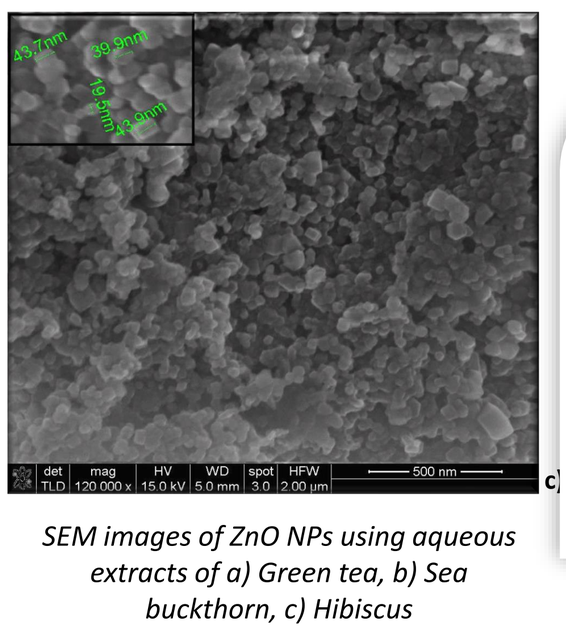
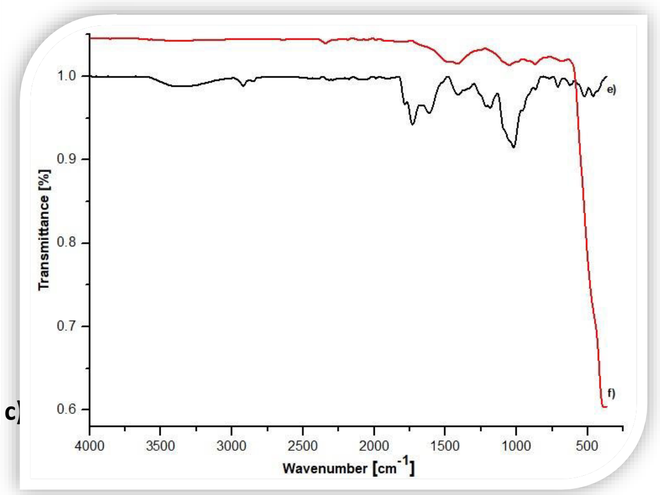




c)

SEM images of ZnO NPs using aqueous extracts of a) Green tea, b) Sea buckthorn, c) Hibiscus



FTIR spectra of :
a) Green tea, b) ZnO NPs using Green tea extract, c) Sea buckthorn, d) ZnO NPs using Sea buckthorn extract, e)Hibiscus, f) ZnO NPs using Hibiscus extract

ACKNOWLEDGEMENTS / REFERENCES

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