

Synthesis and Biosensor applications of Metal/Metal Oxide Nanoparticles Using Camellia Sinensis Cultivated in Rize Region¹Derya Bal Altuntaş¹Department of Bioengineering, Faculty of Engineering and Architecture, Recep Tayyip Erdogan University, Rize 53100, Türkiye

INTRODUCTION & AIM

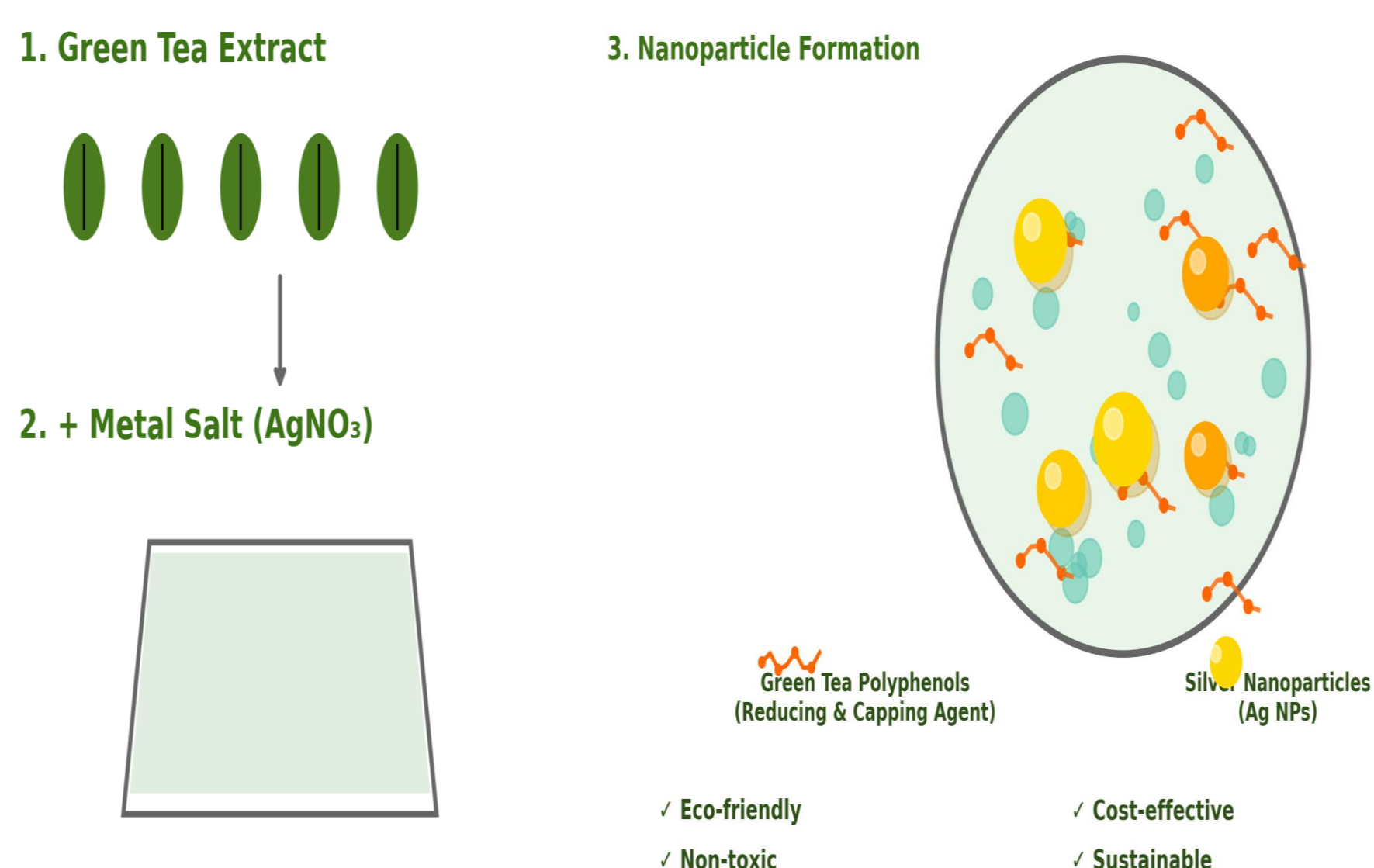
Nanostructures doped Screen Printed Electrode (SPE) have found extensive applications across various research fields due to their superior properties, including high surface area-to-volume ratio, and unique optical, electrical, and mechanical characteristics. With increasing usage areas, the demand for nanostructures has grown significantly, necessitating more synthesis processes. Traditional synthesis approaches often involve harmful chemicals and generate toxic byproducts, raising environmental and health concerns. Green synthesis methods have been developed as environmentally friendly alternatives to conventional approaches that use harmful chemicals. These "Green synthesis" methods enable the synthesis of nanostructures without requiring any chemicals, making the process more sustainable and cost-effective. To synthesize metal and metal oxide nanoparticles using *Camellia sinensis* (Rize tea) through green synthesis methods and investigate their potential applications in biosensor development.

METHOD

Green synthesis, which is a branch of the "bottom-up" approach among nanoparticle synthesis methods, utilizes various biological sources as reducing and stabilizing agents. In green synthesis, metal nanoparticle synthesis is carried out using many biological sources such as sugars, vitamins, plant extracts, microorganisms, bacteria, algae, and fungi, each offering unique advantages in terms of biocompatibility and environmental safety.

Synthesis Process:

- The rich polyphenol content and antioxidant properties of Rize tea utilized as reducing and stabilizing agents
- Synthesized nanoparticles characterized using advanced analytical techniques

Green Synthesis with Green Tea

RESULTS & DISCUSSION

The synthesized nanoparticles demonstrated promising properties and potential applications across multiple domains:

Characterization:

- Successful synthesis confirmed through advanced analytical techniques
- Nanoparticles exhibited superior properties characteristic of green synthesis

Applications Investigated:

- Antimicrobial activity
- Catalysis
- Environmental remediation
- Biomedical fields
- Biosensor applications

Performance:

- The rich polyphenol content and antioxidant properties of Rize tea proved effective for nanoparticle synthesis
- Nanoparticles showed excellent biocompatibility and environmental safety

CONCLUSION



Screen Printed Electrode (SPE)

Results demonstrated that Rize tea serves as an effective biological source for environmentally friendly nanoparticle synthesis. The green synthesis method using *Camellia sinensis* offers a sustainable and cost-effective approach for producing metal and metal oxide nanoparticles with promising applications in biosensing and other biomedical fields.

FUTURE WORK / REFERENCES

Bindu, P., & Thomas, S. (2014). Estimation of lattice strain in ZnO nanoparticles: X-ray peak profile analysis. *Journal of Theoretical and Applied Physics*, 8(4), 123-134.

Bose S, Kuila T, Mishra AK, Rajasekar R, Kim NH ve Lee JH. 2012. "Carbon-based nanostructured materials and their composites as supercapacitor electrodes". *Journal of Materials Chemistry*. 22(3):767-784.