



## DNA concentration and purity characterization through nanotechnology-assisted bioimpedance

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# Introduction



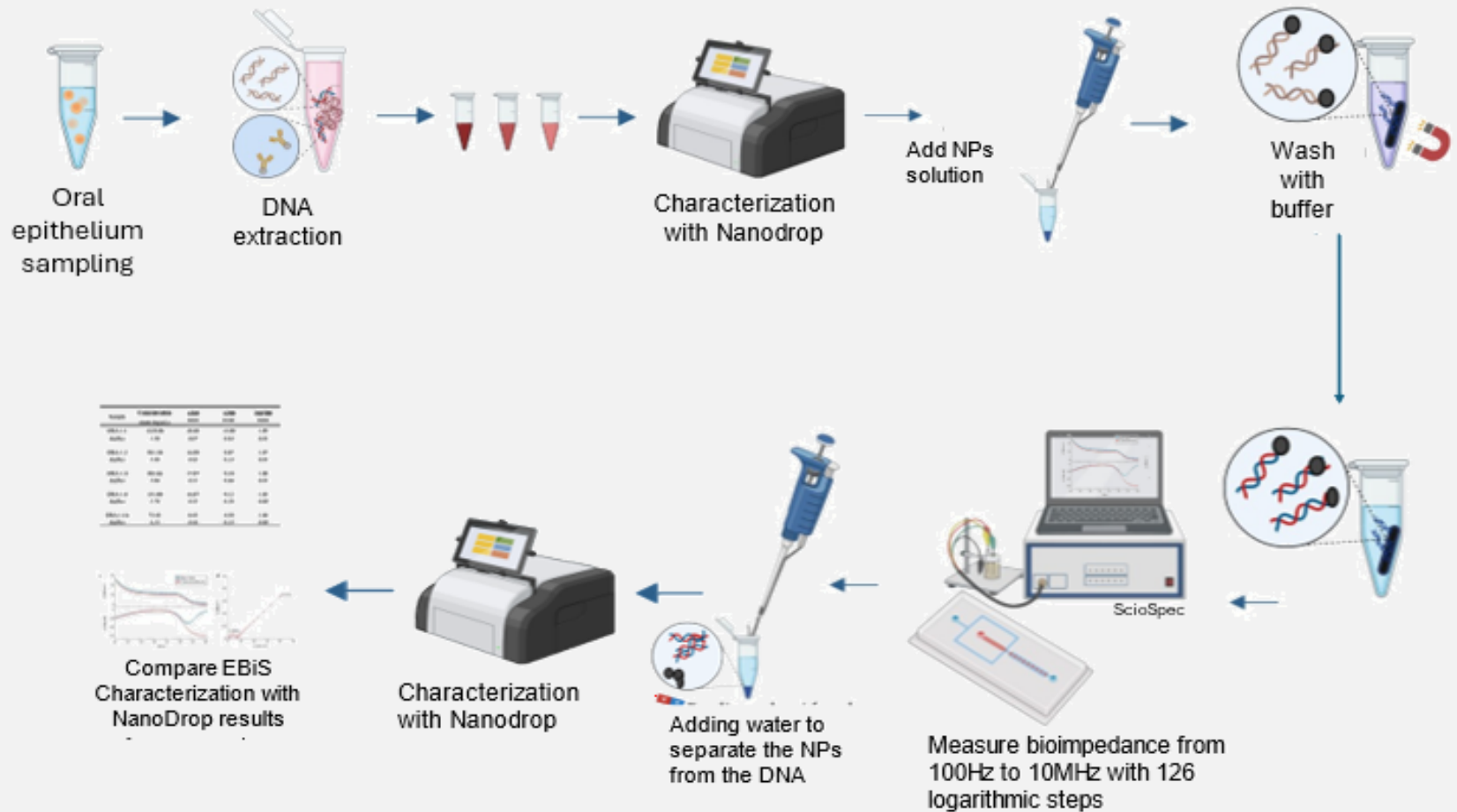
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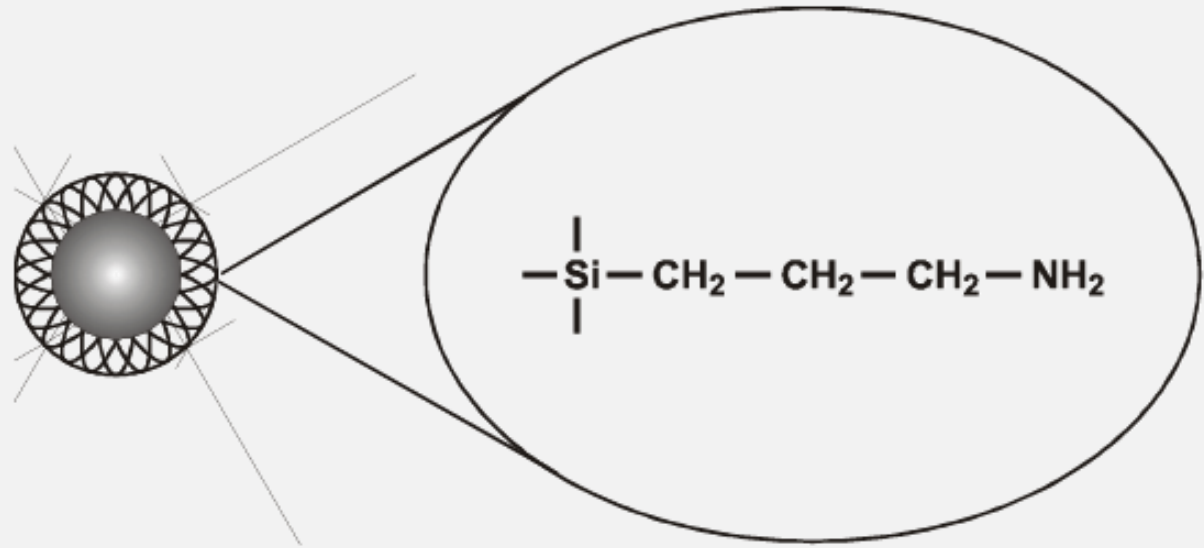
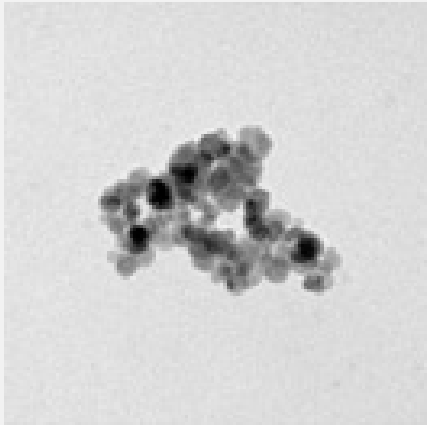
Electrical Bioimpedance Spectroscopy (EBiS) leverages multifrequency impedance measurements to assess biological tissue properties, making it a valuable non-invasive tool in biomedicine. Its ability to detect DNA concentration without labeling techniques is enhanced by incorporating core-shell magnetic nanoparticles, which reduce toxicity and improve stability while enabling effective interaction with DNA. This innovative approach combines EBiS and nanoparticles to achieve precise DNA detection and quantification, addressing challenges in molecular diagnostics and paving the way for cost-effective, adaptable biosensors with broad applications in clinical and research settings.



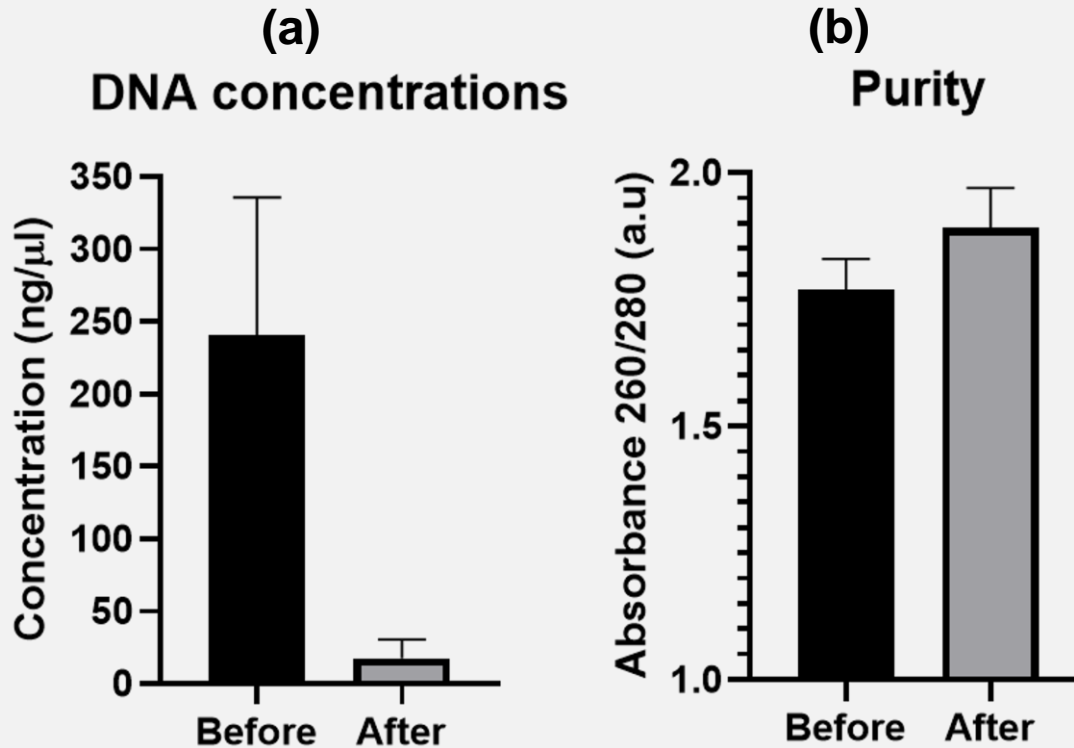
# Methodology



# Nanotechnology

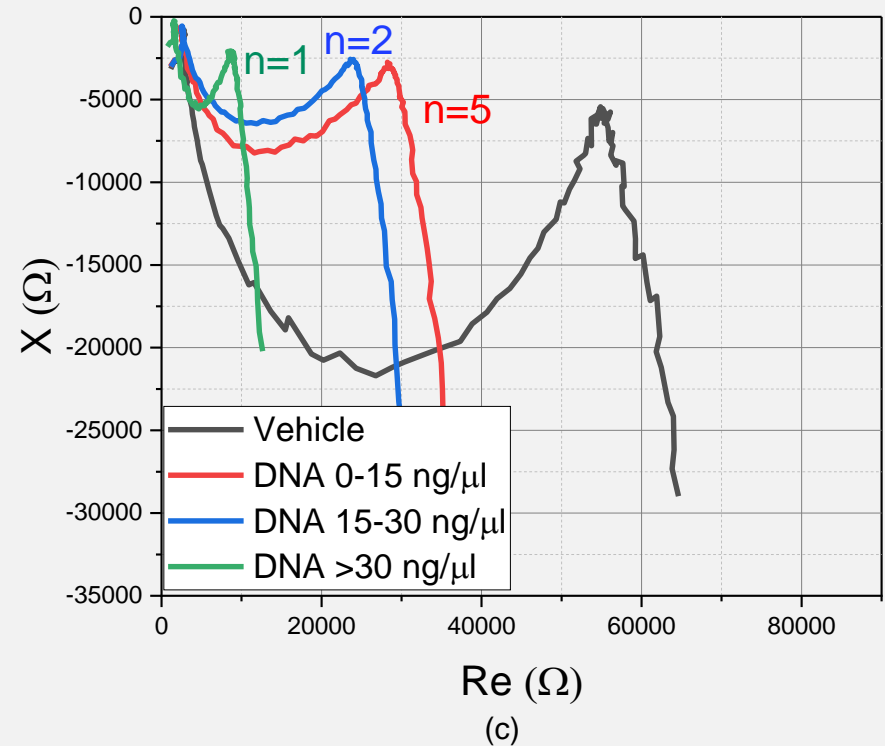
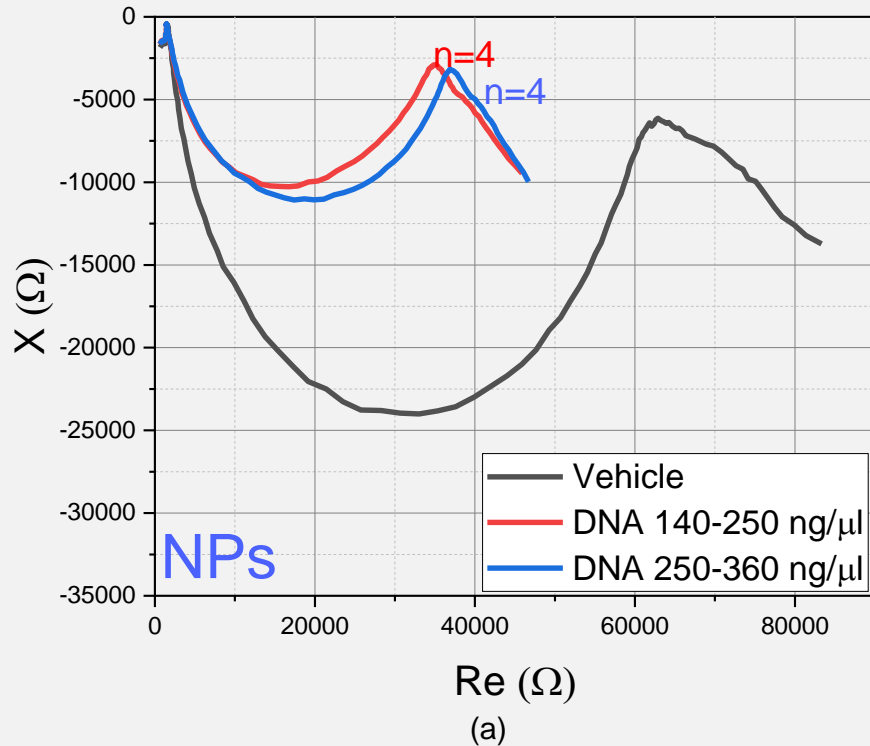


# UV-Vis Spectroscopy Results



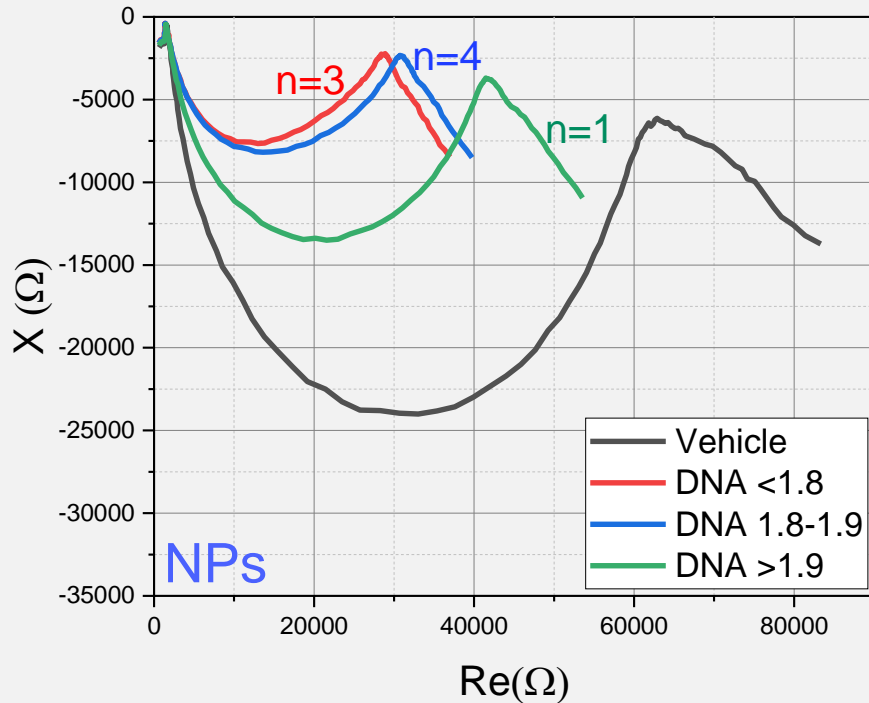
Bar graphs result of UV-Vis spectrophotometry measurements (a) Concentrations before and after purification (b) Purity before and after purification.

# EBiS Results

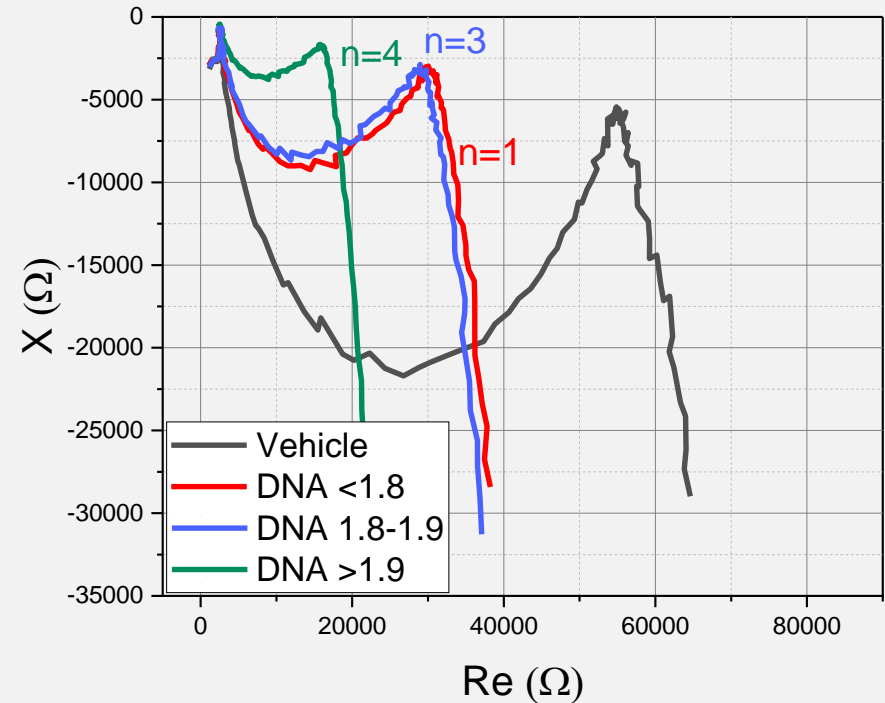


(a) and (c) Nyquist diagram classified based on DNA concentrations assisted with magnetic nanoparticles and after the purification with magnetic nanoparticles respectively

# Results



(b)



(d)

(b) and (d) Nyquist diagram classified based on DNA purity assisted with nanotechnology and after the purification with nanotechnology respectively

# Conclusions

This research demonstrates that magnetic nanoparticles enhance DNA purity despite reducing its concentration, establishing an efficient and accessible method for DNA characterization. The correlation between bioimpedance properties and DNA characteristics suggests potential for cost-effective, versatile molecular diagnostic tools applicable in diverse biomedical scenarios, advancing genetic analysis and real-time monitoring.



# References

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