IOCM 2025 Conference

The 4th International Online Conference on Materials

03–05 November 2025 | Online

MDPI

Interfacial and structural characterization of BSA-coated silver nanoparticles

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INTRODUCTION & AIM

Silver nanoparticles (AgNPs) have attracted considerable attention due to their unique physicochemical properties and potential applications in biomedicine. The formation of a protein corona is a key determinant of nanoparticle behavior in biological environments, influencing stability, biodistribution, and cellular interactions. In this work, we investigated the interaction between AgNPs and bovine serum albumin (BSA) as a model protein, focusing on the physicochemical changes induced by corona formation. The objective is know the interactions present in the system BSA/AgNPs in order to optimize them [1].

METHOD

To this study we used isotropic and anisotropic silver nanoparticles, wich were synthesized via chemical reduction and incubated with BSA.

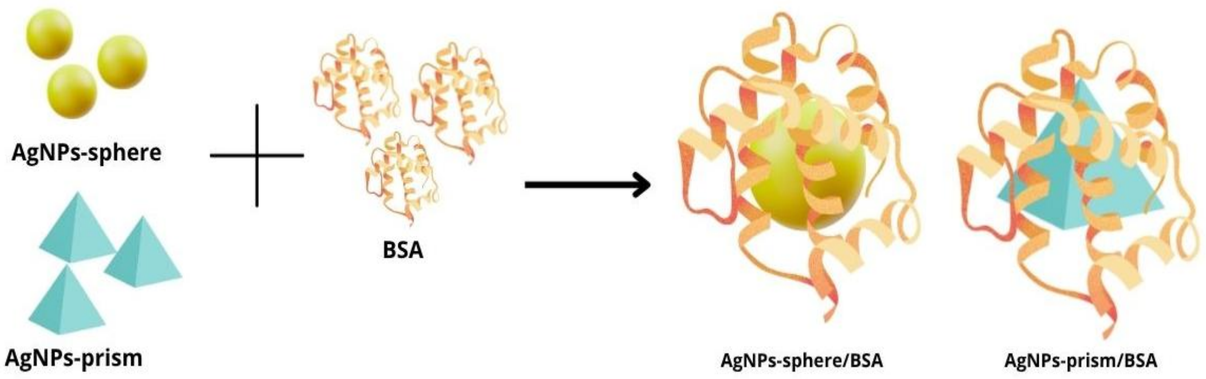

Figure 1. Scheme of experiments. BSA bovine serum albumin. AgNPs-sphere: sphere like silver nanoparticles. AgNPs-prism: prism like silver nanoparticles.

We employed pendant drop tensiometry to measure interfacial tension, and transmission electron microscopy (TEM) was employed to characterize particle morphology, and the presence of protein layers on the nanoparticle surface.

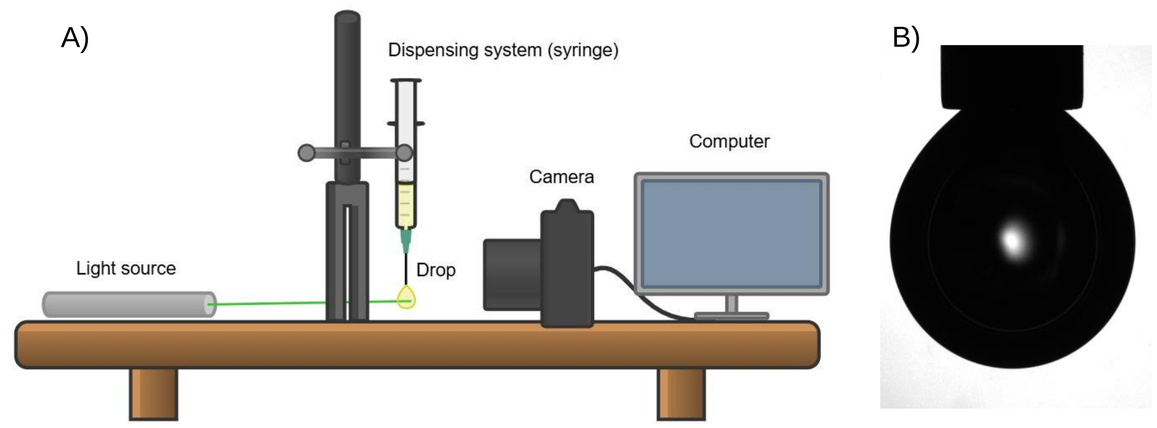

Figure 2. A) An experimental setup for pendant drop tensiometry. **B)** A typical drop image.

A small bond number implies that the interfacial forces dominate the gravitational forces, with the resulting drop profile only slightly deformed away from sphericity [2].

RESULTS & DISCUSSION

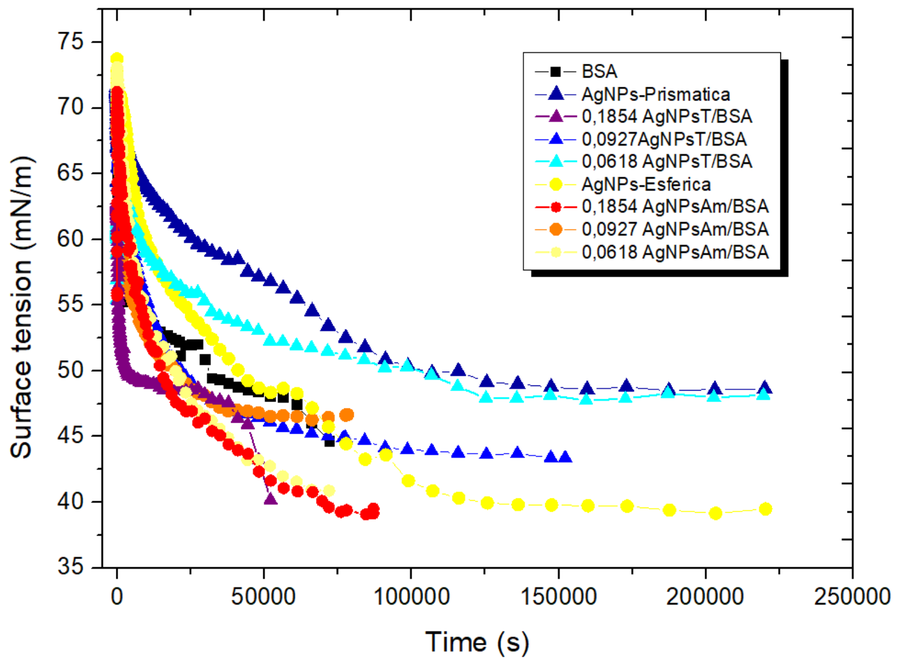

Figure 3. Dynamic surface tension of different bulk concentrations of BSA/ AgNPs.

Surface tension revealed a concentration dependent decrease in interfacial tension upon BSA addition, indicating effective adsorption and surface modification of AgNPs. TEM images confirmed the formation of nanoparticles with spherical morphology and the presence of a thin, uniform organic coating consistent with protein corona.

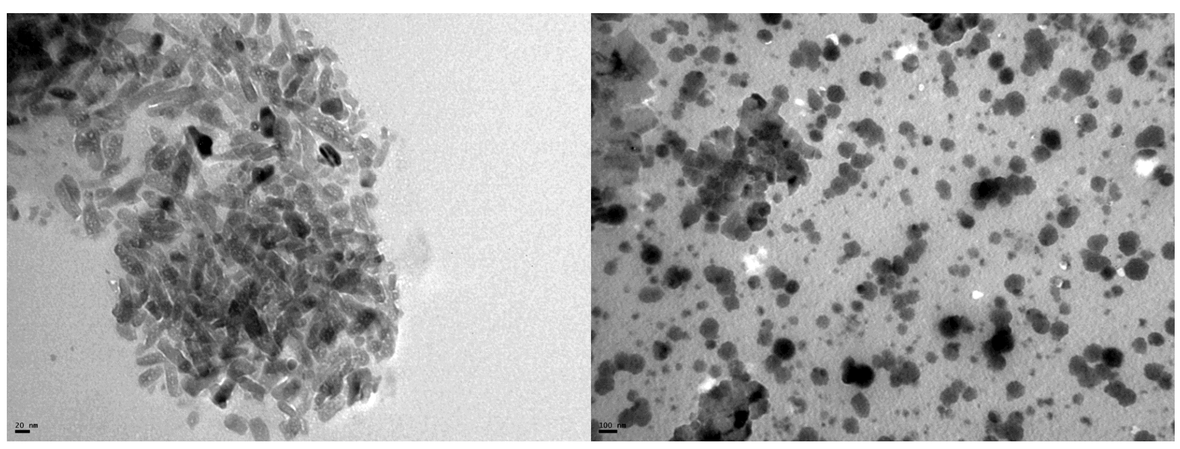

Figure 4. TEM ofBSA/AgNPs.

CONCLUSION

BSA effectively interacts with AgNPs, inducing significant alterations in surface properties and nanoparticles morphology

FUTURE WORK / REFERENCES

[1] S. Shourni et al. Colloids and Surfaces A: Physicochemical and Engineering Aspects 638 (2022) 128273.

[2]J.D.Berry et al./Journal of Colloid and Interface Science 454 (2015) 226-237