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Article

"Soft Protein Corona" as the Stabilizer of the Methionine-Coated Silver Nanoparticles in the Physiological Environment: Insights into the Mechanism of the Interaction

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Abstract: The study of the interactions between nanoparticles (NPs) and proteins has had a pivotal role in facilitating the understanding of biological effects and safe application of NPs after exposure to the physiological environment. Herein, for the first time, the interaction between L-methionine capped silver nanoparticles (AgMet), and bovine serum albumin (BSA) is investigated in order to predict the fate of AgMet after its contact with the most abundant blood transport protein. The detailed insights into the mechanism of interaction were achieved using different physicochemical techniques. The UV/Vis, TEM, and DLS were used for the characterization of the newly formed "entity", while the kinetic and thermodynamic parameters were utilized to describe the adsorption process. Additionally, the fluorescence quenching and synchronous fluorescence studies enabled the prediction of the binding affinity and gave us insight into the influence of the adsorption on the conformation state of the BSA. According to the best of our knowledge, for the first time, we show that BSA can be used as an external stabilizer agent which is able to induce the peptization of previously agglomerated AgMet. We believe that the obtained results could contribute to further improvement of AgNPs' performances as well as to the understanding of their in vivo behavior, which could contribute to their potential use in preclinical research studies.

Keywords: protein corona; AgNPs; BSA; adsorption; kinetics; thermodynamic study

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