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Tuning of protein adsorption on nanoparticles using oppositely charged surfactant and multi-valent ions

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The integration of the nanoparticles with proteins has a prime interest in the field of nanobiotechnology where these complexes are aimed to be utilized in different applications such as targeted drug delivery, biosensing, etc. [1]. The protein adsorption on nanoparticles is governed by several interactions such as hydrogen bonding, electrostatic complexion, hydrophobic attraction, etc. Herein, the interaction of cationic lysozyme protein with the anionic Ludox HS40 silica nanoparticle has been tuned by anionic SDS and multi-valent ZrCl4 ions in the three-component systems. The unique advantage of contrast matching SANS (bulk contrast, micelle contrast, and nanoparticle contrast) has been utilized to probe the role of individual components in the three-components system [2]. The results demonstrate that selective additive induced preferential binding of the protein (lysozyme-SDS/lysozyme-HS40 nanoparticles) and the multivalent ions driven charge inversion of the nanoparticles/proteins can be utilized to create switching between the protein adsorption and non-adsorption. These parameters can also enable the control over the undesired protein adsorption and nanoparticle aggregation in the nanoparticle-protein systems [3].

References

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