

Physicochemical Identity of Protein-Coated Gold Nanoparticles

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When NPs are exposed to the environment, an undefined protein corona is generated, which changes their colloidal properties (i.e. hydrodynamic size, surface charge and aggregation state) fundamentally. This leads to a completely new and undefined physicochemical NP identity. In the presented study, we used gold NPs as a model system because their colloidal stability can be monitored easily with UV/Vis. The impact of the protein properties (molecular weight and isoelectric point) and that of the environmental conditions (pH and ionic strength) on the final physicochemical NPs' properties was investigated. They form either stable dispersions or agglomerate spontaneously when mixed with protein solutions. This depends on the protein and the experimental conditions. Surprisingly, the agglomerates redisperse to individually dispersed and colloidally stable NPs, depending on the purification pH. The final protein coated NPs exhibit specific stabilities and surface charges that depend on protein type and the conditions during its adsorption. By understanding the interactions of NPs with proteins under controlled conditions, we can define the protein corona of the NPs and thus their physicochemical properties in various media.

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[1] I. Dewald, O. Isakin, J. Schubert; T. Kraus, M. Chanana, *J. Phys. Chem. C* 2015, **119**, 25482.