Nano-bio-interactions as Revealed by SERS

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SERS has become increasingly important as a tool to study the interaction of nanoparticles with cellular ultrastructure. In our lab, we apply it to cultured cells, purified compounds, and whole small organisms.

Recently, we have shown that our experiments provide information about the composition, structure and stability of the corona of silver nanoparticles on one hand, and particle structure, agglomeration and morphology on the other hand, both in the context of the cellular ultrastructure [1]. In order to achieve this, SERS is combined with other approaches that provide information about the localization and quantification of nanoparticles. They include sophisticated ultramicroscopic methods, specifically synchrotron X-ray tomography [1] and TEM, but also LA-ICP MS micromapping [2], respectively.

As SERS relies on the plasmonic properties of the nanoparticles, nanoprobes and labels always have to provide suitable size, shape and agglomeration structure. Here we will discuss also interesting composite materials that can be used for studies of nano-bio-interactions, and optical labels carrying SERS reporters that provide high stability and specific signals. As we demonstrated for hemoglobin and red blood cells, the nano-bio-interaction may also have serious consequences for biomolecular structure [3]. In this talk, applicability of a SERS approach for structural studies will be critically discussed.

References:

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