Plasmonic-based Nanoplatforms for Light-Activated Therapy, Bioimaging and Sensing

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Owning many advantages such as unique optical properties, easy surface modification and high biocompatibility, plasmonic nanoparticles have attracted enormous scientific interest in the biomedical field.
In this presentation, we give an overview on our current approaches in fabrication and implementation of plasmonic-based nanoplatforms in a large variety of applications ranging from cell imaging and sensing to drug delivery and light-activated nanotherapeutics. For instance, several classes of biopolymer-coated plasmonic nanoparticles were implemented as versatile nanoprobes for spectroscopic investigation of cells by intracellular imaging *via* surface-enhanced Raman scattering (SERS), localized surface plasmon resonant scattering (LSPR-S) and steady-state and fluorescent lifetime imaging (FLIM). Scanning confocal Raman microscopy combined with dark-field and confocal fluorescence microscopy were used to record relevant intracellular information as nanoparticle localization, local chemical interaction, and intracellular pH mapping. In recent years, our research group has implemented several "proofs of concept" for light-activated nanotherapies against cancer by integration plasmon-induced photothermal therapy (PTT), plasmon-enhanced photodynamic therapy (PE-PDT) and delivery of chemotherapeutic drugs (doxorubicin, cisplatin) [1].
In the last years we focused on the development of new near-infrared (NIR) fluorescent nanoprobes able to perform as contrast agents for real-time image-guided surgery of ovarian cancer [2], as well fabrication of atomic gold nanoclusters and their implementation in the biomedical and sensor fields [3].

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