PLAMONIC NANOPARTICLES IN ORGANIC SUSPENSIONS: PHASE TRANSFER AND APPLICATIONS

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Plasmonic nanoparticles are key building blocks with unique features that allow exploitation of light-matter interactions across different fields.[1,2] Since the optical properties of plasmonic nanomaterials are directly related to their morphology, much effort has been devoted to develop synthetic routes toward the preparation of these materials. Although the preparation of anisotropic nanoparticles with accurate size and shape control is mainly carried out in water, stable nanoparticles in organic solvents are required for several applications. In this context, we present a general route for the phase transfer of plasmonic nanoparticles of different shapes and sizes.[3] The obtained stable organic dispersion can be then used for different applications: Taking advantage of the excellent spreading of such organic dispersions on water, self-assembly of nanoparticles was achieved at the air/liquid interface, leading to extended nanoparticle arrays that could be in turn transferred onto solid substrates to obtain homogeneous plasmonic substrates.

Additionally, the obtained hydrophobic nanoparticles could be further coated with an amphiphilic polymer, which provides the advantage to disperse nanoparticles in biological media with high physiological stability and biocompatibility.[4] Furthermore, using hydrophobic Raman reporter molecules to transfer the particles, that concomitantly act as capping agents, efficient SERS-encoded nanoparticles for multiplexed cell discrimination can be obtained. These tags were used to distinguish five different types of breast cancer cells by imaging of a quintuple cell co-culture.[5]

Plasmonic nanoparticles suspended in organic media can also be included into bicompartmental polymeric particles produced by electrohydrodynamic co-jetting technique.[6] These biodegradable particles can be used for controlled drug delivery or cell and/or scaffold labelling in long term experiments.

We have demonstrated that this general method to obtain plasmonic nanoparticles in organic suspensions offers new opportunities for future applications.

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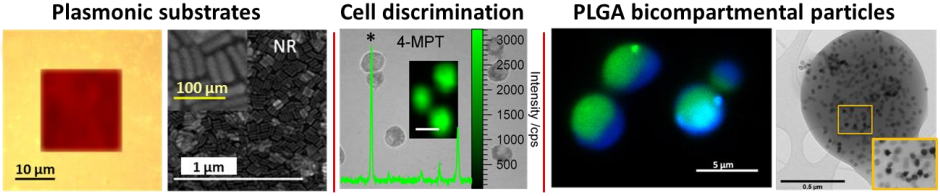

Figure 1: Applications of plasmonic nanoparticles in organic suspensions