

Biosensing with Gold Nanoparticles

Luis M. Liz-Marzán

Bionanoplasmonics Laboratory, CIC biomaGUNE, Paseo de Miramón 182, 20009 Donostia, Spain
Ikerbasque, Basque Foundation for Science, 48011 Bilbao, Spain
lizmarzan@cicbiomagune.es

Abstract

Metal nanoparticles display very interesting optical properties, related to localized surface plasmon resonances (LSPR), which give rise to well-defined absorption and scattering peaks in the visible and near-IR spectral range. Such resonances can be tuned through the size and shape of the nanoparticles, but are also extremely sensitive towards dielectric changes in the near proximity of the particles surface. Therefore, metal nanoparticles have been proposed as ideal candidates for biosensing applications. Additionally, surface plasmon resonances are characterized by large electric fields at the surface, which are responsible for the so-called surface enhanced Raman scattering (SERS) effect, which has rendered Raman spectroscopy a powerful analytical technique that allows ultrasensitive chemical or biochemical analysis, since the Raman scattering cross sections can be enhanced up to 10 orders of magnitude, so that very small amounts of analyte can be detected. In this communication, we present several examples of novel strategies to employ colloidal nanostructures comprising gold or silver and silica in various morphologies, as substrates for ultrasensitive detection of a wide variety of analytes, including cancer markers, drug metabolites and scrambled prions.

References

- [1] L. Rodríguez-Lorenzo, R. de la Rica, R. Alvarez-Puebla, L.M. Liz-Marzán, M.M. Stevens *Nature Mater.* 11 (2012) 604.
- [2] M. Sanles-Sobrido, L. Rodríguez-Lorenzo, S. Lorenzo-Abalde, A. González-Fernández, M.A. Correa-Duarte, R.A. Alvarez-Puebla, L.M. Liz-Marzán *Nanoscale* 1 (2009) 153.
- [3] R.A. Alvarez-Puebla, A. Agarwal, B.P. Khanal, P. Aldeanueva-Potel, E. Carbó-Argibay, N. Pazos-Pérez, E.R. Zubarev, N.A. Kotov, L.M. Liz-Marzán *PNAS* 108 (2011) 8157.