TAILORED METAL NANOPARTICLES TO TUNE THE SPECTROSCOPIC PROPERTIES OF ORGANIC MOLECULES

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Metal nanomaterials have attracted much attention in the last decades because they can be prepared through simple and versatile methods resulting in nm-sized nanoparticles and/or nanostructures whose dimensions and shapes finely determine their optical and electronic properties [1]. Nanometre-size metal particles show intense optical responses determined by Local Surface Plasmon Resonance, whose frequencies and spectral broadening can be supervised by the morphology, composition and concentration of the colloids [1].

The localized surface plasmons of noble metal nanoparticles have been shown to improve the efficiency of a variety of optical phenomena, including Raman scattering and the performance of light-emitting unit [2] and in all cases the enhanced performances are based on a tight control of the distance between the metal surface and the organic units.

Different methods have been developed to prepare silver and gold plasmonic colloidal nanoparticles and usually, to regulate their dimensions and stability, stabilizing agents are necessary [3]. The proper choice of stabilizing agents might assist the establishment of plasmonic interactions.

The tailored preparation of silver or gold colloids has been achieved to support the interactions between the metal surface and the organic molecules. The plasmonic effects on the fluorescence properties [4] and on the Raman spectra of organic dyes or biological substrates will be presented and discussed.

References

[1] Clare, S. E.; Halas, N. J. *Acc. Chem. Res.* 2008, 41, 1842; Storti, B.; Elisei, F.; Abbruzzetti, S.; Viappiani, C.; Latterini, L. *J. Phys. Chem. C* 2009, 113, 7516; W.-S. Chang, B. Willingham, L.S. Slaughter, S. Dominguez-Medina, P. Swanglap, S. Link, *Acc. Chem. Res.* 2012**,** *45*, 1936-1945; E.C. Dreaden, A.M. Alkilany, X. Huang, C.J. Murphy, M.A. El-Sayed, *Chem. Soc. Rev.*, 2012, 41, 2740–2779; M. Nocchetti, A. Donnadio, V. Ambrogi, P. Andreani, M. Bastianini, D. Pietrella, L. Latterini, *J. Mater. Chem. B*, 2013, 1, 2383-2393; Latterini, L. and Tarpani, L., 2014 in Bio- and Bioinspired Nanomaterials (eds D. Ruiz-Molina, F. Novio and C. Roscini), Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, Germany;

[2] Cao, Y. C.; Jin, R.; Mirkin, C. A. Science 2002, 297, 1536−1540; Hooshmand, N.; Bordley, J.A.; El-Sayed, M.A., *J.Phys. Chem. C* 2015, *119* (27), 15579-15587; Niu, W.; Chua, Y.A.A.; Zhang, W.; Huang, H.; Lu X., *J.*

Am. Chem. Soc. 2015, *137* (33), 10460-10463; J. John, L. Thomas, A. Kurian, S.D. George, J. Lumin., 2016, 172, 39-46;

[3] S. Mourdikoudis, L.M. Liz-Marzán, *Chem. Mater.* 2013 *25* (9), 1465-1476; L. Latterini, L. Tarpani *J. Phys. Chem.* 2011 *115* (43), 21098-21104;

[4] L. Tarpani, L. Latterini, *Photochem. Photobiol. Sci.*, 2014, **13**, 884-890.