

# Integration of Gold Nanoparticles in Optical Resonators

Mauricio E. Calvo<sup>1</sup>, Alberto Jiménez-Solano<sup>1</sup>, Carmen López-López<sup>1</sup>, Olalla Sánchez-Sobrado<sup>1</sup>, Cristina Fernández-López<sup>2</sup>, Ana Sánchez-Iglesias<sup>2</sup>, Luis M. Liz-Marzán<sup>2</sup> and Hernán Míguez<sup>1</sup>

<sup>1</sup>Instituto de Ciencia de Materiales de Sevilla, Consejo Superior de Investigaciones Científicas - Universidad de Sevilla, Américo Vespucio 49, 41092, Sevilla, Spain

<sup>2</sup>Departamento de Química Física, Universidad de Vigo, 36310 Vigo, Spain

mauricio.calvo@icmse.csic.es

Herein we demonstrate the interplay between localized surface plasmons of gold nanoparticles and the field confinement effects that occur in porous one-dimensional photonic crystal based resonators [1,2] containing them (Figure 1). Experiments show the spectral modification of the optical absorption of one-dimensional photonic crystal based resonators containing different types of gold nanoparticles (rods and spheres of different sizes, Figure 2) [3]. We also demonstrate that the porous nature of the final hybrid material provides a means to precisely control the absorption spectrum of the multilayer as a function of the refractive index of the guest compounds. Results are explained in terms of the calculated spatial distribution of the electric field intensity within the configurations under analysis [4].

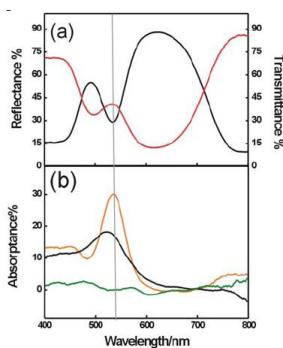


Figure 1

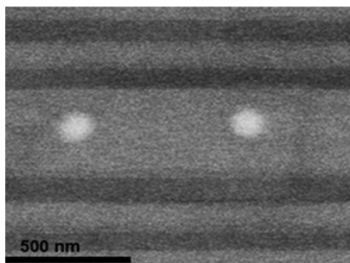


Figure 2

## References

- [1] Colodrero, S., Ocaña, M. and Míguez, H. *Langmuir* 24 (2008) 4430-4434.
- [2] Calvo, M.E., Sánchez-Sobrado, O.; Colodrero, S., Míguez, H. *Langmuir* 25 (2009) 2443
- [3] Sánchez-Sobrado, O., Lozano, G., Calvo, M.E., Sánchez-Iglesias, A., Liz-Marzán, L.M. and Míguez, H. *Adv. Mater.* 23 (2011) 2108-2112.
- [4] Jiménez-Solano, A., López-López, C., Sánchez-Sobrado, O., Luque, J.M., Calvo, M.E., Fernández-López, C., Sánchez-Iglesias, A., Liz-Marzán, L.M. and Míguez, H. *Langmuir* 28 (2012) 9161-9167.