

# Synthesis of Plasmonic Nanostructures for Nanopolaritonics

Petra Ivaskovic<sup>a,b</sup>, Miguel Comesaña-Hermo<sup>a</sup>, Emilie Genin<sup>b</sup>, Mireille Blanchard-Desce<sup>b</sup>, Renaud Vallee<sup>a</sup>, Serge Ravaine<sup>a</sup>

<sup>a</sup>Centre de Recherche Paul Pascal, Pessac, France; <sup>b</sup>Institut des Sciences Moléculaires, Talence, France

## Abstract

Gold nanorods have received a great attention in recent years due to their unique optical properties which depend on their shape, size and aspect ratio. They offer two absorption bands corresponding to their width and length, transverse at shorter wavelength and the longitudinal at a longer [1]. Longitudinal plasmon absorption can be modulated through their linear assembly, leading to the new properties which arise from the coupling of the optical and electronic properties between the individual nanorods. Tuning the optoelectronic properties has a wide range of applications, especially in plasmonics [2].

In order to produce these plasmonic nanostructures, we used a seed-mediated growth method, a highly controlled redox reaction performed in the room temperature in the aqueous solution. The method was optimized by the use of various aromatic additives, which led to the improvements in monodispersity and spectral tunability [3]. Obtained nanorods were characterized by transmission electron microscopy and UV-visible spectroscopy.

Moreover, we assembled gold nanorods using different thiol-terminated molecules. Preferential binding of surfactant on the longitudinal side of NR allowed the binding of thiol groups to the ends of nanorods, leading to their assembly in the longitudinal direction.

In the end, we are presenting the main goal of a project – synthesis of Y-shape nanoplasmonic assemblies comprising nanorods and the linker molecules, an architecture which should be able to selectively route the plasmonic current, serve as plasmonic switch and finally enable the nanoscale light manipulation.

## References

- [1] L. Vigderman et al., *Adv. Mater.* 24 (2012) 4811-4841.
- [2] K.G. Thomas et al., *J. Phys. Chem.* 108 (2004) 13066-13068.
- [3]. X. Ye et al., *ACS Nano.* 6 (2012) 2804-2817.