BRIGHT AND PHOTOSTABLE FULLY-ORGANIC NANOPARTICLES FOR MULTICOLOUR SINGLE PARTICLE TRACKING

Jonathan Daniel,[1] Antoine G. Godin,[2] Brahim Lounis,[2] Laurent Cognet,[2] Mireille Blanchard-Desce[1]

[1]Institut des Sciences Moléculaires (ISM), UMR CNRS 5255, Université de Bordeaux, 33400 Talence
[2] Laboratoire Photonique Numérique et Nanosciences (LP2N) UMR CNRS 5298, Université de Bordeaux, 33400 Talence
E-mail : jonathan.daniel@u-bordeaux.fr

Single molecule tracking is a powerful imaging technique where a single molecule can be detected as long as the molecule is tagged with a fluorescent probe or is it-self fluorescent. [1] Because few biomolecules of interest are fluorescent, one usually need fluorescent markers having high brightness and high photostability to ensure of short exposure times (video rate) and low light dose to minimize photo-degradation of biological materials. In this context , non-organic nanoparticles are promising because of the lack of photostability and brightness of single organic dyes. Here we demonstrate the design and synthesis of nanoparticles made of pure organic dyes (quadrupoles) soluble in water and their promises in single particle tracking experiments. These nanoparticles which are obtained by nanoprecipitation combine the advantages of the confinement effect (high-stability and brightness) usually destined to semiconductor nanoparticles (i.e. QDs) with the versatility, the tunability and the low toxicity of organic materials. Our nanoparticles can be imaged and tracked at video-rate at the single molecule level in a multicolor imaging experiment using a monochromatic source of light (@488 nm). Their emission spectra can be tuned from green to NIR both in water and in cells.[2] During the presentation, new insight about these nanoparticles for single particle tracking experiments will be presented.

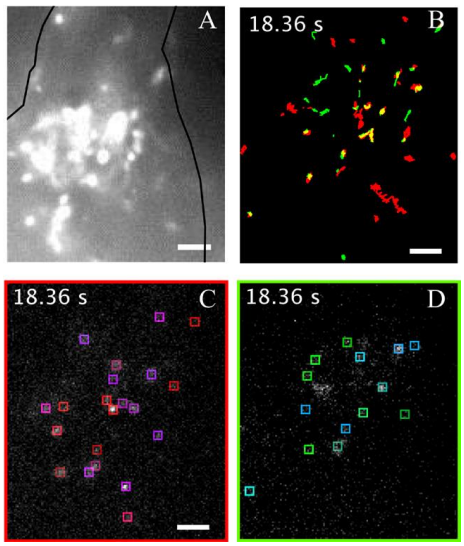

Figure 1. Simultaneous and live Single Particle Tracking of Green and NIR Fluorescent Organic Nanoparticles (FONs) in live COS 7 cell. A) Bright field. B) Reconstruction of the trajectories of the Green and NIR FONs within the COS 7 cell. C) Single Particle Tracking of the NIR FONs in the cell. D) Single Particle Tracking of the Green FONs in the cell.

[1] L. Groc, M. Lafourcade, M. Heine, M. Renner, V. Racine, J.-B. Sibarita, B. Lounis, D. Choquet, L. Cognet, J. Neurosci., **2007**, Vol. 27, pp 12433-12437.

[2] J. Daniel, A. G. Godin, M. Palayret, B. Lounis, L. Cognet, M. Blanchard-Desce, J. Phys. D: Appl. Phys., **2016**, Vol. 49, pp. 084002-084010.