Title: Dye Doped Silica Nanoparticles as Luminescent Organized Systems for Nanomedicine

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Silica nanoparticles are versatile platforms with many intrinsic features, including a low toxicity. Proper design and derivatization yield particularly stable, very bright nanosystems displaying multiple functions, which can be used for either photoluminescence (PL), or electrochemi-luminescence (ECL) sensing, labelling or imaging applications. For these reasons silica nanoparticles already offer unique opportunities, and further improvement and optimization can substantially expand their possible applications in fields of high impact, such as medical diagnostics and therapy, environmental and food analysis, and security.
In this context, we have developed a direct micelle assisted strategy based on the use of Pluronic F127 as high molecular weight surfactants. The one-pot synthesis yields PEGylated silica nanoparticles endowed with very high monodispersity, colloidal stability and core-shell structure. These nanoparticles were recently reported with the acronym PluS NPs (Pluronic Silica NanoParticles). These NPs had a silica core of about 10 nm and an overall hydrodynamic diameter of about 25 nm. Interestingly, PluS NPs can be tailored for optimization of processes such as directional energy transfer, which provide those systems with extremely valuable functions: high light-harvesting capability, signal-to-noise maximization, multiplex output, and signal amplification. *In-vivo* experiment proved the absence of toxic effects on mice even after three months after injection. We also found that cellular uptake was influenced by nanoparticle functionalization while the drug loading ability can bue tuned with a suitable choice of the silica precursor.