Since both liposomes and nanoparticles have shown great potential in application for clinical diagnostics and therapeutics, the perfect combination of the two materials is appealing for further improving the theranostic effect. Therefore, fabrication of supracrystals in aqueous solution is desirable. Several approaches are presented to reach such goal:

(1) Zwitterionic Au nanoparticles (Au\textsuperscript{±}NPs) coated are encapsulated in vesicular systems. The highest efficiency is obtained at a pH value slightly larger than the isoelectric point.

(2) 3D self assemblies of hydrophobic nanocrystals in crystalline structure called supracrystals are suspended in aqueous solution. With Co and Au supracrystals the crystalline structure. With Co supracrystals the paramagnetic properties whereas with Au counterparts novel optical properties are observed.

(3) The design of so called “supracrystalline colloidal eggs” formed by controlled assembly of nanocrystals into complex colloidal supracrystals through superlattice-matched epitaxial overgrowth along the existing colloidosomes. We extend the supracrystalline growth to lattice-mismatched binary nanocrystal superlattices, in order to reach anisotropic superlattice growths, yielding freestanding binary nanocrystal supracrystals that could not be produced previously. These new approaches open new troutes to potential biological and biotechnological applications.

**Keywords:** supracrystals, biocompatible materials, colloidosomes

**Presenting author's email:** mppileni@orange.fr