

Titre

Hybrid colloidal building blocks for new light nanosources

Résumé

Synthesis of original hybrid colloidal nanoparticles will be explored –combining photoactive molecules and dielectric scatterers and/or plasmonic nanostructures– as well as their assembly for designing innovative light nanosources.

Miniature photonic integrated devices, in optoelectronic, biomedical or catalytic applications, involve the development of new local light sources. In this context, light sources based on scattering media for amplified spontaneous emission (ASE) or random lasing (RL) are considered to be one of the most promising alternatives to conventional lasers or thermal sources. Composed of scattering and gain materials, these systems present numerous benefits: (ultra)small size, inexpensive and easy to fabricate, low spatial coherence, low threshold, tunable and with a unique response. Regarding this wealth, a multitude of works have been recently emerging to investigate the physical phenomena, especially in systems such as: suspensions of dyes and particles, active nanopowders or doped polymers.

In the project we propose to go further by controlling both the synthesis of emitting building blocks (gain+scatterer, or “active scatterer”) and their assembly in disordered materials. As example, silica nanoparticles doped with luminescent lanthanide complexes, associated with silver or gold nanostructures, could be a promising starting system. Self-assembling behavior and optical properties of such hybrid nanoparticles will be investigated aiming for preparation of new light sources and integration in future photonic devices.

Techniques utilisées

Sol-gel process and *chimie douce* - Synthesis, surface modification and assembly of hybrid nanoparticles

Spectroscopy (UV-vis absorption, fluorescence) - electron microscopy (SEM, TEM) - scattering techniques (DLS, SAXS, GISAXS)

Compétences souhaitées

Good experimenter with knowledge in materials chemistry and physical chemistry of materials

Curious, comfortable with bibliography resources

Coordonnées du Correspondant :

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Début du stage : flexible

Financement

Possibility to pursue a PhD