Spécialité de Master « Optique, Matière, Paris »

Stage de recherche (4 mois minimum, à partir de début mars)

Proposition de stage

Date de la proposition : pour l'année 2019

Responsable du stage */ internship supervisor*:

Nom / *name*: COOLEN Prénom/ *first name* : Laurent

Tél : 01 44 27 78 31 Fax :

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Nom du Laboratoire / *laboratory name*: Institut de NanoSciences de Paris (INSP)

Code d'identification : UMR 7588 Organisme : SU/CNRS

Site Internet / *web site*: http://www.insp.jussieu.fr/-Nanostructures-et-optique-.html

Adresse / *address:* 4 place Jussieu

Lieu du stage / *internship place*: 4 place Jussieu, 22-32, 5e étage

Titre du stage / *internship title*: **Optical properties of self-assembled fluorescent nanoplatelets**

The group « Nanostructures and optics » at INSP works on the optical properties of photonic or plasmonic nanostructures and their coupling to fluorescent emitters, which can be used to enhance light absorption and emission, with potential applications in lighting, displays, bio-imaging, quantum cryptography or photovoltaics. Semiconductor nanostructures, such as spherical nanocrystals or planar nanoplatelets, obtained by chemical reactions in solution, are promising bright stable fluorescent emitters for a wide range of applications in opto-electronics.

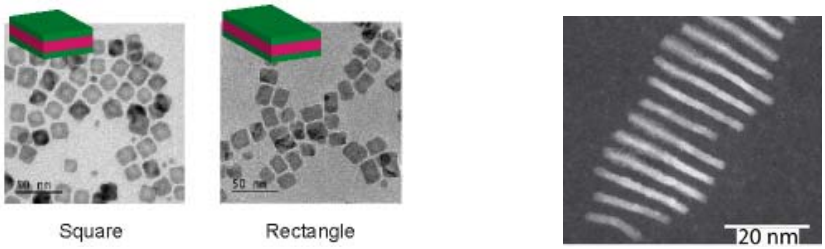

Figure : (a) (left) TEM images of square and rectangular nanoplatelets (B. Dubertret, ESPCI) [2] ; (b) (right) TEM images of nanoplatelets stacked together by self-assembly (B. Abécassis et al., Science Advances 2017).

Our group works in particular on the fluorescence properties of individual emitters, studied by fluorescence microscopy, which reveal in particular quantum optical properties such as the emission of « single photons » (emitted one-by-one). In order to characterize the emitting dipole of semiconductor nanostructures, we have developed in the last years characterization methods combining polarization and angular analysis [1]. Applied to nanoplatelets (fig. a) of various geometries [2], these methods showed different dipole moments and orientations depending on the platelets geometries and deposition orientation, with effects both of the electron-hole quantum confinement in the platelet and of their dielectric shape.

The nanoplatelets' ligands and solvent can be manipulated to create architectures of self-organized stacked platelets (fig. b). The aim of the internship will be to use fluorescence microscopy and various analysis techniques (spectroscopy, polarimetry, Fourier-plane analysis, low temperature measurements) in order to characterize the emission of the stacks of platelets and analyze coupling effects between the platelets.

*[1] C. Lethiec et al., Phys. Rev. X **4**, 021037 (2013),*
*[2] Fu Feng et al., Nano Research **11**, 3593 (2018) ; Fu Feng et al., ACS Photonics **5**, 1994 (2018).*

Ce stage pourra-t-il se prolonger en thèse ? *Possibility of a PhD* **? : Yes**

Si oui, financement de thèse envisagé/ *financial support for the PhD***: application to Ecole doctorale**

Lumière, Matière, Interactions	**X**	Lasers, Optique, Matière	**X**