FLUORESCENT NANOSOURCES IN ULTRA-CONFINED LIQUIDS

LABORATORY : Institut Lumière Matière

LEVEL : M2
TEAM(S) : AGNANO

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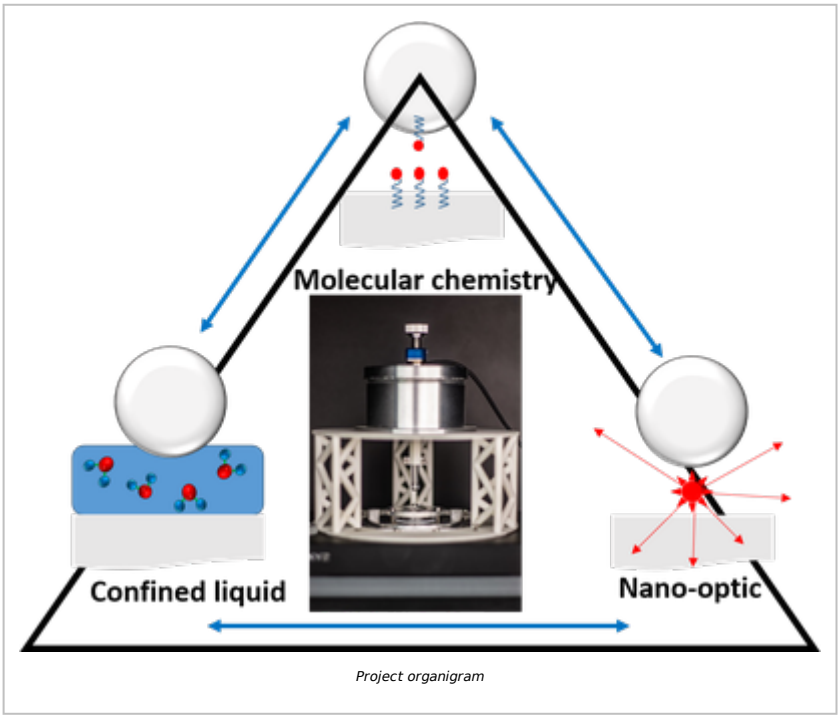
KEYWORD(S) : fluorescence / liquids / Nanophotonics

SCIENTIFIC CONTEXT :

The ability to precisely localize the light at the nanoscale represents a major challenge with many potential applications in energy storage, for highly-sensitive sensors, for optical communications with slow light and for quantum optics.



Project organigram

In this context, our team at ILM studies optical nanostructures for light manipulation and propagation at the scale of single nano-objects such as single emitters (molecules or quantum dots), single plasmonic nanoantennas or plasmonic crystals. In particular, if a fluorescent nanoemitter is inserted in a nanocavity (sub-10nm thickness), its emission can be increased and specifically directed. On one hand, the emitter can be used to get information about the cavity. On the other hand, we can use the cavity to increase interactions between a few controlled emitters to achieve collective effects.

In this work, the cavity is obtained by a sphere positioned near a flat surface. The cavity is filled with water (see scheme below). This project brings together chemistry and physics (optics and liquids) with three involved teams (two at ILM and one in ENS-Lyon).

The work will be done in close collaboration with the Liquid@Interface team at the ILM.

MISSIONS :

The Master 2 project will be mainly experimental. She/he will develop and improve optical experiments to study single molecule fluorescence either deposited on a substrate or diffusing inside a liquid.

Molecules will be chosen in collaboration with the chemistry lab at ENS-Lyon. In deposited, the goal will be to isolate single molecules and analyze the fluorescence by nanospectroscopy and temporal measurements.

In solution, the molecules will diffuse following a Brownian motion. Temporal analysis of the emission will give us access to the number of freely molecules as well as the fluid viscosity.

OUTLOOKS :

This internship may lead to a PhD proposal (application to Ecole Doctorale PHAST).

BIBLIOGRAPHY :

Link to the proposal :

https://www.researchgate.net/publication/383709459_Master_2_Internship_Fluorescent_nanosources_in_ultra-confined_liquids?channel=doi&linkId=66d815012390e50b2c50f7f1&showFulltext=true

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