Spécialité de Master « Optique, Matière, Plasmas »

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

Proposition de stage

Date de la proposition : 09/12/14

Responsable du stage / *internship supervisor*:

Nom / *name*: Symonds — Prénom/ *first name* : Clementine

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Nom du Laboratoire / *laboratory name*:

Code d'identification : iLM — Organisme : UCBL-CNRS

Site Internet / *web site*: http://ilm.univ-lyon1.fr/

Adresse / *address:* Université Claude Bernard LYON I - CNRS
Bâtiment Brillouin
Domaine Scientifique de la Doua
69 622 Villeurbanne Cedex France

Lieu du stage / *internship place*: iLM, équipe Nanostructures pour l'Optique

Titre du stage / *internship title*: **Dynamic and energy transfer of new plasmonic materials**

Résumé / *summary*

Context

Surface plasmons are electromagnetic waves present at the interface between a metal and a dielectric material. These plasmon modes can induce strong modifications in the emissive properties of molecules or semiconductor nanostructures if placed at a few tens of nanometers of the metal. In particular it is possible to mix the spectral and dynamic properties of two different materials by hybridizing them with a plasmon mode (strong coupling). These new structures are promising for energy transfer between materials, or could be exploited for fast optical modulation which is necessary for many optical components.

Our team is interested in the strong coupling regime resulting in an hybridization between excited states and plasmon modes. The formation of these mixed plasmon / exciton states induces collective effects that result in a coherent emission of otherwise independent molecules. This effect can take place over distances of several microns as recently highlighted by our team. We now want to exploit these collective effects and these large interaction lengths to the mixing of different materials.

Intership

The work will focus on the realization and experimental study of mixed metal/semiconductor nanostructures (characteristic size ranging from 50 nm to a few microns) composed of two organic materials patterned on a metal. These structures will be obtained by soft lithography (LBL deposition, nano-stamping). In a first step we will focus on the realization of these structures, and on the optical characterization of their spectral and dynamic properties in order to observe the hybridization of the two materials. In a second step, time resolved studies will be implemented in order to evidence the dynamic of the energy transfer as well as the non-linear effects that could be exploited for fast optical modulation.

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

Si oui, financement de thèse envisagé/ *financial support for the PhD***: bourse ministère**

Lasers, Optique, Matière	**X**	Lumière, Matière, Interactions	**X**
Plasmas : de l'espace au laboratoire			