Spécialité de M2 : Concepts Fondamentaux de la Physique
Ecole Doctorale de Physique de la Région Parisienne (ED107)

PROPOSITION DE SUJET DE STAGE DE M2 ET/OU DE THESE

Nom Laboratoire : INP (UPMC) et LPEM ESPCI
Code d'identification CNRS : UMR 7588 et UMR 8213
Nom du ou des responsables du stage ou thèse : Emmanuel Lhuillier et Benoit Dubertret
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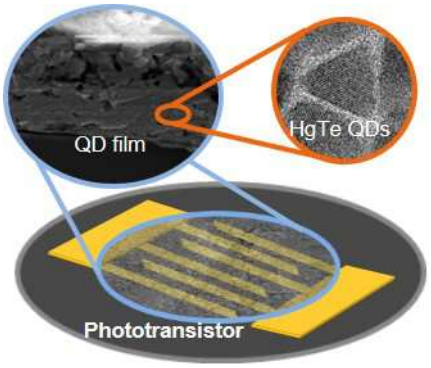
Lieu du stage : INSP (4, place jussieu, 75005 Paris) et LPEM (ESPCI, 10 rue Vauquelin, 75005 Paris)
Stage uniquement : NON Thèse uniquement: NON
Stage pouvant déboucher sur une thèse : OUI
Financement proposé : Ecole doctorale, CIFRE (Nexdot)

Narrow band gap nanocrystals for infrared optoelectronic

Colloidal quantum dots are nanometer sized semiconductor nanocrystals. They present fluorescent properties which generate interest at the industrial scale since they are now used as the next phosphor generation for display. The next big challenge for these materials is their integration into opto-electronic components such as LED, laser and detector. However this requires being able to control finely both optical and transport of quantum dots array[1]. Quantum dot can offer a low cost alternative to existing technologies based on epitaxially grown semiconductor since they are able to combine low cost fabrication of organic electronic with the high performance or inorganic compound. This is especially interesting in the infrared range of wavelength[2] where current device remain expensive.



Scheme of the device

We are in particular interested in narrow band gap material mercury chalcogenide quantum dot. In the bulk these materials are semimetal which, once processed under colloidal form, are n type semiconductors which allow tunable optical properties in the mid and far infrared. We are interested in developing strategies to achieve large carrier mobility in thin film of quantum dots since it will directly impact the final device performances. We now want to further investigate the infrared optoelectronic properties of such material.
The intern will be in charge to build and study the transport and phototransport properties of devices based on these materials. Measurement will be conducted in a phototransistor configuration under cryogenic and Fermi level control. The internship will take place between INSP at UPMC and laboratory LPEM at ESPCI.
No specific skills are required but we expect the candidate to be highly motivated. Native English speaker are particularly welcome

[1] *E. Lhuillier et al, Nano Lett 15, 1736 (2015).*
[2] *S. Keuleyan et al, Nat. Photon. 5, 489 (2011).*

Indiquez le ou les parcours (ex DEA) qui vous semblent les plus adaptés au sujet :

Physique de la matière condensée :	OUI	Physique des Liquides	OUI
Physique Quantique:	NON	Physique Théorique	NON