



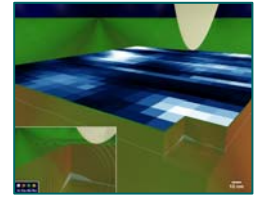
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## Postdoctoral position in quantum dot nano-optics



Institut d'Électronique Fondamentale  
CNRS - Université Paris-Sud 11  
91405 Orsay, France



### Infrared nanospectroscopy of a single quantum dot

A postdoctoral position is opened right after summer 2010 in the "Quantum dot and photonic nanostructures" group at Institut d'Électronique Fondamentale, CNRS-Université Paris-Sud 11. This group is presently developing an ultrasensitive photothermal imaging of low temperature single quantum dot absorption. The position is part of a 3 year program funded by the French National Research Agency (ANR SONORE) corresponding to an emerging investigation field of single semiconductor quantum dots considered as local acoustic and thermal nanosources locally emitting phonon wave packets. This program covers both the investigation of the photothermal and photoacoustics response of single self-assembled nanostructures and their ultrasensitive nanospectroscopy. In particular this is done in the essentially unexplored, at the single nanostructure level, far infrared spectral region with the spectral and spatial resolution of absorption well below the diffraction limit. It corresponds to an original and new research direction, exploiting the local emission of phonons by buried nanostructures controlled through electronic excitations. The program will contribute to identify the potential of quantum dots for phononic amplification, in the perspective of the realization of a saser, the sound counterpart of a laser.

In the laboratory the candidate will supervise the coupling of a low temperature atomic force microscope – used to locally detect photo-induced deformation – with a optical pulsed laser excitation – providing phonon wave packets emission triggering. The post-doc candidate will conduct spectral and spatial resolution of the intersublevel and interband absorption of single self-assembled InAs/GaAs quantum dots and investigation of the mechanisms at the origin of the photothermal/photoacoustics response. These developments will also be based on routine ensemble linear spectroscopy performed on a large number of quantum dots by Fourier Transform spectroscopy and the three dimensional calculation of their optical properties (energy, polarizations, oscillator strength).

We encourage highly motivated individuals with strong expertise in nanophotonics or optical properties of semiconductor nanostructures to apply for this position; the postdoctoral work will cover several skills including atomic force microscopy for the local measurement of photothermal deformations, electron-phonon interaction in semiconductor quantum dots, pulsed laser time resolved spectroscopy, optical cryogenics and 3D electronic structure calculations. An experience in operation of femtosecond lasers such as optical parametric oscillator or optical parametric amplifier is welcomed (but not required) for daily near infrared investigations. Midinfrared spectral region will be covered in collaboration with the team of the CLIO midinfrared free electron laser, a large scale facility at Orsay, for 2 week-long sessions per year.

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**References and group presentation** are available at <http://pages.ief.u-psud.fr/QDgroup>

Our group offers leading top experimental and theoretical studies, where personal dynamism and applied, basic, experimental and theoretical research interests find a natural place.

