COHERENT AND SPIN SPECTROSCOPY OF GaN NANOSTRUCTURE

DIRECTEUR DE THÈSE : MATHIEU GALLART
IPCMS-DON, 23 RUE DU LŒSS, 7, 67034 STRASBOURG
TEL : 03 88 10 71 93 ; E-MAIL : MATHIEU.GALLART@IPCMS.UNISTRA.FR

Gallium nitride (GaN) and its alloys still remain the subject of intense research for optoelectronics applications in the visible and UV range[1]. Studies on high crystalline quality GaN quantum dots are motivated by the possibility to control physical, optical and electronic properties of such nanostructures in order to use them in future electronic devices. In particular, one could take advantage of the quantum behavior of single nano-objects to implement quantum information and quantum computing. However, considering realistic applications implies a full understanding of electronic state dynamics in these systems. Ultrafast spectroscopy is a powerful tool to measure the lifetime of charges and spins in semiconductor nanostructures. Moreover, it allows to optically create coherent superposition of quantum states and to measure their evolution. We plan to perform non-linear time resolved spectroscopy in order to study coherent optical properties of GaN quantum dots which exhibit unique electronic and optical properties, and can be integrated in nano- and micro-optoelectronic.

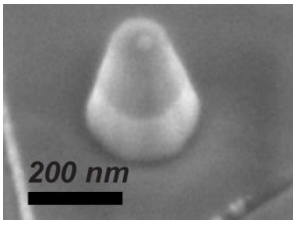

FIGURE 1: A TYPICAL GALLIUM NITRIDE QUANTUM DOT.

The team NanoFemto welcomes a PhD student on this trendy subject. The Student will be fully involved in the implementation of a four wave mixing experimental set-up in order to study these new and promising systems. Some new and unexpected physical effects, specific to the low dimensionality of these systems are likely to be highlighted.

1 M. Gallart, M. Ziegler, O. Crégut, E. Feltin, J.-F. Carlin, R. Butté, N. Grandjean, B. Hönerlage, and P. Gilliot, Phys. Rev. B 96, 041303(R) (2017).