ULTRAFAST SPECTROSCOPY OF GaN QUANTUM DOTS

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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 (QDs) 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, even if single photon emission has been demonstrated in single GaN QDs[2], the electronic state dynamics in these systems is not still fully understood. In particular, the way the QD electronic fine structure acts on the recombination dynamics, as well as the physical processes involved in the relaxation from the excited states to the radiative state of the QDs remain poorly known[3,4]. The present subject aims at studying relaxation dynamics of populations and coherences in GaN QDs by means of ultrafast spectroscopy. The Student will be fully involved in the implementation of pump-probe and four wave mixing experimental set-ups 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.

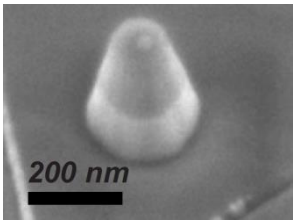

FIGURE 1: A TYPICAL GALLIUM NITRIDE QUANTUM DOT.

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