Stuttgarter Physikalisches Kolloquium

Fachbereich Physik, Universität Stuttgart
Max-Planck-Institut für Festkörperforschung
Max-Planck-Institut für Intelligente Systeme

Ansprechpartner: Prof. Harald Giessen
E-Mail: giessen@physik.uni-stuttgart.de
Telefon: 0711 - 685-65111

Dienstag, 09. November 2021	16:15 Uhr	V57.01

Universität Stuttgart, Pfaffenwaldring 57, 70569 Stuttgart-Vaihingen

Gastgeber: Peter Michler, Universität Stuttgart, Telefon: 0711 - 685-64660

Why we are moving to GaAs site-controlled pyramidal quantum dots

Emanuele Pelucchi
Tyndall National Institute (Irland)

Abstract

Quantum technologies are here to stay. Nevertheless, several issues need to be addressed to make them a reality. In the quantum photonics with quantum dots field several requirements are necessary before practical exploitation. Among them are site-control, emission and "excitonic" uniformity, spectral purity, high QD symmetry, high photon conversion/extraction efficiency, and many specific others. Herein we will navigate through recent achievements of site-controlled InGaAs and GaAs QDs grown by MOVPE in inverted pyramidal recesses. The system is known for its wavelength uniformity, spectral purity, entangled-photon emission quality and potential for practical applications. We will discuss also important recent developments on their control and engineerability, including future directions, and the relevance of resonant pumping strategies. We will also discuss the limitation encountered, and how we hope to overcome them.

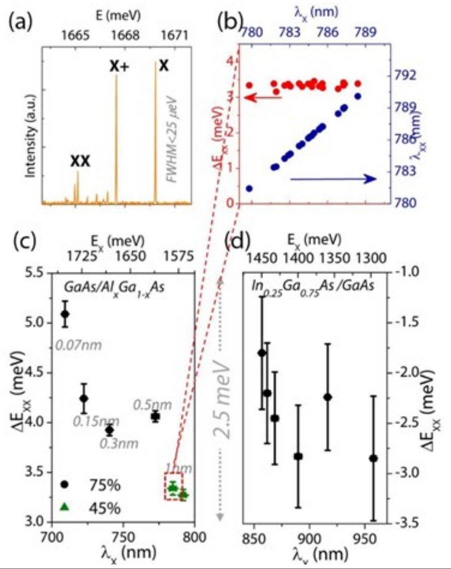

Fig. 1 a) Spectrum of GaAs/Al0.85Ga0.15As QD with the resolution-limited linewidth below 25μeV. b) Biexciton binding energy distribution from individual 1 nm GaAs/Al0.45Ga0.55As QDs. c) Summary of the biexciton binding energy distribution in GaAs/Al0.45Ga0.55As and GaAs/Al0.75Ga0.25As QDs. Given points are the average values, and the error bars are standard deviations. d) Summary of the biexciton binding energy distribution in In0.25Ga0.75As/GaAs QDs for comparison. c) and d) are shown in the same energy range of 2.5 meV for comparison purposes.