Halbleiter-Nanophotonik

SFB 787

Einladung

Es spricht: **Prof. Grzegorz Sęk**
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Ort: **Technische Universität Berlin**
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Hardenbergstraße 36, 10623 Berlin
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Thema: **„Optical properties of semiconductor quantum dashes in view of nanophotonic applications at the telecommunication wavelengths"**

Abstract:

Optical properties of semiconductor nanostructures have recently been explored mainly with respect to applications in optoelectronics as in lasers or amplifiers and in nanophotonics as in single photon sources, nanolasers up to the ultimate single-dot thresholdless laser, or emitters of entangled photon pairs. For that purpose, epitaxially-grown nanostructures on InP substrate can potentially be considered, mainly due to their easily tunable emission wavelength covering well the range of the 2nd and 3rd telecommunication windows, and the tunability of their shapes and geometry, and the resulting control of the electronic structure and polarization properties.
There will be presented a spectroscopic study of molecular-beam-epitaxy-grown InAs/InGaAlAs/InP quantum-dot-like structures emitting at the application-relevant range of 1.3 - 1.55 µm, properties of which are tailored via changes in their morphology. The single dash properties have been explored based on high resolution microphotoluminescence experiment. Emission of various exciton complexes has been identified from the excitation power dependent spectra combined with the polarization-resolved photoluminescence revealing the exciton fine structure splittings, plus the photon correlation measurements to confirm the origin of the lines. The carrier/exciton dynamics on a single dot level has been investigated giving the respective lifetimes. Eventually, efficient single photon emission from such nanostructures has been detected at around 1.55 µm from both a neutral exciton state and a charged exciton – a trion. Eventually, a magnetic field control of the exciton bright states splitting has been proposed making possible its reduction down to zero, which appeared to be specific for nanostructures of that kind with large in-plane anisotropy and due to the observed inversed spin-split states configuration. These results open up a new route for quantum dashes on InP and other anisotropic structures to be applied in sources of entangled photon pairs from the biexciton-exciton cascade or in spin-based quantum memories suitable for fiber-based telecommunication and data transmission technology.

Gäste sind herzlich willkommen!
Prof. Dr. S. Reitzenstein