



Halbleiter-Nanophotonik

SFB 787

Einladung

Es spricht:

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Zeit:

Donnerstag, 21. Juli 2016, 10:00 Uhr

Ort:

Technische Universität Berlin

Institut für Festkörperphysik

Hardenbergstraße 36, 10623 Berlin

Raum EW 431

Thema:

„Fabrication and characterization of two dimensional photonic crystal membranes in cubic AlN/GaN“

Abstract:

Group III-nitride quantum dots (QDs) attracted much attention for the development of optical and quantum optical devices, operating in the UV spectral range. Microresonators enable to control the spontaneous emission of light and to realize an efficient single photon emitter (SPE). Promising candidates for such devices are 2D photonic crystal (PhC) nanocavities because of their high Purcell factor.

Recently, SPE employing hexagonal QDs in AlN have been realized. However h-GaN QDs exhibit a strong internal electrical field causing a reduced recombination probability of electrons and holes in confined states. This issue may be overcome by using cubic AlN/GaN where no internal polarization fields exist.

Our samples were grown by plasma assisted molecular beam epitaxy on 3C-SiC substrates. The active layer consists of c-GaN QDs embedded in a 60 nm c-AlN matrix. The fabrication of the PhCs contains a patterning step with electron beam lithography to realize the hexagonal array of holes and multiple steps of reactive ion etching including an undercut of the active layer. Various cavity sizes are fabricated, in particular H1 and L3 cavities. We have investigated the optical properties of the QD ensemble and different PhCs using micro-photoluminescence measurements at room temperature. Two samples were realized, including H1 and L3 cavities. For both cavity types, fundamental modes with high quality factors of about 8300 for the H1 cavity and about 5000 for the L3 cavity were determined. To validate the experimental results, simulations, using the time domain solver from CST Microwave Studio, were done. The simulations fit very well to the experimental results.

Gäste sind herzlich willkommen!

Prof. Dr. Axel Hoffmann