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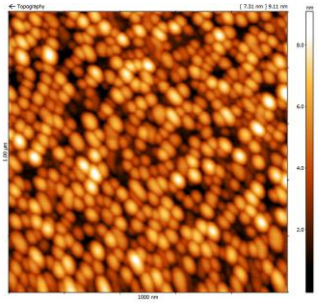
Master/Diploma thesis

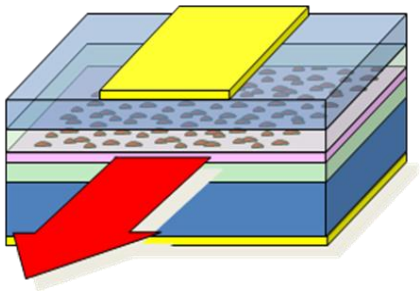
Growth and characterization of 1.55 µm InAs/InP quantum dots and laser structures suitable for fabrication of tunable narrow linewidth light sources

Because of their small size, quantum dots (QDs) display unique optical and electrical properties that are different in character to those of the corresponding bulk material. They can be used for numerous applications, including lasers, LEDs, detectors, amplifiers, switches, transistors, and solar cells. Nowadays QDs based semiconductor lasers demonstrate outstanding performance advantages, such as high efficiency, temperature stability, high frequency operation and high reliability. Such QDs lasers are key components for present and future telecom applications in terms of permanent increase of data transmission rate.
The main goal of this thesis is to get 1,55 µm high density (>5×10^{10} cm^{-2}) InAs/InP quantum dot laser material with very narrow size distribution function, which can be used later as active region in laser structures suitable for fabrication of tunable narrow linewidth distributed feedback (DFB) lasers and semiconductor optical amplifiers.

The major tasks of this diploma work include:

- MBE growth of InAs/InP quantum dot structures at different growth conditions, e.g. substrate temperature, growth rate, III-V group element ratio, etc;
- Optical and morphological characterization of the grown QD structures by the help of low-temperature photoluminescence and atomic force microscopy studies respectively;
- Growth, structural and optical characterization of the laser structures;
- Evaluation of the laser structure performance in pulsed and CW regime.





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