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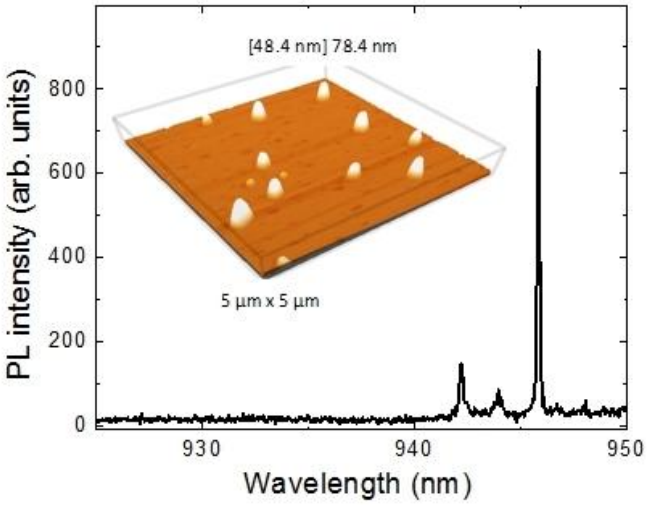
Master thesis

Integration of optically active III-V quantum dots in silicon matrix by MBE growth and their characterizations

Silicon is the key material in the semiconductor electronic technology due to its excellent electronic, thermal and mechanical properties. However, due to its indirect bandgap silicon does not possess good optoelectronic properties. III/V materials on the other hand, owing to their direct bandgap, have been established as the main materials for the fabrication of optoelectronic devices. The idea is to grow optically active III/V quantum dots (QDs) directly on silicon substrates.

Using a core-in-a-shell III–V QD approach, we have demonstrated for the first time bright light emission with narrow spectral linewidths from single InAs/GaAs QDs grown directly on silicon substrates.
(M. Benyoucef et al., *Appl. Phys. Lett.* 102 (13), p. 132101)



Tasks:

- Epitaxial growth of III/V QDs directly on silicon substrates using MBE system.
- Embedding optically active quantum dots in silicon matrix.
- Morphological characterizations of the QDs by AFM in the clean room.
- Optical characterizations of the embedded QDs by micro-photoluminescence.

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