COURSE SYLLABUS

Self assembled epitaxial quantum dots

2526-116R-M11

Title

Self assembled epitaxial quantum dots

Teacher(s)

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Language

English

Short description

Epitaxial Quantum Dots (QDs) are nanometric-sized semiconductor structures obtained by growing specific materials on top of a crystalline substrate with a precise control at the atomic level. These nanostructures confine electrons and holes in all three spatial dimensions, leading to discrete energy levels, much like atoms, which make them of significant interest in various fields including quantum computing, optoelectronics, and photonics. This course provides an insight on the self-assembly of QDs by Droplet Epitaxy and Local Droplet Etching, exploring the kinetic and thermodynamic factors that control dot formation and how they can be engineered to control QD size with sub-nanometric precision. The second focus of this course is to investigate the quantistic properties of QDs, model

their optical transitions using numerical simulations and learn how these properties can be engineered by controlling QDs growth parameters. Finally, this course will discuss the real-world applications of such QDs, with a particular emphasis on quantum technologies.

CFU / Hours

1

Teaching period

9/12/2025-12/12/2025

Sustainable Development Goals