Course syllabus

Kristalltillväxt och halvledarepitaxi Crystal Growth and Semiconductor Epitaxy

FAFN15, 7,5 credits, A (Second Cycle)

Valid for: 2023/24
Faculty: Faculty of Engineering, LTH
Decided by: PLED F/Pi
Date of Decision: 2023-04-18

General Information

Main field: Nanoscience.
Elective for: F4, K4-m, MNAV1, N4-nf, N4-m
Language of instruction: The course will be given in English

Aim

The aim of the course is that the student, once the course is completed, has aquired knowledge to understand crystal growth and especially semiconductor epitaxy.

Learning outcomes

Knowledge and understanding
For a passing grade the student must

- be able to explain crystal growth and epitaxy and the relevant concepts within thermodynamics and kinetics.
- be able to explain the connection between growth parameters and growth method and the properties and quality of the result.

Competences and skills
For a passing grade the student must

- be able to evaluate and choose an appropriate crystal growth method for a specific issue.
- be able to orally and in writing present issues concerning crystal growth in a scientific way.

Judgement and approach
For a passing grade the student must

- be able to reflect on the role of epitaxy in society.
- be able to discuss how crystal growth and epitaxy can contribute to a more sustainable society.

Contents

This course treats the fundamental aspects of crystal growth, e.g. the thermodynamic prerequisites for crystal growth such as chemical potential, construction of binary phase diagrams, supersaturation, and nucleation. Further on, surface energies, surface diffusion, and Wulff's theorem are studied. In the course section on epitaxial growth surface reconstructions, lattice mismatch, and dislocations, as well as characterization – both in- and ex-situ are discussed. Growth techniques and reactor models are also dealt with. During the course, the various moments will be illuminated by examples from modern research, especially research on epitaxy of nanostructures.

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)
Assessment: Assessment takes the form of a written exam at the end of the course. It is mandatory to attend the first lecture in order to be admitted to the course.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Admission

Assumed prior knowledge: FFFF10 Processing and Device Technology, a basic course in thermodynamics and materials science.
The number of participants is limited to: No

Reading list

- Pohl, Udo W: Epitaxy of Semiconductors. Springer, 2013, ISBN: 978-3-642-32969-2.

Contact and other information

Course coordinator: Vanya Darakchieva, vanya.darakchieva@ftf.lth.se
Course homepage: https://canvas.education.lu.se
Further information: It is mandatory to attend the first lecture in order to be admitted to the course.