Faculty of Science

FYST35, Physics: Chrystal Growth and Semiconductor Epitaxy, 7.5 credits

Fysik: Kristalltillväxt och halvledarepitaxi, 7,5 högskolepoäng

Second Cycle / Avancerad nivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2009-10-07 to be valid from 2009-10-07, spring semester 2010.

General Information

The course is an elective course for second-cycle studies for a scientific candidate - or Master's degree (120 credits) in physics.

Language of instruction: Swedish and English
If needed, the course is given in English.

Main field of studies	*Depth of study relative to the degree requirements*
Physics	A1N, Second cycle, has only first-cycle course/s as entry requirements

Learning outcomes

The course intends to provide necessary knowledge to understand crystal growth and in particular epitaxy of semiconductor structures.

Knowledge and understanding

On completion of the course, the student should:

- 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

Skills and abilities

To pass the course, the student should:

- be able to evaluate and choose an appropriate crystal growth method for a specific issue
- be able to orally or in writing present issues concerning crystal growth in a scientific way
- be able to assimilate and summarise scientific articles within the subject

Course content

In this course, we will in detail go through the fundamental aspects of crystal growth. We will treat the thermodynamic preconditions for crystal growth such as chemical potential, construction of binary phase diagrams, supersaturation and nucleation. Further, we will study surface energies, surface diffusion and Wulffs theorem. Within the course section on epitaxial growth, we will discuss concepts such as surface reconstruction, lattice matching, dislocations and characterisation both in- and ex-situ. We will also go through growth methods and reactor models. During the course, the different subparts will be highlighted with examples from modern research, in particular research on epitaxy of nanostructures.

Course design

The teaching consists of lectures, group work and project work. Participation in project work and thereby integrated other teaching is compulsory.

Assessment

Examination takes place in writing in the form of an examination at the end of the course. Students who do not pass the regular exam are offered a new possibility shortly after the regular exam.

Subcourses that are part of this course can be found in an appendix at the end of this document.

Grades

Marking scale: Fail, Pass, Pass with distinction.
To pass the entire course, approved examination and passed project report and participation in all compulsory parts are required.
The final grade are decided through the written examination.

Entry requirements

For admission to the course, 90 credits natural sciences are required in which knowledge equivalent to FYSA31 Physics 3, Modern physics, 30 credits and FYSD13 Process- and component technology, 7.5 credits, should be included and English B or the equivalent.

Subcourses in FYST35, Physics: Chrystal Growth and Semiconductor Epitaxy

Applies from H09

0901 Crystal Growth and Semiconductor Epitaxi, 7,5 hp
Grading scale: Fail, Pass, Pass with distinction