Thin Film Physics

Programme course

6 credits

Tunnfilmsfysik

TFYA41

Valid from: 2017 Spring semester

Determined by
Board of Studies for Electrical Engineering, Physics and Mathematics

Date determined
2017-01-25

Main field of study
Applied Physics, Physics

Course level
Second cycle

Advancement level
A1X

Course offered for
- Applied Physics and Electrical Engineering, M Sc in Engineering
- Physics and Nanoscience, Master's programme
- Materials Science and Nanotechnology, Master's programme
- Applied Physics and Electrical Engineering - International, M Sc in Engineering

Entry requirements
Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

Prerequisites
Knowledge of fundamentals of materials science, crystallography, solid state physics and thermodynamics

Intended learning outcomes
The course should give knowledge on mechanisms and processes for synthesis and microstructural evolution of thin films from the vapour phase. Included is also an overview of methods used for synthesis films and industrial applications thereof. After the course the student should:

- understand the fundamental atomistic mechanisms and processes that control film formation and microstructural evolution.
- understand the effect of the process conditions on film growth microstructural evolution.
- know the principle, the advantages and the disadvantages of different thin film deposition methods.
- have insights in possibilities and the importance of different thin films and coatings for a variety industrial applications.

Course content

Vapour condensation and adsorption.
Surfaces and surface diffusion.
Epitaxy and growth modes.
Thin film nucleation and coalescence.
Homoepitaxial and heteroepitaxial growth
Growth and microstructural evolution of polycrystalline films
Generation and evolution of stresses in thin films
Methods for synthesis of thin films from the vapour phase

Teaching and working methods

Teaching will be provided in the form of lectures, laboratory exercises, and visit to industries.

Examination

PRA1	Student presentations	0.5 credits	U, G
UPG1	Visit to Industry	0.5 credits	U, G
LABA	Laboratory Work	0.5 credits	U, G
TENB	A written examination	4.5 credits	U, 3, 4, 5

The student presentations (which are accompanied by a written essay) can be graded and added to the final score of the written exam as a bonus.

Grades

Four-grade scale, LiU, U, 3, 4, 5

Department

Institutionen för fysik, kemi och biologi

Director of Studies or equivalent

Magnus Johansson

Examiner

Kostas Sarakinos

Course website and other links

Education components

Preliminary scheduled hours: 40 h
Recommended self-study hours: 120 h

Course literature

T. Michely, J. Krug, “Islands, Mounds and Atoms: Patterns and Processes in Crystal Growth Far from Equilibrium”, Springer 2003. P. M. Martin, “Handbook of Deposition Technologies for Films and Coatings”, Elsevier 2010. M. Ohring, “Materials Science of Thin Films”, Academic Press 1991. Extramaterial tillgängligt på kurshemsidan (lösenordsskyddat)

Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at http://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.