Surface Analysis by X-ray Photoelectron Spectroscopy, 3.0 credits

Ytanalys med röntgenfotoelektronspektroskopi, 3.0 hp

Third-cycle education course

6FIFM78

Department of Physics, Chemistry and Biology

Valid from: First half-year 2024

Approved by **Approved**

Registration number

Entry requirements

Entry requirement for studies on third-cycle education courses

- second-cycle degree,
- 240 credits in required courses, including at least 60 second-cycle credits, or acquisition of equivalent knowledge in some other manner

Learning outcomes

By the end of the course the students will be able to:

- a comprehensive understanding of XPS
- a good knowledge of involved theoretical aspects
- systematic knowledge of current practices in the analysis of surfaces;
- a knowledge on the used analytical equipment;
- understand the theory and practice of the surface analysis by XPS
- understand and interpret results obtained with XPS
- perform XPS data analysis
- obtain good skills in working with CasaXPS software
- appreciate the possibilities and limitations of the XPS technique
- be able to critically assess research in which XPS has been applied

Contents

- Introduction to Photoelectron Spectroscopy I: Basic Principles
- Introduction to Photoelectron Spectroscopy II: Chemical Information
- Instrumentation
- Surface Analysis of Polymers
- Surface Analysis of Inorganic Systems
- Complementary Analytical Techniques
- Sputter Depth Profiling
- Non - Destructive Depth Profiling
- Qualitative and Quantitative analysis
- Spectral interpretation
- Artifacts
- Applications examples
- Sample preparation
- Recent Advances in Surface Analysis

Educational methods

The course consists of 10h of lectures + 6h of laboratory exercises. It is expected that students spend additional time for self study

Examination

Examination is in the form of:
(i) lab report and presentation of individual projects- students are supposed to perform thorough characterization by XPS of one sample of their own and present a complete written lab report. The report is graded (pass/fail) by the examiner.
(ii) written solutions to problems that will be hand out during the lectures.
Re-examination: if students happen to miss the laboratory part which is the most essential they have a possibility to join different group.
Students who fail are offered one re-examination occasion in close connection to the course. After that participation in a coming course examination is offered. The re-examination should be equally comprehensive as the ordinary examination.

Grading

Two-grade scale

Course literature

Surface Analysis by Auger and X-ray Photoelectron Spectroscopy edited by D. Briggs and J.T. Grant
Lectures will also be available for students in the electronic form
The supplementary reading:

- *Photoelectron Spectroscopy: Principles and Applications* by Stefan Hufner
- *Auger- and X-ray Photoelectron Spectroscopy in Materials Science* by Siegfried Hofmann

General information

The course is organized every second year if there is enough interest from students (at least 6 students interested).
The course is planned and carried out according to what is stated in this syllabus. Course evaluation, analysis and suggestions for improvement should be fed back to the Research and PhD studies Committee (FUN) by the course coordinator.