IM2659 Project on Nanomaterials 7.5 credits

Projekt i nanomaterial

Course syllabus for IM2659 valid from Autumn 11

This is a translation of the Swedish, legally binding, course syllabus.

Grading scale:
Education cycle: Second cycle
Main field of study: Physics

Intended learning outcomes

This course will give hands on experience on bottom-up, solution based, synthesis techniques of nanomaterials and use of standard analytical tools for materials' property evaluation.

After a successful completion of the course, students should be able to:

· Perform an extensive literature survey on the synthesis topic/material of choice.

· Prepare a detailed report on the topic of synthesis/material.

· Design their synthesis experiments for the targeted material of choice.

· Explain the underlying chemical and physical principles of the selected/designed synthesis scheme.

· Perform chemical stoichiometric calculation for the preparation of solutions.

· Apply chemistry lab practices properly

· Prepare a set-up for planned synthesis experiment.

· Perform XRD analysis on the fabricated nanopowder.

· Interpret XRD results and relate it to homogeneity of material.

· Perform microstructure analysis on the fabricated nanopowder.

· Perform thermal analysis on the fabricated nanopowder.

· Interpret TGA thermogram, indicating corresponding physical changes.

· Interpret DSC thermogram, indicating corresponding physical/chemical changes.

· Perform UV-Vis measurements on the fabricated nanopowder (whenever relevant to the project).

· Perform FTIR analysis on the fabricated nanopowder.

· Interpret analysis results from an FT-IR spectrum.

Course main content

This course aims at giving students hands-on experience and chemistry lab practice on solution based chemical fabrication techniques for nanomaterials. Students (in teams of 2-3) will choose a topic among the available list of projects. This project begins with a comprehensive literature search on the fabrication and characterization of the selected material by conventional routes and advantages vs. disadvantages of the used methodologies: to be presented in the form of a written report.

Disposition

The course will start with a meeting with the course coordinator and the tutors. Project topics will be distributed to the project teams (of 2-3 students).

Teams will then perform a thorough literature survey on the topic, design their own chemical synthesis method, discuss with their tutors, and the proceeed with the set-up and chemical synthesis process. The material will be then characterized by the student using the analytical techniques they are exposed in course IM2658. The course will be completed by a final project presentation.

Language of instruction

Language of instruction is specified in the course offering information in the course and programme directory.

Eligibility

Attendance to courses

IM2657 Nanostructured Materials and Self Assembly

IM2658 Experimental Techniques - Bulk

Documented chemistry knowledge may give exemption from IM2657

Literature

Relevant publications in the scientific literature.

Relevant publications in the scientific literature.

Required equipment

Access will be granted by the tutors in the course.

Examination

- LAB1 - Lab Work, 3.0 credits, grading scale: P, F
- PRE1 - Final Presentation, 2.5 credits, grading scale: P, F
- REP1 - Project Report, 2.0 credits, grading scale: P, F

Final examination, worth 2.5 hp, will be in the form of a presentation on the selected subject, detailing the background, experimental work undertaken and detailed characterization results with proper discussion.

Requirements for final grade

All parts are COMPULSORY to attend to receive a final grade.

Project Report: REP1 2 hp P/F

Lab Work: LAB1 3 hp P/F

Final presentation: PRE1 2.5 hp P/F

Final grade A-F