FSH3501 Radiation Damage in Materials 8.0 credits

Strålskadefysik i material

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

If the course is discontinued, students may request to be examined during the following two academic years

Establishment

Course syllabus for FSH3501 valid from Spring 2010

Grading scale

Education cycle

Third cycle

Specific prerequisites

Recommended prerequisites: Basic knowledge in solid state physics.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

After having completed the course, the student should be able to

- Explain and quantify how various types of radiation spectra generate point defects in a crystal, and explain how these give raise to various types of damage; hardening, swelling and embrittlement.
- Apply statistical mechanics and kinetic theory in order to predict equilibrium properties and diffusion rates of point defects or components in an alloy.
- Based on a scientific problem carry out a computer experiment, e.g., atomistic simulations or rate-theory simulations, describing various aspects of structure or kinetics of crystal defects, and analyze the results.
- Interpret some important types of experiments targeting the properties of point defects, in terms of atomistic processes.

Course contents

Mechanisms for generation of point defects

Hardening, swelling and embrittlement

Solubility

Diffusion

Clustering

Molecular dynamics, Monte Carlo and rate theory simulations

Disposition

The course consists of 8x2 h lectures, incuding problem solving. It also contains two computer laborations.

Course literature

G.S. Was, Fundamentals of radiation materials science, Metals and Alloys, Springer 2007.

Examination

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

1. Solutions to home assignments should be handed in.
2. The solutions are discussed in an oral exam.
3. One computer lab with written report.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.