Optical Spectroscopy of Materials (E027300)

Due to Covid 19, the education and evaluation methods may vary from the information displayed in the schedules and course details. Any changes will be communicated on Ufora.

Course Specifications
Valid as from the academic year 2021-2022

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Course size
Credits 4.0
Study time 120 h
Contact hrs 45.0 h

Course offerings in academic year 2021-2022
A (semester 1) English Gent

Lecturers in academic year 2021-2022
Poelman, Dirk WEO4 lecturer-in-charge
Vrielinck, Henk WEO4 co-lecturer

Offered in the following programmes in 2021-2022

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<tr>
<td>Bridging Programme Master of Science in Photonics Engineering</td>
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<td>European Master of Science in Photonics</td>
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<tr>
<td>Master of Science in Photonics Engineering</td>
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Teaching languages
English

Keywords
optical spectroscopy, vibrations, luminescence, Raman spectroscopy

Position of the course
Make the students acquainted with a number of important spectroscopic techniques for the investigation of the electronic and the vibrational properties of solid materials. This includes both the theoretical background of the techniques and their practical application.

Contents

• UV-VIS-NIR Spectrophotometry: Introduction, Applications
• Infrared and Raman Spectroscopy: Introduction, Vibrational transitions in materials, Electronic transitions in materials
• Luminescence Spectroscopy: PL (photoluminescence), CL (cathodoluminescence)

Initial competences
solid state physics

Final competences

1. Estimate the complex refractive index of an arbitrary material from optical measurements.
2. Understand the concepts optical density, infrared- and Raman-active modes, excitation spectrum, emission spectrum, configuration coordinate diagram.
3. Have insight in the relation between resolution, dynamic range, measurement time and signal to noise ratio in optical measurements.
4. Interpret the infrared absorption spectra of solid materials.
5. Understand the origin of different luminescent processes in solids.
6. Understand the possibilities and limitations of ellipsometric measurements in comparison with photometric measurements.

Conditions for credit contract
Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract
This course unit cannot be taken via an exam contract

Teaching methods

(Approved)
Guided self-study, lecture, practicum, project

Extra information on the teaching methods
The course partly consists of lectures where the experimental techniques and the interpretation of the measurements are described. Next to this, the students have a number of lab sessions (in groups) where they conduct measurements (under guidance). They make a lab report (individually or in group) on their measurements.

Learning materials and price
Course notes available; price ~ 10 Euro

References

Course content-related study coaching

Evaluation methods
end-of-term evaluation and continuous assessment

Examination methods in case of periodic evaluation during the first examination period
Oral examination

Examination methods in case of periodic evaluation during the second examination period
Oral examination

Examination methods in case of permanent evaluation
Assignment, report

Possibilities of retake in case of permanent evaluation
examination during the second examination period is possible

Extra information on the examination methods
Periodic evaluation: oral exam discussing the contents of the theoretical lectures and the interpretation of measurements (based on the written lab reports).

Calculation of the examination mark
50% on written lab reports; 50% on oral exam.