Halide Perovskite Materials for Optoelectronic Applications, 6.0 credits

Halidperovskitmaterial för optoelektroniska tillämpningar, 6.0 hp

Third-cycle education course

6FIFMA9

Department of Physics, Chemistry and Biology

Valid from: First half-year 2026

Approved by **Approved**

Registration number

Entry requirements

A background in materials science, physics, chemistry, electrical engineering, or a related field relevant to optoelectronic devices.
Foundational knowledge of semiconductors and device physics.
A demonstrated interest or research focus related to halide perovskites, solar cells, light-emitting devices, lasers, or X-ray imaging.

Specific information

This course introduces the fundamentals and recent advances in halide perovskite materials and their application in a wide range of optoelectronic devices. The course will cover the unique properties of perovskites, their synthesis, device architectures, and performance metrics across various technologies including: solar cells, light-emitting diodes (PeLEDs), lasers, X-ray detectors and imaging, and photodetectors.

Learning outcomes

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

- Explain the structural and optoelectronic properties of halide perovskites.
- Evaluate device architectures for perovskite-based optoelectronic applications.
- Analyze performance parameters and degradation mechanisms.
- Discuss the opportunities and limitations of perovskites in real-world applications.
- Critically review scientific literature in the field.

Contents

Here is a brief course content.

1. Overview of Halide Perovskites
2. Perovskite Solar Cells (PSCs)
3. Perovskite Light-Emitting Diodes (PeLEDs)
4. Perovskite Lasers
5. Perovskite X-ray Detectors and Imaging
6. Other Emerging Applications
7. Cross-Cutting Challenges and Industrial Relevance
8. Seminar and Literature Discussions

Educational methods

Educational methods applied in this course are*:*

- Lectures by experts in the field
- Student-led literature seminars
- Group discussions
- Optional lab tour or demo (if facilities allow)

Examination

- Participation in seminars
- Presentation or written report on a selected topic

Grading

Two-grade scale

Course literature

A list of recommended literature will be provided by the course coordinator before the start of the course.