

PHYS-747

Introduction to Metalorganic Vapour Phase Epitaxy of III-V semiconductors

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Cursus	Sem.	Type
Physics		Opt.

Language of teaching	English
Credits	1
Session	
Exam	Oral
Workload	30h
Hours	15
Courses	15
Number of positions	15

Frequency

Every year

Remark

Next time: Spring

Summary

This course offers an insight into the science of epitaxial growth, a chapter of surface science requiring basic understanding of thermodynamics, crystallography, electronic and optical properties of semiconductors.

Content

Metalorganic Vapour Phase Epitaxy (MOVPE) is one of the main fabrication techniques of a large variety of widely studied semiconductor materials of key relevance for modern optoelectronic devices, for which this course illustrates the challenges, methods and achievements.

The course will cover the following chapters:

1) Overview and introduction

- a) Scientific & technical importance
- b) Historical perspectives
- c) Place among epitaxial techniques

2) Instrumentation

- a) System architecture
- b) Hazards and safe lab design
- c) Lab visit

3) Growth process

- a) Main growth regimes
- b) Choice of precursors
- c) Influence of carrier gases

4) Surfaces & growth modes

- a) Surface characterization
- b) Vicinal surfaces
- c) Surface dynamics
- d) Surface segregation

- e) Surfactant mediated epitaxy
- 5) **Masked selective area epitaxy**
- a) Facet growth behavior
 - b) Alloy content modulation
 - c) Epitaxial lateral overgrowth
 - d) Template assisted selective area epitaxy
- 6) **Non-planar selective area epitaxy**
- a) Self-limited growth behaviour
 - b) Quantum wires and quantum dot arrays
- 7) **Epitaxy of III-nitride semiconductors**
- a) GaN heteroepitaxy
 - b) InGaN & InAlN alloys
 - c) Doping issues

Note

Also by Zoom:

<https://epfl.zoom.us/j/7997015211#success>

Keywords

Surfaces, epitaxy, semiconductors, surfactants, nanostructures

Resources

Bibliography

"Organometallic Vapor-Phase Epitaxy: theory and practice", Academic Press, 2nd Ed., 1999 - G.B. Stringfellow

Ressources en bibliothèque

- ["Organometallic Vapor-Phase Epitaxy: theory and practice", Academic Press, 2nd Ed., 1999 - G.B. Stringfellow](#)

Moodle Link

- <https://go.epfl.ch/PHYS-747>