

PHYS-747

Introduction to Metalorganic Vapour Phase Epitaxy of III-V semiconductors

Dwir Benjamin, Grandjean Nicolas, Leran Jean-Baptiste, Rudra Alok, Zamani Reza

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

The course will cover the following chapters:

1. Overview of the MOVPE process (2h)

- a. Atomic level growth processes
 - i. Adsorption and desorption
 - ii. Adatom and step motion
 - iii. Surfactant effects
- b. Influence of surface processes
 - i. Growth modes
 - ii. Dopant incorporation
 - iii. Selective growth
 - iv. Non-planar growth

2. Instrumentation (3h)

- a. Overall architecture
- b. Source molecules
 - i. Group III
 - ii. Group V sources
- c. Gas distribution
- d. Growth chambers
- e. Growth parameters
- f. Safety management
- g. Lab visit

3. Epitaxial layer characterisation (4h)

- a. Visible light microscopy
- b. Scanning probe microscopy (AFM, STM)
- c. Scanning Electron Microscopy
- d. Transmission Electron Microscopy
- e. X ray diffractometry
- f. Photoluminescence spectroscopy
- g. Chemical profiling

4. Specific materials (3h)

- a. GaAs & related alloys
- b. InP & related alloys
- c. III-V nitrides

5. Examples of GaAs based nanostructures (3h)

- a. Pyramidal quantum Dots
- b. Selective area growth of nanowires

Keywords

Epitaxy, III-V semiconductors, 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](#)