

MSE-465

Thin film fabrication processes

Muralt Paul

Cursus	Sem.	Type
Materials Science and Engineering	MA1, MA3	Opt.

Language of teaching	English
Credits	2
Session	Winter
Semester	Fall
Exam	Oral
Workload	60h
Weeks	14
Hours	2 weekly
Courses	2 weekly
Number of positions	

Summary

The students will learn about the essential chemical, thermodynamic and physical mechanisms governing thin film growth, about the most important process techniques and their typical features, including process-microstructure relationships.

Content

- * Introduction (Samples, applications, importance, history, overview).
- * Major deposition methods with examples and typical applications: - evaporation - introduction to cold plasmas - sputter processes - reactive plasma processes - chemical vapour deposition (CVD) - plasma enhanced CVD - further methods including plasma surface treatments
- * Nucleation and growth models
- * Examples throughout the chapters on hard coatings, microelectronics, display technology, optics, coatings on polymers

Keywords

condensation from a vapour
 Plasma and thermal activation
 thin film growth models
 non-equilibrium and equilibrium processes
 Ion bombardment
 Film morphology and microstructure
 wetting angle
 Ad-atoms

Learning Prerequisites**Recommended courses**

Basics courses on thermodynamics, physics, and chemistry

Learning Outcomes

By the end of the course, the student must be able to:

- Describe thin film growth methods
- Explain main mechanisms
- Categorize the different methods
- Propose methods according to requirements
- Theorize on the effect of process parameters

Transversal skills

- Assess one's own level of skill acquisition, and plan their on-going learning goals.

Teaching methods

ex cathedra
exercices
demonstrations

Assessment methods

Continuous assessment and oral exam

Supervision

Office hours	Yes
Assistants	Yes

Resources

Bibliography

Copies of foils
Script on the web
recommended books

Websites

- <http://my.epfl.ch>