



COUCHES ULTRAMINCES ET SURFACES FONCTIONNALISÉES

FUNCTIONALIZED THIN LAYERS AND SURFACES

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| Lecturers : 14 | TC : 4.0 | PW : 4 | Autonomy : 6 | Study : 0.0 | Project : 0.0 | Language : FR

Objectives

The objective is, in a first part, to study the relationship between elaboration conditions of thin films, structure and associated micro/nanostructure, and the desired specific properties in various application fields: mechanics, optics, electronics, chemistry and biology. The search of new performances, the development of nanotechnologies and the need for innovation require a multifunctional approach for the conception of the objects. On the surface, i.e. at the interface with the external medium, solicitations, damages, or specific properties are occurring and must be optimized and/or considered to be different from the ones of the bulk material.

Keywords : Thin film, deposition methods, defects, electrical properties, supraconductivity, optical properties, mechanical properties, self-assembled monolayers, sol-gel

Programme

During this course, we will particularly study the mechanical properties (elasticity, plasticity, damage and adhesion of the films on the substrate), the electrical properties (influence of bidimensionality on the carriers, films of nanometric thickness taking into account the quantum nature of their electronic properties), the optical properties (application to integrated optics and obtention of specific functional properties) of thin films. The last part of the course will be dedicated to the study of self-assembled monolayers and their applications. A practical session will allow the students to take part to a molecular beam epitaxy experiment in the cleanroom.

Learning outcomes

- Know the mechanism and elaboration systems of a thin film.
- Know the different properties and applications of a thin film.

Independent study

Objectifs : This activity is not concerned with framed autonomy activities outside personal work.

Méthodes : This activity is not concerned with framed autonomy activities outside personal work.

Core texts

Bethany R. Hughes, Yaser Dahman *FABRICATION AND SELF-ASSEMBLY OF NANOBOMATERIALS APPLICATIONS OF NANOBOMATERIALS, CHAPTER 14*

Assessment

Final mark = 100% Knowledge
Knowledge = 100% final exam