

Techniques de spectroscopies et microscopies



En bref

- › Langue(s) d'enseignement: Français
- › Ouvert aux étudiants en échange: Oui

Présentation

Description

> X and electron microscopy sciences

Spectroscopies with electron microscopes : EELS et EDX

Spectroscopy of X absorption in synchrotron : XANES et EXAFS

Electron spectroscopy for surface characterization: XPS

> Near-field Microscopies

AFM : contact mode (c-AFM), non-contact (nc-AFM), intermittent contact (t-AFM), lateral forces (lf-AFM), spécifique interactions, force spectroscopy.

SNOM: Optical near-field, operating principle, type of set-up, experimental set-up

STM: topographic mode (i-V constant or constant tip-sample distance) and tunnel-effect spectroscopy (STS).

> Raman Spectroscopy

Relation of molecular-structures - macroscopic phenomena (physical origin of the refractive index, absorption, diffusion).

Application of Raman spectroscopy in microscopy.

Main sources of light (white source, LED, Laser diode) : materials and temporal and spectral characteristics.

Principles of Raman and Resonance Raman spectroscopy.

Extension on non-linear spectroscopy (second harmonic generation, emission with biphotonic absorption).

Objectifs

The objective of this module is first to complete the knowledge of the student on the microscopy techniques already approached in M1. Advanced microscopy techniques such as X microscopy (STXM, tomography), and near field microscopy (AFM, STM, SNOM) in the aim to acquire informations (dimensions, shape, composition, structuring) at the nanometric scale will be discussed without going deeply into the physics of these techniques, but simply as characterization tools for a student chemist. The goal is to answer the question: What is the useful technique to get important informations to know?

With the same objective, Raman spectroscopy will be described as a tool for characterizations and applications.

Heures d'enseignement

CM - Techniques de spectroscopies et microscopies

Cours magistral

12h

Pré-requis obligatoires

Be able to explain the fundamental differences between spectroscopic methods presented for the characterization of materials (XPS, XANES, EDX, EELS).

Know how to choose the best characterization technique based on the sample concerned.

Know how to choose which microscopies for the best characterization of materials and surfaces.

Be able to use and interpret imaging results obtained with near-field microscopies.

Be able to understand the relevance of scientific articles based on spectroscopic studies and near-field characterization of materials.

Infos pratiques

Lieu(x)

> Angers