

### Techniques de spectroscopies et microscopies

Niveau d'étude BAC +5 / master ECTS 1 crédits Composante Faculté des sciences

#### 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 (If-AFM), spécific interactions, force spectroscopy.
- # SNOM: Optical near-field, operating principle, type of set-up, experimental set-up
- # STM: topographic mode (İ-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, structu-ring) 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

#### Compétences visées

# Be able to explain the fundamental differences between spectroscopic methods pre-sented 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

#### Campus

> Campus Belle-beille

