

# UE Surface functionalization and applications I



Niveau d'étude  
Bac +4



ECTS  
3 crédits



Composante  
UFR PhITEM  
(physique,  
ingénierie, terre,  
environnement,  
mécanique)



Période de  
l'année  
Toute l'année

- > **Langue(s) d'enseignement:** Anglais
- > **Ouvert aux étudiants en échange:** Oui
- > **Code d'export Apogée:** PAX8NCAD

## Présentation

### Description

The applications of surface functionalization are multiple and cover large fields at the interface between chemistry and biology. The aim of this course is to focus on two challenging applications: surface functionalization for biosensors and for (electro)catalysis. The course is structured into two modules differentiated by the nature of the functionalized material which (mineral/inorganic or biological).

Contents:

- I. Short introduction on biomolecules (DNA, proteins, enzymes, sugars...)
- II. Functionalization of mineral and inorganic based-materials and related characterization techniques (fluorescence microscopy, AFM, SEM, ellipsometry...)

DNA, sugars and proteins

- Physisorption, chemisorption
- Self-assembly on conducting and semi-conducting surfaces (silanization, thiol self assembly)
- Electrofunctionalization: conducting polymers, diazonium salts

- Auto-organization of biomolecules : origami, DNA wires, protein auto-assembly, protein organized around organizing structure (Metals...)

- Applications: biosensors, stimulating electrodes and anti-fouling surfaces

Catalysts

- Fonctionnalization

- Applications: (photo)electrocatalytic water splitting (reduction of protons, water oxidation), CO2 reduction

Enzymes

- Fonctionnalization

- Applications: hydrogenases, CO2 reductase ...

III. Fonctionnalization of bio-based nanomaterials

DNA

- Fonctionnalization with catalysts

- Applications

Proteins

- Fonctionnalization (bioconjugation) with catalysts (artificial enzymes) and nanoparticles

- Applications

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## Heures d'enseignement

UE Surface functionalization and applications I - CM-TD

Cours magistral - Travaux dirigés

24h

**Période** : Semestre 8

## Infos pratiques

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### Lieu(x) ville

› Grenoble

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### Campus

› Grenoble - Domaine universitaire