UE Surface functionalization and applications I

Niveau d'étude
Bac +4

ECTS
3 crédits

Composante
UFR Physique, Ingénierie, Terre, Environnement, Mécanique (PhITEM)

Période de l'année
Printemps (janv. à avril/mai)

Diplômes intégrant cet élément

- Master Nanosciences et nanotechnologies

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…)

Informations non contractuelles.
Dernière mise à jour le 30 juin 2026

DNA, sugars and proteins

- Physisorption, chemisorption
- Self-assembly on conducting and semi-conducting surfaces (silanization, thiol self assembly)
- Electrofunctionnalization: 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

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

Enzymes

- Functionnalization
- Applications: hydrogenases, CO2 reductase …

III. Functionnalization of bio-based nanomaterials

DNA

- Functionnalization with catalysts
- Applications

Proteins

- Functionnalization (bioconjugation) with catalysts (artificial enzymes) and nanoparticles
- Applications

Heures d'enseignement

CMTD	Cours magistral - Travaux dirigés	24h

Période : Semestre 8

Infos pratiques

Lieu(x) ville

Grenoble

Campus

Grenoble - Domaine universitaire

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