Physicochemistry of semiconductors

ECTS
3 crédits

Etablissement(s)
UFR Chimie, UFR des Sciences fondamentales et biomédicales

Volume horaire
24h

Période de l'année
Semestre 2

En bref

- **Langue(s) d'enseignement:** English
- **Forme d'enseignement :** Cours TD
- **Ouvert aux étudiants en échange:** Non

Présentation

DESCRIPTION

The purpose is to introduce electronic transport properties of organic and inorganic semiconductors as well as the basic principles of semiconductor-based devices. The course contents is the following: Part 1 – band structure of semiconductors (direct versus indirect bandgap), density of states, notion of hole, density of charge carriers, intrinsic and extrinsic semiconductors (doping and temperature effects); electronic transport (Drude model: conductivity, mobility of charge carriers), drift current under electric field versus diffusion current under gradient of concentration, polarizability (delocalized transport versus hoping), out-of-equilibrium semiconductor (generation/recombination processes of charge carriers). Part 2 – Inorganic PN junction (Schockley equation), organic Schottky diode (metal/organic semiconductor interface), optical properties of organic and inorganic semiconductors (light absorption, photoluminescence and electroluminescence), basic operation of optoelectronic devices (photodiode, photovoltaic diode, electroluminescent diode.

HEURES D'ENSEIGNEMENT

Physicochemistry of semiconductors	Cours Magistral	20h
Physicochemistry of semiconductors	Travaux Dirigés	4h

PRÉ-REQUIS OBLIGATOIRES

Pour en savoir plus, rendez-vous sur > u-paris.fr/choisir-sa-formation

wave/particle duality; pi-conjugated system; cubic crystal lattice in direct and reciprocal space; electron diffraction by crystal lattice; free electron gas (Sommerfeld model: electron energy quantization, standing electronic waves in the crystal, periodic boundary conditions); wave function of electron in periodic potential (Bloch theorem); theory of energy bands (Fermi surface, Brillouin zones, bandgap, density of states of 1D, 2D, 3D crystals) ; perfect Fermi gas (Fermi-Dirac statistics).

En bref

CONTACTS

Responsable pédagogique
Nicolas Battaglini
nicolas.battaglini@u-paris.fr

LIEU(X)

Campus des Grands Moulins