

Master Physique fondamentale et applications

Fabrication and characterization of optoelectronic devices

Informations

Composante : Faculté des Sciences

Responsables

Ludovic ESCOUBAS
Johann TOUDERT
Carmen RUIZ HERRERO

Langue(s) d'enseignement

Anglais

Contenu

Optoelectronic devices are now core technologies for several key technical areas such as telecommunications, information processing, lighting, sensors, and photovoltaics. The objectives of this course are (i) to teach fundamental notions about physical phenomena in optoelectronic materials, (ii) to introduce the principle and architecture of optoelectronic devices, such as light emitters, photodetectors, imaging sensors, solar cells, (iii) to introduce the fabrication and characterization methods of optoelectronic materials and devices.

Part 1 - Basis of optoelectronic phenomena

Band structure, E-k diagrams (metal, semi-metal, semi-conductor), semiconductor doping
Photon absorption, charge photo-generation, diffusion, recombination
Junctions

Part 2: Optoelectronic devices

Electroluminescence
Light-emitting diode (LED)
Laser LED (edge, MQW, DFB, tunable, VCSEL)
Photodetectors, imaging sensors
Solar cells

Part 3: Device fabrication and characterization

Compétences à acquérir

- Be familiar with the electronic structure of materials
- Understand the key material properties for optoelectronic applications
- Get knowledge about the working principles and architecture of optoelectronic devices
- Select adequate materials and devices for chosen optoelectronic applications
- Get knowledge about technology for the fabrication and characterization of optoelectronic materials and devices

Modalités d'organisation

Evaluation: 1 homework, 1 home-prepared oral presentation, 1 written exam

Bibliographie, lectures recommandées

- Optoelectronics & Photonics: Principles & Practices, 2nd Edition, Safa O. Kasap, Univ of Saskatchewan
- A. Rogalski, Infrared Detectors, 2nd edition, CRC Press, Boca Raton, Florida (2010).
- Wei-Chic Wang, "Optical detectors" & "Radiometry", teaching lessons, National, Tsing Hua University

Pré-requis obligatoires

- Basis in material science and solid state physics
- Basis in electronics
- Basis in optics and photonics

VOLUME HORAIRE

- Volume total: 30 heures
- Cours magistraux: 20 heures
- Travaux dirigés: 10 heures

Codes Apogée

- SPFBU33J [ELP]

Pour plus d'informations

[Aller sur le site de l'offre de formation...](#)



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