OPTOelectronic Group

iemn
Institut d'Electronique, de Microélectronique et de Nanotechnologie
UMR CNRS 8520

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Research portfolio

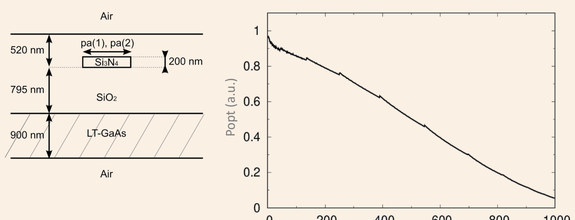
- Modelling
  - Integrated optics (BPM)
  - Acousto-optics
  - Optics (ray tracing)
- Acousto-optic devices
  - Deflectors
  - Filters
- Microwave-photonics
  - Analog Digital Conversion
  - GaN optoelectronics
- Photonic sensors
  - Photovoltaics
  - Plasmonics

The group has an historical research activity in the microwaves photonics and acousto-optics domains.
Photonic sensor thematics started in the early 2010s.
The modelling activity supports the device research and is adapted to its developments.

Modelling activities

Light propagation in integrated optics/optoelectronics (3D-BPM)

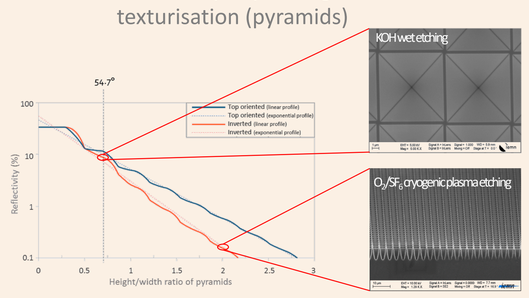
Waveguide design for linear evanescent coupling between Si_3N_4/SiO_2 waveguide and GaAs detector



Collaboration with iemn THz-Photonics

Light trapping structures (ray-tracing)

Solar cell reflectivity depending on surface texturisation (pyramids)



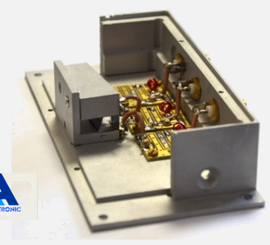
Acousto-optic devices

Acousto-optic filtering

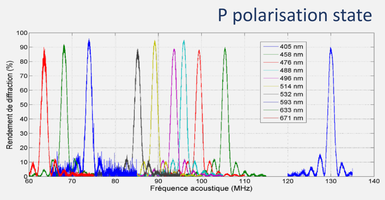
Polarimetric acousto-optic tunable filter

- Visible 400-680 nm range
- Polarisation state transparency
- Tunable band-pass

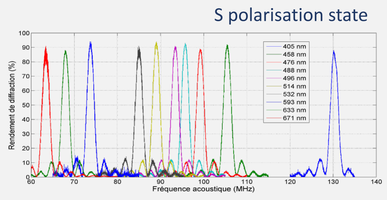
Collaboration with OPTO-ELECTRONIC



P polarisation state



S polarisation state

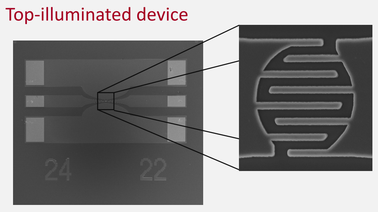


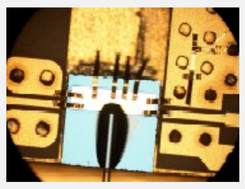
Microwave-photonics: devices

Microwave subsampling ADCs

Electro-optic sampling
High speed photoswitch using GaAs LT

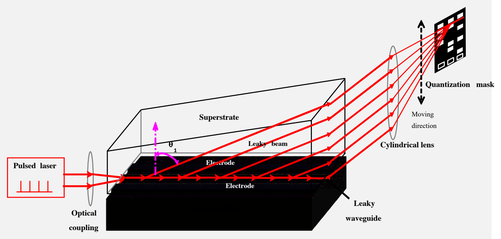
Top-illuminated device



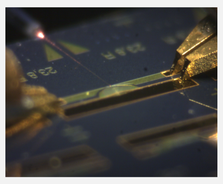


Packaged device (iXblue)

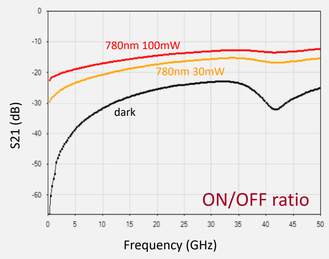
All optical sampling
Integrated optics light deflector



Integrated optical waveguide device



Collaboration with THALES



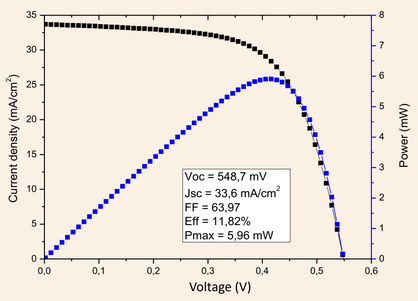
Collaboration with IETR UNIVERSITÉ DE NANTES

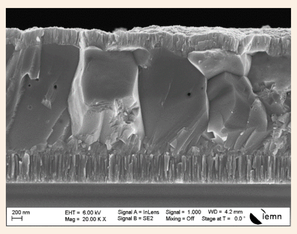
Photonic sensors: Photovoltaics

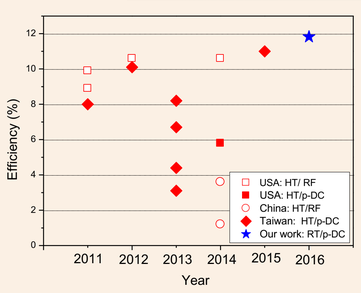
Full PVD deposition of thin film solar cells

CIGS cells

- Single quaternary CIGS target
- Room temperature deposition + post-anneal







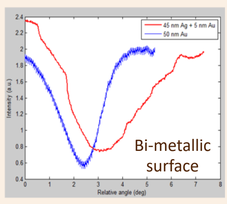
High-bandgap abundant material based thin films for top cell of Si based tandem cells (Zn-IV-N_2)

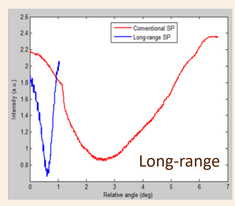
Collaboration with CROSSLUX, Institut Jean Lamour, CEA tech, INES, GeePs

Photonic sensors: Plasmonics

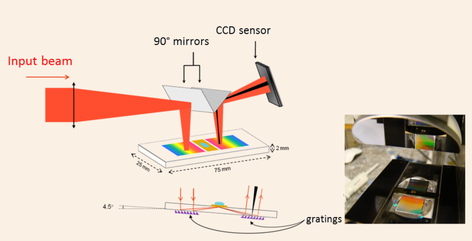
Surface plasmon resonance sensing

Sensitivity improvement

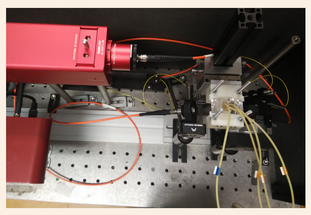




Sensor including coupling optics



Fluidics integration and spectral interrogation



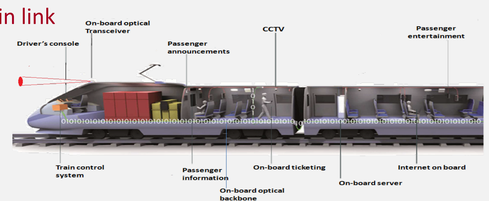
Application to real time:
- detection of pathogens in phytosanitory domain
- biopesticide spreading optimization

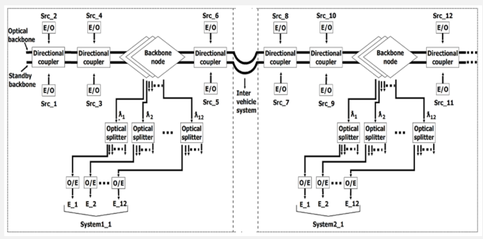
Interreg France-Wallonie-Vlaanderen
SMARTBIOCONTROL
BioSens

Microwave-photonics: systems

High bit-rate optical links applied to railway transportation

Design of system architecture using COTS fiber optics components
- Simulation of full system (VPI)
- Inter-coach link
- Ground-train link





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