SIEĆ BADAWCZA ŁUKASIEWICZ

Łukasiewicz Research Network – Institute of Electron Technology

Department of Photonics

The Department

- Has at its disposal state-of-the-art technological and characterization equipment, which allows carrying out competitive research in the field of photonics, especially in the field of semiconductor lasers. Our main research fields are mid-IR Quantum Cascade Lasers (QCLs), type-II superlattice detectors (mid-IR) as well as near-IR optically pumped disk lasers (OPSDLs, VECSELs).
- Offers the set of competencies that are very well suited to development of new light sources through ability to adapt quickly to changes in the design required by device optimization procedure, as all of the required processes (design, growth, fabrication and characterization) are gathered in one group of specialists.
- Uses numerical tools (FimmWave, Apsys, Comsol, FlexPDE, Matlab) for design of semiconductor devices.
- Conducts R&D and participates in various projects fund by national grants on high level of competence with focus on:
  - Design, growth, fabrication and characterization of optoelectronic devices – lasers (visible, IR) and detectors (IR),
  - Processing technology of III-V semiconductor compounds.
  - Growth of semiconductor compounds in GaAs-, InP- or GaSb-based material systems.

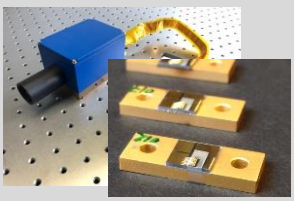
Facilities

Two molecular beam epitaxy reactors

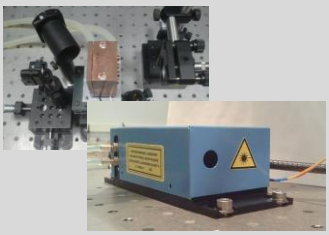
Deep-UV photolitography

Die- and wire-bonding

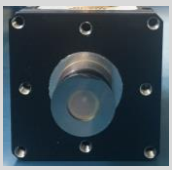
Sample developments



Quantum Cascade Lasers emitting in range 4.5 - 10 micrometers. We are designing, fabricating and testing QC lasers. We can develop (design, grow, fabricate) a device meeting specific requirements. Our QCLs offer high peak powers (500 mW) at room temperature. We can deliver mounted chips or devices in a hermetic housing with simple, computer-controlled power supply. Our devices have been used in prototype FSO system developed by Military University of Technology in Warsaw.



Vertical External Cavity Lasers. We are capable of fabricating the heterostructures and set-up the external cavity lasers for the emission in 1000 nm range and using nonlinear optics second harmonic can be generated in blue and green spectral range. The use of epitaxially grown semiconductor saturable absorbers permits to modelock our semiconductor disc lasers and solid state laser as well. The pulses of femtosecond length can be produced.



Type-II superlattice detectors. Type II InAs/GaSb superlattice detectors operating in the mid-wavelength infrared spectral range (3-5 μm) are developed at the Institute of Electron Technology. Mid-IR InAs/GaSb photodiodes achieve a high Johnson's noise-limited specific detectivity throughout the entire considered temperature range: D*=3×1011 Jones at 75 K and D*=3×109 Jones at 225 K.

Cooperation:

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