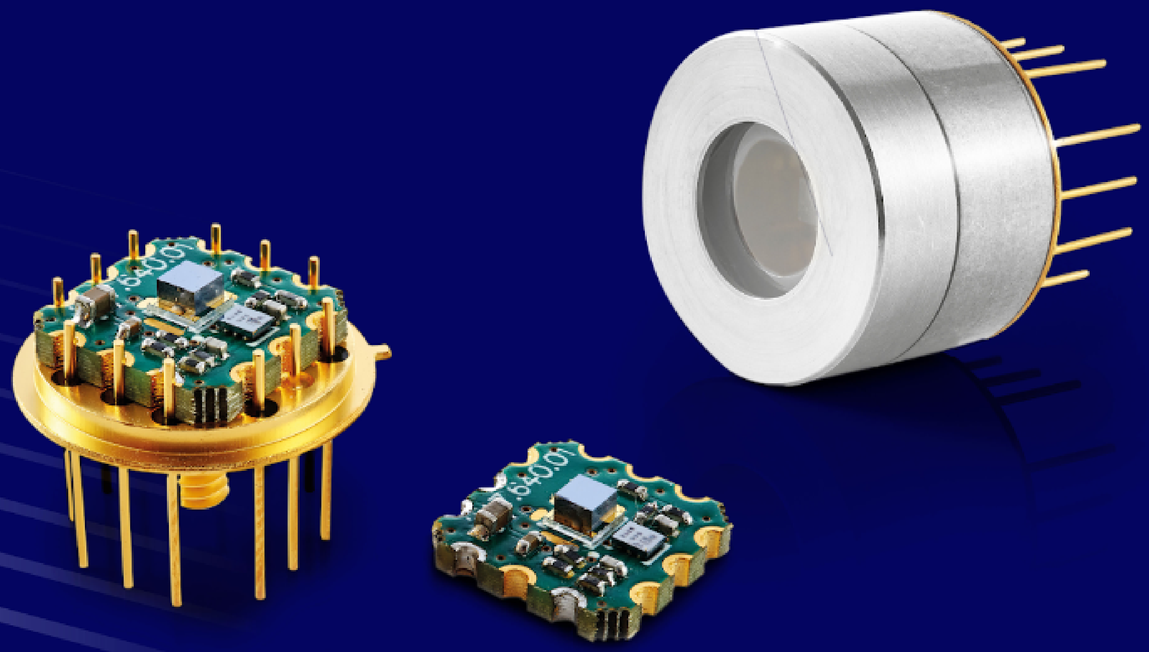
Polish infrared detectors for environment, medicine and modern army

VIGO PHOTONICS

Jędrzej Mijas, MSc
Application Engineer
National Knowledge Valorisation Day
27/05/2025



PHOTONICS DEVICES MANUFACTURER FROM POLAND

Epiwafers

Infrared photon detectors

Infrared modules

WHO WE ARE?

VIGO Photonics S.A. is a photonic semiconductors company.

We are the sole European provider of photon mid infrared detectors, competing with Asian & US companies.

We produce the high-quality epiwafers for photonic and microelectronic applications based on advanced compound materials (III-V & II-VI).

38 YEARS on the market

6500 m^2 production area

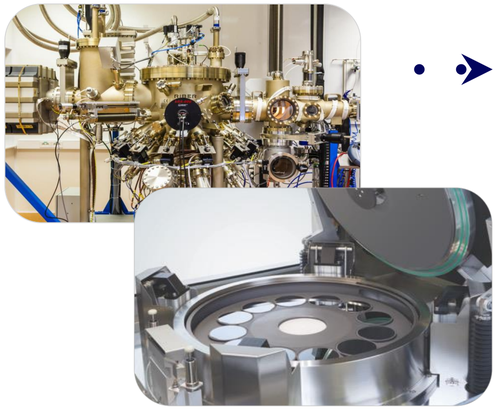
UNIQUE TECHNOLOGY - Own independent technology developed in VIGO Photonics.

CUSTOM FIT SOLUTIONS - Flexibility to tailor and test solutions that respond to customer requirements.

COMPLETE IN-HOUSE VALUE CHAIN

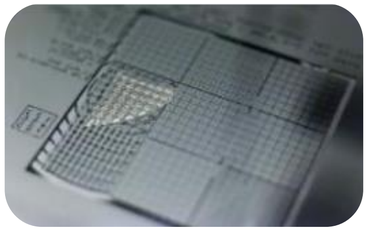
COMPLETE FRONT-END AND BACK-END PRODUCTION LINE FOR INFRARED PHOTONIC DEVICES (Near IR to Long Wavelength IR)

1.EPITAXY



II-VI and III-V epiwafers for photonic and microelectronic devices (QCL and VCSEL lasers, diodes, quantum dots, microelectronics)

2. PROCESSING



MCT and III-V detector chips

3. DETECTORS PACKAGING

Automated assembly, packaging and characterisation of complete infrared detectors.

4. INTEGRATION WITH ELECTRONICS

Detection modules with application specific electronics.

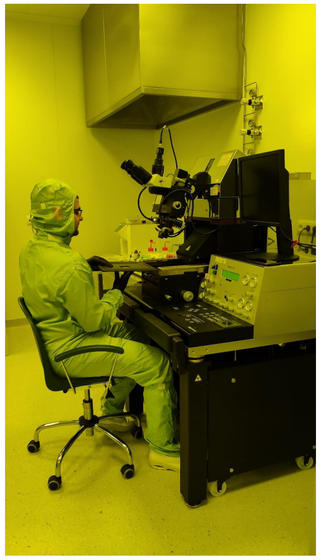
PRODUCTION AND R&D CAPABILITIES

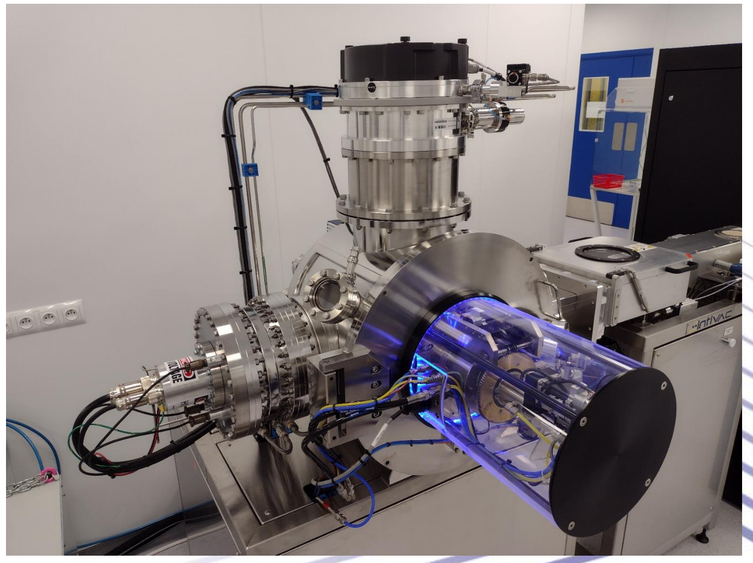
MODERN AND AUTOMATED PRODUCTION LINE

- Production capacity of 100,000 detectors per year.
- Control of product parameters at every stage of production.
- Possibility to create a production station dedicated to a special, unique product.
- Production independence and our own complete production line.

OWN RESEARCH AND DEVELOPMENT FACILITIES

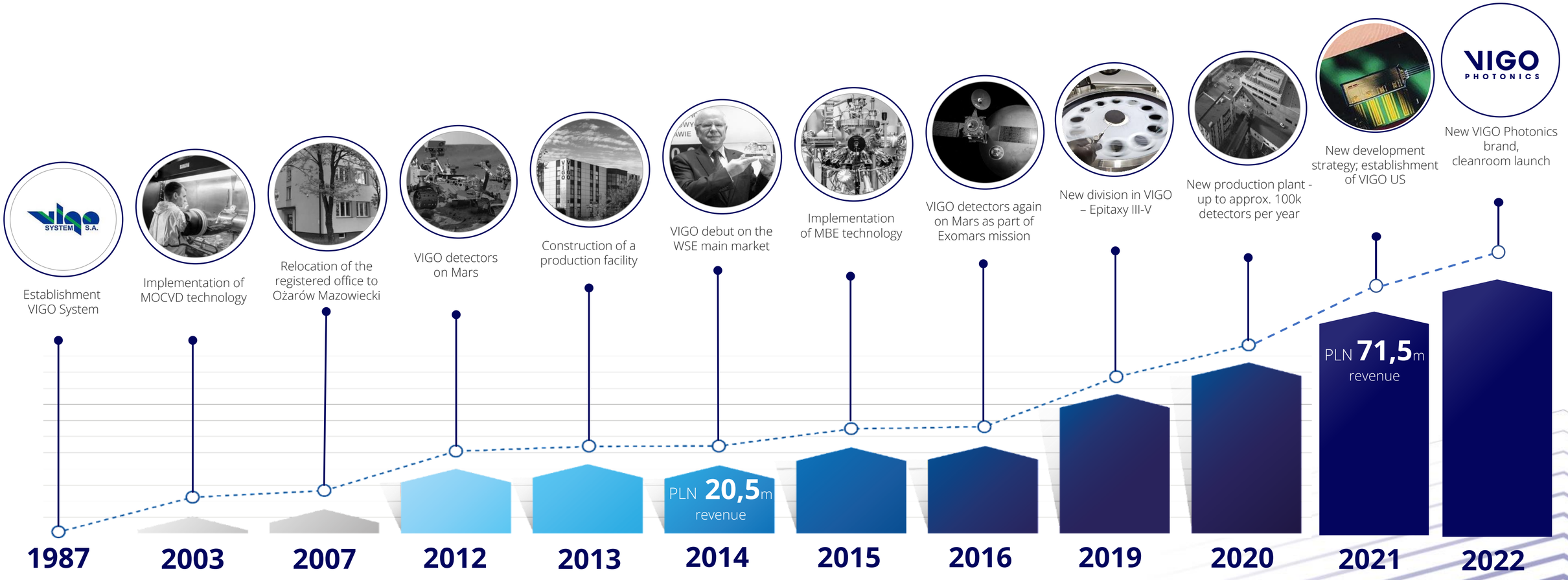
- State-of-the-art laboratories and devices for the creation of semiconductor layers and photonic solutions.
- Clean room laboratories (ISO 6 cleanliness class).
- World-class experts and cooperation with the best research centers around the world.
- Constant investments in improving technology and developing new solutions.





MILESTONES OF THE VIGO'S DEVELOPMENT

OVER 30 YEARS OF CONTINUOUS DEVELOPMENT AND EXPANSION ON THE MARKETS

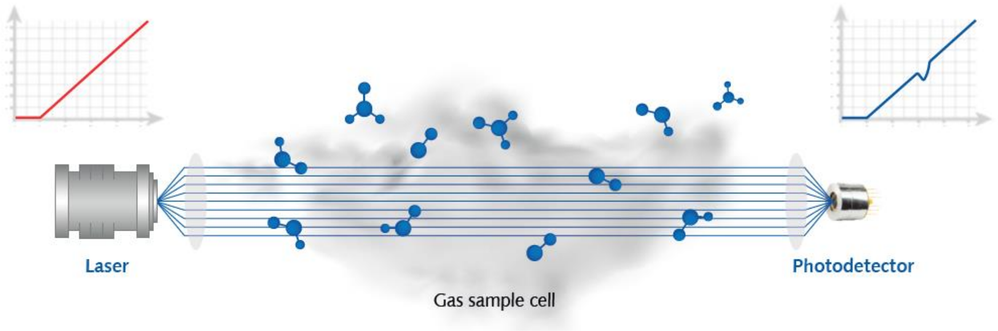


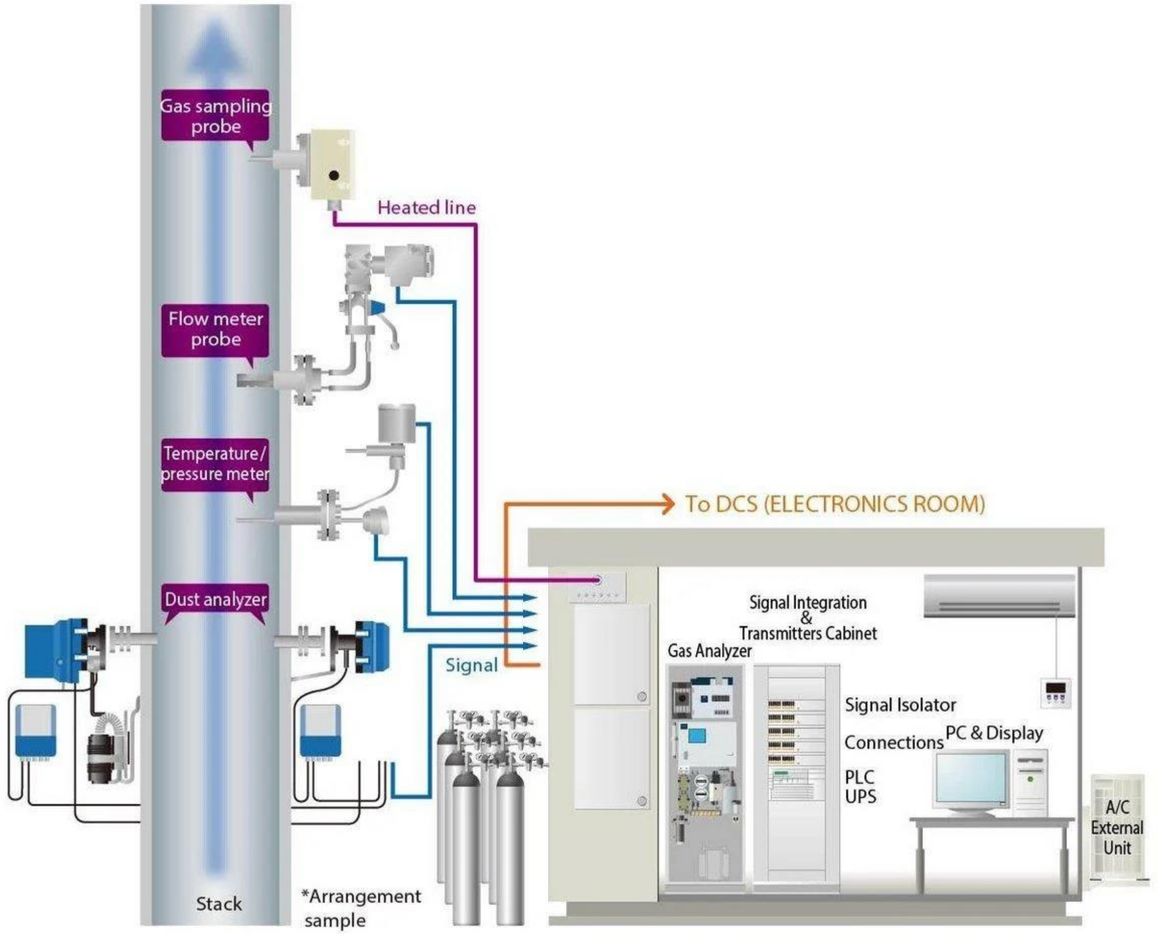
DETECTORS FOR ENVIRONMENT

Gas Sensing, Continuous Emission Monitoring, Water Quality Monitoring

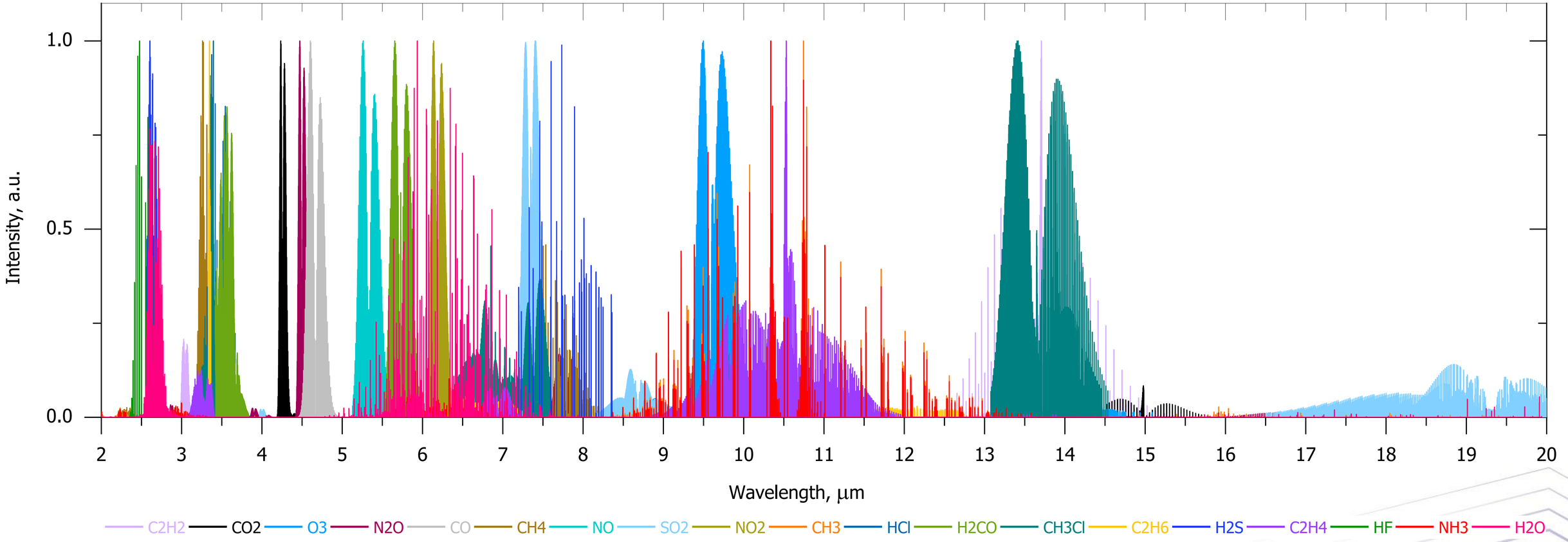
Infrared detectors are a vital part of gas sensing systems. Detection in IR allows to distinguish clearly between gases and sense very low concentrations in real time.

- RAVEN SENSORS project (ultra high resolution atmospheric sensors).
- WATERSPY and AQUARIUS projects (water quality monitoring for bacteria and contaminants)





DETECTORS FOR ENVIRONMENT

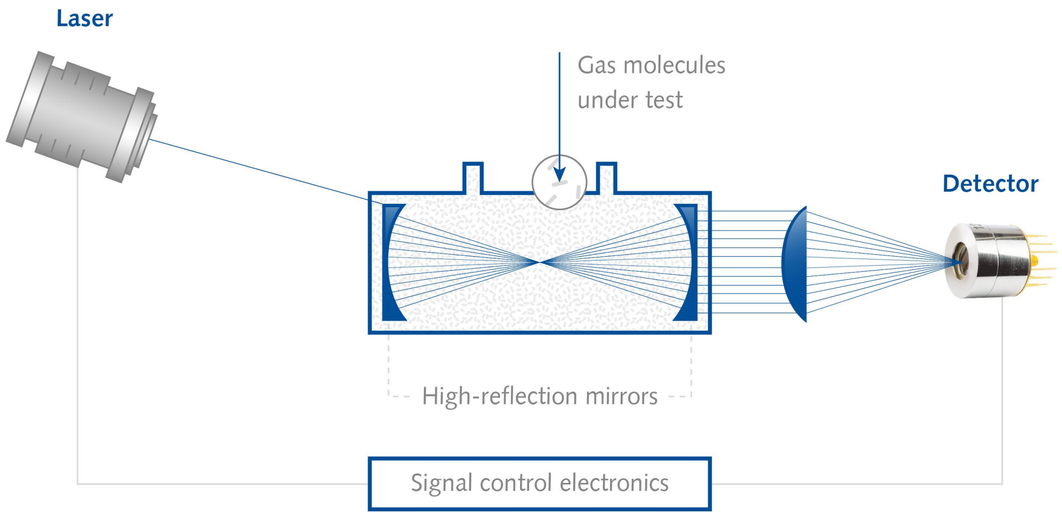


DETECTORS FOR MEDICINE

Human Breath Analysis

Laser-based Mid-IR systems can detect extremely low concentrations of gases (down to 0.1 ppb) to advance early detection of various diseases.

- SENSORMED project (detection of trace concentrations of biomarkers for cancer prevention).



Non-invasive Glucose Monitoring

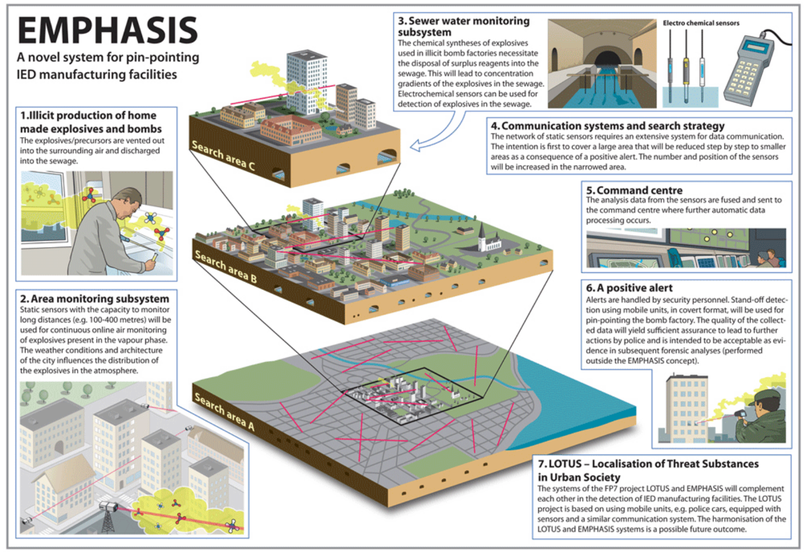
Glucose is one of the substances which has clearly defined absorption in Mid-IR.
High-performance detectors allow for sensing via skin tissue – without the need for pricking fingers.

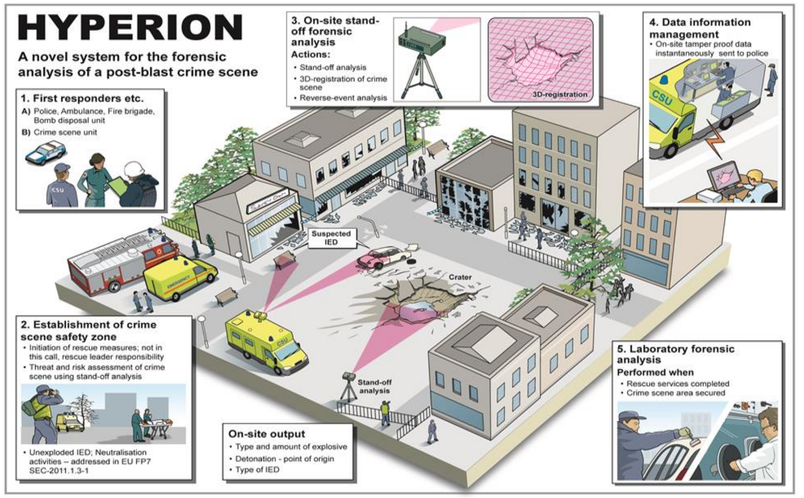
DETECTORS FOR MODERN ARMY

Drug and Explosives Detection

Infrared detectors combined with dedicated lasers and optics can be used to detect drugs, explosives or other hazardous substances.

- EMPHASIS project (detection of hidden explosives production in urban areas).
- HYPERION project (forensic analysis system at the explosion site).
- CHEQUERS project (explosion detection system).





DETECTORS FOR MODERN ARMY

Laser warning systems

- Destined for detection of vehicles and military objects' radiation from impulse rangefinders or laser illuminators
- The system can fire smoke-screen towards the direction of detected laser radiation

Self protection systems calibration

- Calibration of infrared countermeasures, laser range finders,, target designators, dazzlers etc.
- Different wavelengths possible

Anti-tank mines

- Detects hot moving objects on a battlefield
- Combined with acoustic systems for a proper target detection
- Range up to tens of metres
- Used to protect the troops

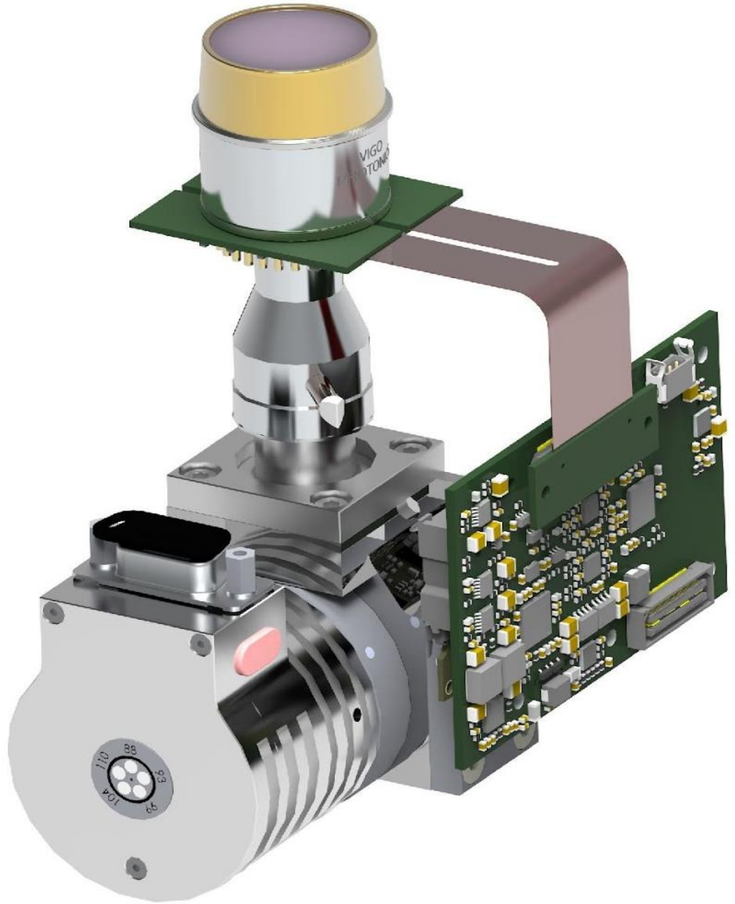
Fire suppression systems

- Device is intended to protect the crew and the engine compartments of combat vehicles in case of: flame and fuel explosion.

DETECTORS FOR MODERN ARMY

Focal Plane Arrays for Thermal Cameras

- Completely Polish design of MWIR and LWIR focal plane arrays
- Vertically integrated production
- State of the art parameters



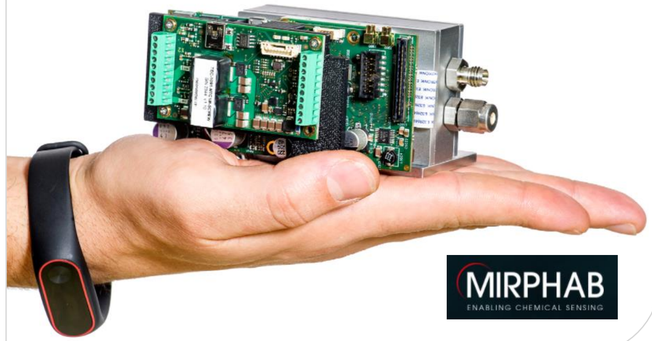
IR DETECTORS TO III-V PHOTONIC INTEGRATED CIRCUITS

HyperPIC – DEVELOPMENT AND INDUSTRIALIZATION OF THE WORLD'S FIRST MID-IR PIC!

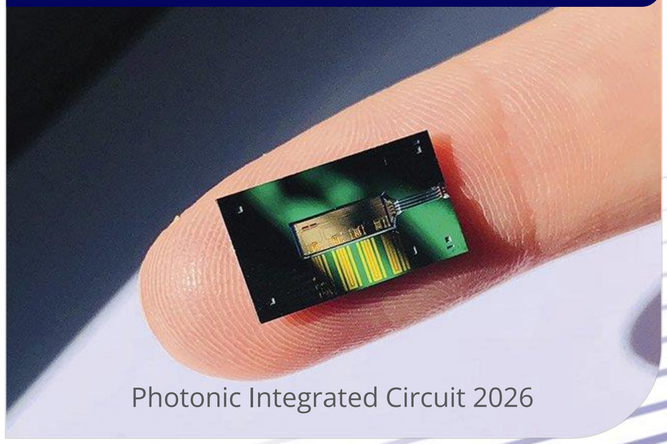
GAS DETECTOR – YESTERDAY

Environmental Management Authority

GAS DETECTOR – TODAY



GAS DETECTOR – TOMORROW



Photonic Integrated Circuit 2026

IR DETECTORS TO III-V PHOTONIC INTEGRATED CIRCUITS

VIGO PHOTONICS

III-V epitaxy

III-V processing

Detectors and lasers

Designing waveguides (passive elements)

Si/SiN/InP processing

Technological platform

Designing data microprocessors

ASIC

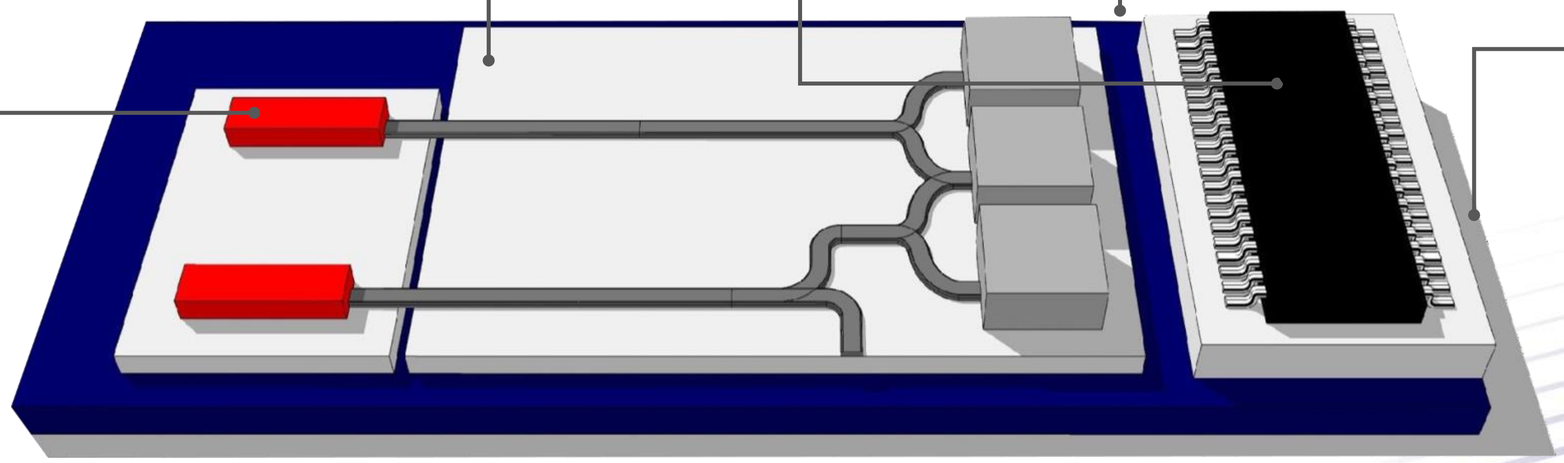
Microassembly and integration

PIC packaging

Designing tools for clients

Circuit architecture

Designing



VIGO PHOTONICS

LET'S CREATE THE FUTURE TOGETHER!

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