Infrared solutions for your applications

Kordian Lipski

May 2020
ABOUT US

// Key competitive advantages

VIGO System supplies a wide range of products for photonics. Our offer includes both epitaxial semiconductor materials as well as infrared detectors and detection modules. All products are based on our own unique technology.

Our competitive advantage is based on:

› Over 30 years of experience in detector manufacturing
› The best quality to price ratio
› Ability to meet the highest quality requirements (NASA, military)
› Main supplier for detectors for QCL
› > 150 employees (1 professor, 14 PhDs and >50 engineers)
› 6500 m² of production area

// Our strengths

› TECHNOLOGY Unique technology, established internally and continuously developed, allowing production of sophisticated optoelectronics sensors
› PEOPLE Highly educated and experienced personnel
› MARKET KNOWLEDGE Numerous group of satisfied customers. Wide network of distributors
› INNOVATION Close co-operation with academia and R&D institutions allowing for highly advanced research. Ability to recruit highly competitive staff
Vertically integrated manufacturer of Mid IR components

Complete production line for infrared semiconductors and Mid IR photonic devices

1. Epitaxy

Growth of MCT and III-V semiconductor layers in MOCVD and MBE technology

Production of high quality epitaxial heterostructures from materials of group III-V. GaAs and InP based products.

2. Processing

Contact and passivation deposition, dry and wet etching and photolithography

Preparation of structures for assembly: dicing, wirebonding and flip-chip

3. Detectors packaging

Dedicated electronics for each type of infrared detector

Integration of infrared detector with electronics in common packages. Complete detection modules

4. Integration with electronics

Microlenses monolithically integrated with the active structures

Automated assembly, hermetization and packaging

EPIC Online Technology Meeting on Mid-IR Photonics
Kordian Lipski
VIGO System – WHAT WE OFFER?

// Parameters vs fundamental limits

- Detectivity approaching fundamental limits of performance
  - Time response approaching GHz range

![Graph showing parameters vs fundamental limits](image)

![Products of VIGO System](image)
// Affordable MWIR detection module:

- Detector integrated with low noise preamplifier in a common miniaturized package (10×10×3 mm³)
- Uncooled MWIR InAsSb detector
- Frequency response – DC to 3 MHz
- RoHS compliance – consumer market safety!
- Competitive price – 120 Euro

// In development:

- Other spectral ranges
- Further miniaturization
- Temperature stabilization
- Planar optics
- Digital output (SPI and USB)

---

### Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak wavelength</td>
<td>4.6 µm</td>
</tr>
<tr>
<td>10% cut-on wavelength</td>
<td>1.2 to 4.0 µm</td>
</tr>
<tr>
<td>10% cut-off wavelength</td>
<td>5.9 µm</td>
</tr>
<tr>
<td>Peak voltage responsivity</td>
<td>400 V/W</td>
</tr>
<tr>
<td>Peak detectivity</td>
<td>$3.5 \times 10^8$ cm-Hz$^{1/2}$/W</td>
</tr>
<tr>
<td>Electrical bandwidth</td>
<td>3 MHz</td>
</tr>
<tr>
<td>Acceptance angle</td>
<td>up to 160°</td>
</tr>
<tr>
<td>Output voltage swing</td>
<td>0.5 V</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-20 to 60°C</td>
</tr>
</tbody>
</table>
VIGO System – NEW PRODUCT LINE

// Spectroscopy, eg. gas, liquids and solids analysis

› Strong absorption lines
› Detection of almost any chemical compound
› High sensitivity
› High selectivity

The chemical composition analysis system is usually built from a MWIR radiation source and a receiver (detector)

Each chemical compound has its own spectral lines on the spectral characteristics

/// Industry

› Temperature measurement
› Laser metrology
› Monitoring of industrial and laboratory processes
› Laser parameters monitoring and control
VIGO System – NEW PRODUCT LINE

// MWIR/LWIR HgCdTe and InAsSb linear arrays

Features

› High sensitivity
› High-speed response
› From DC to a few MHz
› Low drift of output signals
› Compact, small size and weight packages
› Convenient cryogenic-free operation
› Customizable array formats, spectral range, responsivity and signal processing circuits

<table>
<thead>
<tr>
<th>Array format</th>
<th>linear or bilinear, up to 32 elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pixel size</td>
<td>minimum 25×25 μm</td>
</tr>
<tr>
<td>Detector material</td>
<td>HgCdTe or InAsSb</td>
</tr>
<tr>
<td>Detector type</td>
<td>PV or PC</td>
</tr>
<tr>
<td>Cut-off wavelength</td>
<td>3 to 14 μm</td>
</tr>
<tr>
<td>Cooling</td>
<td>1 to 4-stage TEC</td>
</tr>
<tr>
<td>Time constant</td>
<td>1 ns – 10 μs</td>
</tr>
<tr>
<td>Active elements temperature</td>
<td>210 – 270 K</td>
</tr>
<tr>
<td>Temperature sensors</td>
<td>thermistor or diode</td>
</tr>
<tr>
<td>Package</td>
<td>TO8 16-pin or butterfly 40-pin</td>
</tr>
<tr>
<td>Window</td>
<td>Si/Al₂O₃/Ge/ZnSe with or w/o AR coating, planar or wedged</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-20 to 70°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-20 to 50°C</td>
</tr>
</tbody>
</table>
MAIN APPLICATION TYPES

// Temperature monitoring

› Temperature control of fast moving objects
› Advantage over other sensors in terms of response time, detectivity and resistance to environmental conditions

// Plastic sorting

› Elimination of moving parts and/or filters
› High separation accuracy due to high SNR ratio
› High speed measurement
› Low power consumption