



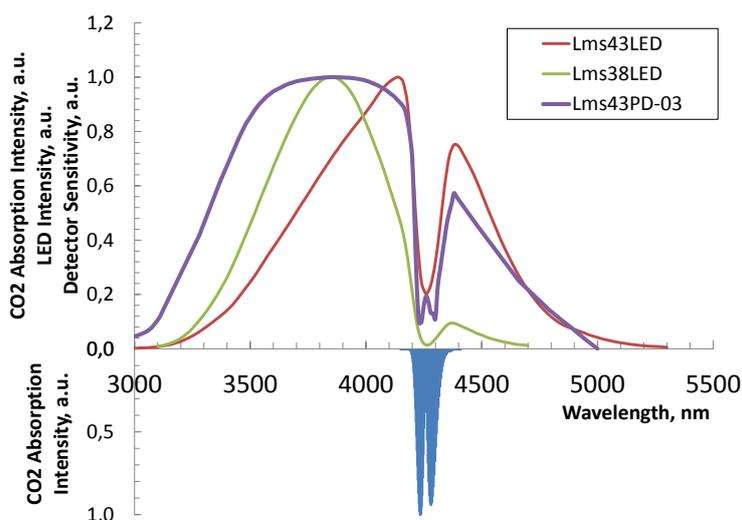
Nowadays medical diagnosis, treatment and prevention of diseases require contemporary, precise and reliable medical instruments. We offer new optical sensing tools based on mid-infrared LED-PD optopairs that can be used in a vast number of medical applications.

Our devices can be used in solving the following medical problems:

► **Respirometry (CO<sub>2</sub> concentration measurement in breathed out air):**

Carbon dioxide has the main absorption band at **4200-4300 nm** (the data are taken from HITRAN Catalogue). So, we recommend using light emitting diode **Lms43LED** and **Lms43PD** series photodiode.

The spectra of an **LED** and a **PD** for CO<sub>2</sub> detection:

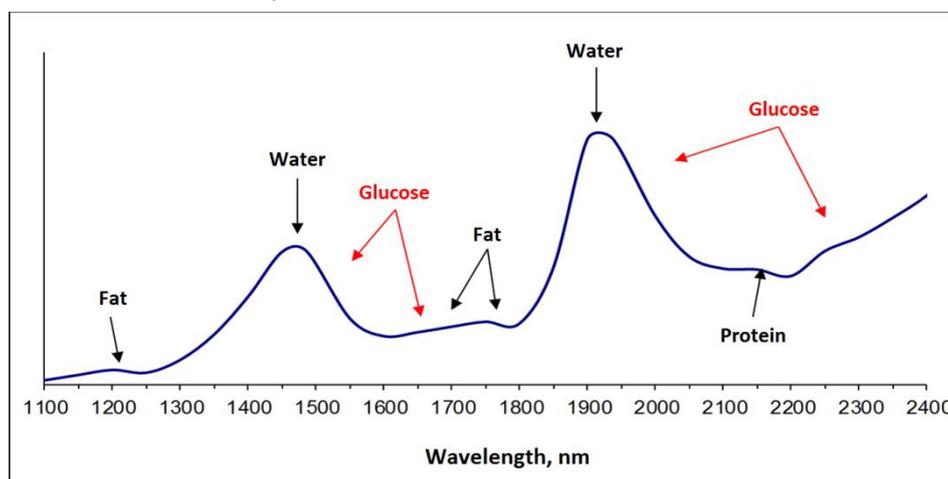


► **Analysis of blood, tissues, skin absorption (non-invasive glucose measurement etc.):**

Creation of a compact scanner based on multi-element mid IR LED-array will enable scanning of a certain spectral range within several seconds, defining absorption properties of the analysed matter and detecting the existence of some deviations from the normal levels.

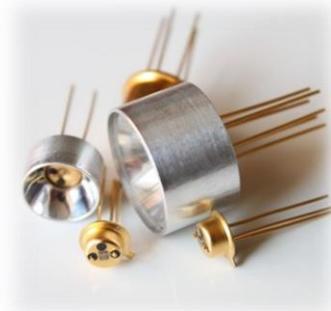
Measuring of glucose absorption based on control of one or two peak wavelengths may not provide reliable results due to the influence of fat, hemoglobin, water and other substances on the measuring signal. Only complex analysis of the absorption spectrum can provide good selectivity and reliability of glucose measurements.

Absorption of IR radiation in blood, tissues, skin



## Advantages of our devices:

- **Non-invasive** analysis
- Possibility to arrange a **compact design** of an optical cell thanks to compact size of the LED chip – **0.35 × 0.35 mm**
- No need of using additional optical filters – LED emission band width is comparable to absorption band widths of analysed substances
- **Low power consumption** (<1 mW)
- **Short response time** (10–50 ns)
- Possibility to achieve modulation **ranges** of up to **100 MHz**
- Operation temperatures up to +150°C
- **Lifetime** of **80 000 hours**



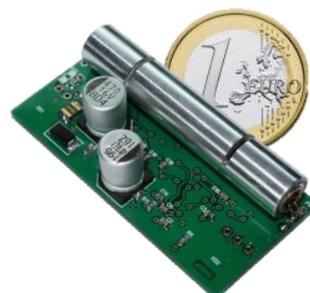
## LED-PD based **evaluation systems** and **analysers** for **medical applications**

For quick start we offer **out-of-the-box** solutions that can be launched with minimal effort – **evaluation kits** and **systems**:

- **Evaluation kits** with modular design that includes:
  - Light emitting diode LmsXXLED (any LMSNT LED can be chosen) with an LED driver
  - Photodiode LmsXXPD-XX (any PD can be chosen) with a preamplifier
  - SDM synchronous detector
- **COMING SOON CDS-4 carbon dioxide sensor module** – a low-cost “on-board” system with very low power consumption that includes a compact optical cell and electronics for LED power supply and PD signal amplification all-in-one. The sensor module can become a core of a device measuring CO<sub>2</sub> concentration in breathed out air.
- **CDS-5** is an evaluation system for CO<sub>2</sub> with a compact optical cell that incorporates an LED and a photodiode with a special glass covering. It includes all the needed circuitry for quick setup: LED driver, photodiode preamplifier, synchronous detector. carbon dioxide evaluation system with an advanced optical cell.
- **NEW LA-1t LED analyser** – a device oriented for the initial experiments with different liquid (and other) substances, enables defining the absorption properties of the analyzed sample in the spectral range 1.3 – 2.3 μm.

LLA’s optical module includes:

- **8-element LED array** with peak emission wavelengths about 1.3, 1.4, 1.6, 1.7, 1.9, 2.1, 2.2 and 2.3 μm;
- **Wideband photodiode** with a cut-off wavelength about 2.4 μm and 2 mm sensitive area diameter.
- **ZigBee/Bluetooth** wireless data transmission module for **fast data transfer** to a data **control center**
- Battery power supply for **autonomous operation**



*CDS-4 prototype*



*CDS-5 optical cell*



*LA-1t LED analyser*