



Different types of sensors are widely used by agricultural and food industries. We offer new optical sensing tools based on mid-infrared LED-PD optopairs that can be used in a vast number of applications. The use of our sensors will help to solve many problems and to raise yields, decrease costs and reduce chemical input.

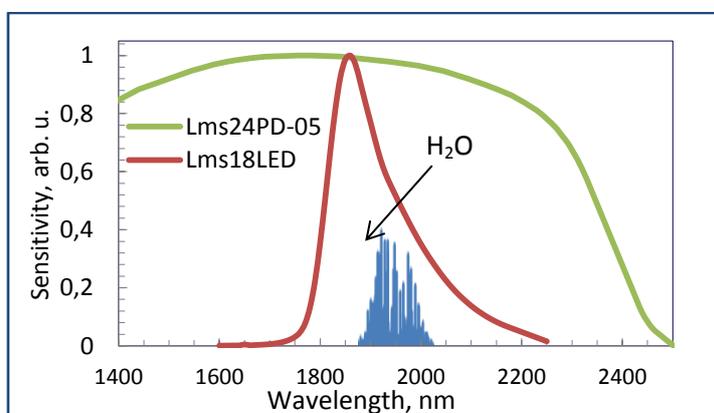
Our devices can be applied to solve the following problems:

► **Humidity measurement:**

- humidity of arable crops (grain, legumes etc.) measurement
- humidity of cotton, wool measurement
- soil humidity measurement

Humidity is measured by the optical absorption of water. In mid-IR water has the main absorption band at 1800-1950 nm (the data are taken from HITRAN Catalogue). So, we recommend using light emitting diode **Lms18LED** or **Lms19LED** and **Lms24PD** series photodiode.

Spectra of an **LED** and a **PD** for H₂O detection:



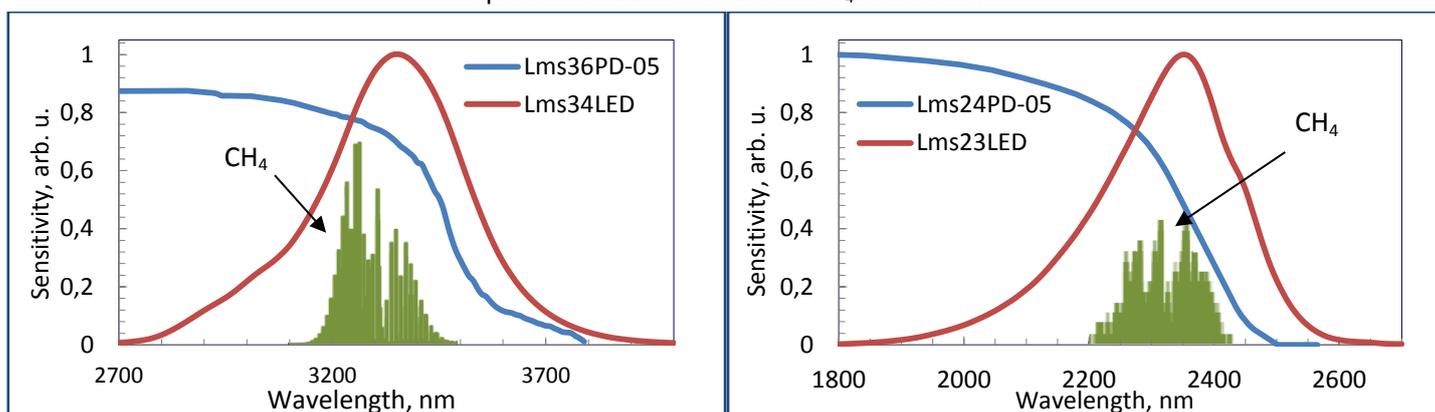
► **Methane measurement:**

- methane concentration measurement in biogas production
- methane quantification in pastures

Methane has the main absorption band at **3200-3400 nm**. Weaker absorption bands that can be used for detection are located around **2300 nm** and **1650 nm** (the data are taken from HITRAN Catalogue). So, we recommend using:

- ✓ for development of **compact** measuring cells and/or for detection of **low CH₄ concentrations**: light emitting diode **Lms34LED** and **Lms36PD** series photodiode;
- ✓ for development of **long-path** measuring cells and/or for **high CH₄ concentration** detection: light emitting diode **Lms23LED** and **Lms24PD** series photodiode.

Spectra of **LEDs** and **PDs** for CH₄ detection:



► **Quantitative analyses of plants, crops and food:**

- sucrose/fructose quantification in crops
- proteins measurement
- fibers measurement
- alcohol content measurement
- chlorophyll concentration measurement in petals and leaves



Advantages of our devices:

- **Non-destructive** 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**

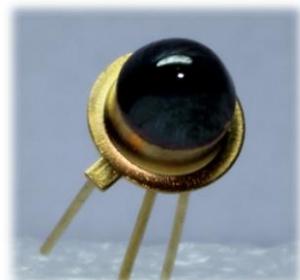
LED-PD based **evaluation kits, systems** and **analysers**

For quick start we offer different **out-of-the-box** solutions for **evaluation** purposes:

- **MDK** and evaluation kit with modular design that include:
 - Light emitting diode Lms34LED (other LED is available) with an LED driver
 - Photodiode Lms36PD (other PD is available) with a preamplifier
 - SDM synchronous detector
 - Any additional component(s) can be added by request
- **NEW MDK-c** evaluation kit with modular design that include:
 - LED Lms34LED-CG (LED with a special glass covering) with an LED driver
 - Photodiode Lms36PD-CG (PD with a special glass covering) with a preamplifier
 - SDM synchronous detector
 - Any additional component(s) can be added by request
- **NEW MDS-5** system 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.
- **NEW MDS-4 methane 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.
- **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**



New LEDs and PDs with a special glass covering (present in MDK-c/MDS-4/MDS-5)



optical cell included in MDS-4/MDS-5



MDS-4 methane sensor module



LA-1t LED analyser