PAPER MOISTURE MEASUREMENT

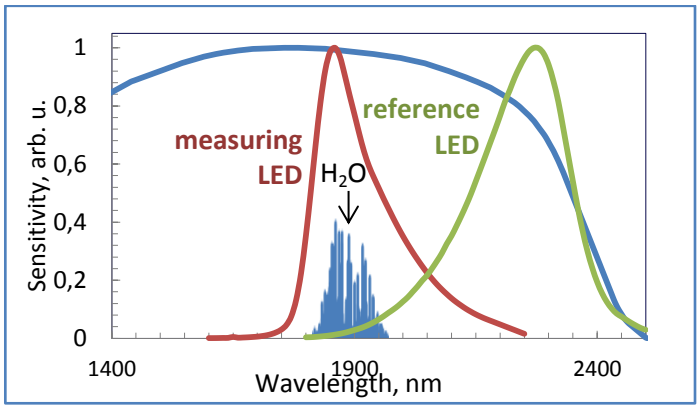
One of the key parameters of paper manufacturing is paper **moisture**. It is important to know the amount of moisture on every stage of paper manufacturing in order to control the technological process. There are different techniques of **water** detection. We offer method of **optical absorption** based on **mid-infrared** LED-PD optopair.

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** as a measuring LED, **Lms22LED** as reference LED and **Lms24PD** series photodiode to detect signals from the both emitters.

The main principle of H_2O detection:

The measuring LED emits radiation at a wavelength corresponding to the maximum absorption of the water, the reference LED emits at a wavelength not absorbed by the water. The concentration of the analyte is proportional to $ln\frac{I_{reference}}{I_{measuring}}$, where $I_{reference}$ is an intensity of the reference LED, and $I_{measuring}$ is an intensity of the measuring LED.

The spectra of an **LED** and a **PD** for H_2O detection:



Advantages of our devices:

- **Non-contact** analysis
- Possibility to make a **compact design** of an optical cell thanks to compact size of the LED chip – **0.35 × 0.35 mm**
- Possibility to arrange customized multi-element arrays enables developing multi-wavelength emitters that include both the measuring and the reference LEDs
- 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** for **moisture measurement**

- **NEW LA 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**

LA-T1 LED analyser

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