

sIRoCube – stationary NIR-Spectrometer for Online Plastic Identification

With the Infrared spectrometry (NIR) of the **IoSys** units it is possible to identify **bigger plastic parts** coming from the **household-, engineering electronics areas**. It enables direct analysis of non-dark-colored plastic parts and other materials like **carpets** and **textiles**.



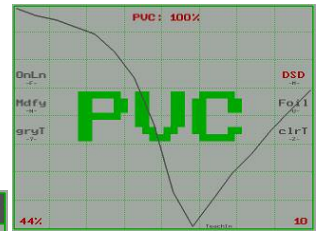
The **basic principle** of the method is the diffuse near infrared reflection spectroscopy whereby characteristic absorption behaviors of different polymer types are used in that spectral region. The polymer sample is radiated with a infrared light and the reflected light of the measuring place is analyzed using a near infrared detector array.

For **plastic identification** the samples are quickly transported - e.g. using a conveyor belt - below the optical focus lens. The light focus (ca. 4 cm) of the movable NIR light source can be adjusted for distances from 30 to 60 cm. The identification result is also generated by an integrated **relay-interface board** as an output signal for sorting systems. Polymer types and the corresponding relay positions can be set individually. A 9-pole-SUB-D connector allows individual cable wiring. The online result additionally can be shown on an external VGA screen too. The portable device includes the optical NIR-system and the computer, which controls and evaluates the identification process. The power supplies are mounted outside to enable individual cable wiring (e.g. parallel operation). This design enables to set up several sIRoCube units side by side, allowing to cover the whole width of a conveyor belt. Parameter settings like the selection of detection models can be set by an external keyboard or by the integrated LCD-touchscreen. Additional connections like an USB-interface allow external data transfer.



As an **optional feature** a LED array visualizing the identification result is available (dimensions in mm: 270 x 270 x 100, weight: 2 kg, power supply: 100-230 VAC, 50/60 Hz).

Identification of different plastic types is the result of a trained pattern recognition. After the measurement of the plastic sample the optical information (absorption bands of overtone- and combination vibrations) are processed by a neural network. The result of the calculation is a list of the most probable polymer type identified within a probability of 0 and 100%.



The software allows detailed spectra viewing, loading, saving and editing. Different measuring parameters like the possibility to display the resulting spectra easily allow to develop

own applications. Also up to **7 pre-set polymer types** can be counted with corresponding **external signal generation**.

With the **sIRoCube** (16 Pixel) it is possible to identify relevant plastics within few milliseconds **independently of surface structure** and **contamination** as following:

PP, PE, PS, PET and PVC

- ✓ **Identification of household and packaging plastic**
- ✓ **Contact-free and non-destructing measurements**
- ✓ **Measuring time within a few milliseconds**
- ✓ **Sample distance up to 60 cm**
- ✓ **Online setup for conveyer belt application**
- ✓ **Detailed spectra overview for easy evaluation**
- ✓ **Combination of several sIRoCube units possible**
- ✓ **7 programmable separate outputs for signal generation**

According to different demands in recycling matters, customers can arrange to have the **system calibrated for special applications** (e.g. **PA, ABS, PPO, SAN, PC+PET, PC, PC+ABS, PBT, PMMA, POM and ABS+PVC**).



As modular system **sIRoSort**, several sIRoCubes can be combined in parallel, equipped with a controlled pressured-air ejection array to eliminate unwanted plastic types (e.g. PVC) like for the **separation of PET bottles**. The unit with adjustable feeding funnel and a roll-on cart is simply placed under a conveyor belt which transports the input feed of mixed plastics.