sIRo – stationary Infra-Red optic for Identifying Plastics
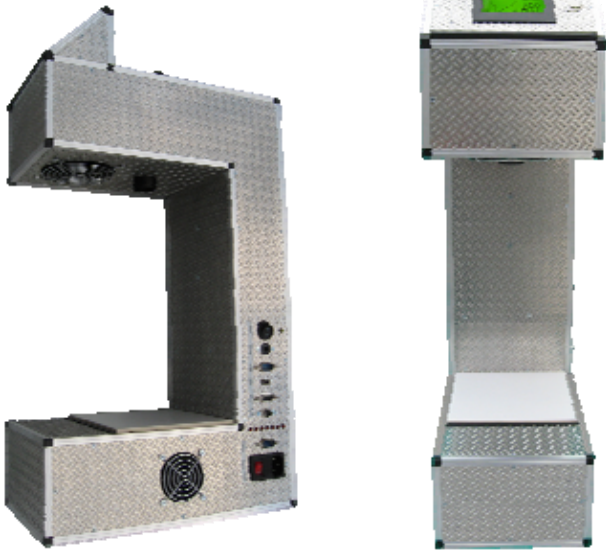
High level material plastic recycling demands that plastic materials must be **sorted** according to **various types** *IoSys - Dr. Timur Seidel e.K.* has taken part in solving the problem. A **stationary but flexible Infra-Red optic** was developed by IoSys It will help to make further amounts of waste polymers available for re-use.

With the technique of the so-called near Infrared spectrometry (NIR) it is possible to identify plastics coming from the household-, engineering electronics and automotive application fields. It allows direct analysis of non-dark-colored plastic parts (**films, foils, bottles, granules, solid, foamed)** 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 sample is simply placed through the open U-shape (30 cm) of the unit below the light source and the measuring head. The identified polymer is shown on the LCD-touchdisplay. 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 easy cable wiring. Furthermore the result can be shown on a VGA screen. The device includes the optical NIR-system, the power supplies and the computer, which controls and evaluates the identification process. Parameter settings like model selection can be set by an external keyboard and by the integrated the 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. (dimension in mm: 590 x 170 x 320, weight: 6 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. The setting of different measuring parameters as so as the possibility to display the resulting spectra easily allows to develop own applications.
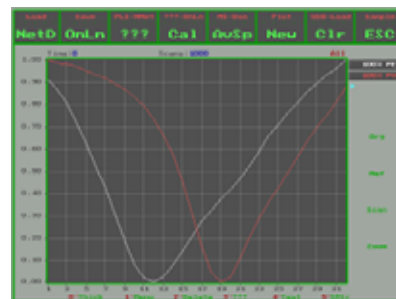
Furthermore up to **7 pre-set polymer types** can be counted with corresponding **external signal generation**.

With the **sIRo** it is possible **independently of surface, structure** and **contamination** to identify relevant plastics as following:

PA6/PA66, PA12, PE, PP, ABS, PS, PPO, SAN, PC+PET, PC, PC+ABS, PBT, PET, PMMA, POM, ABS+PVC and PVC

- ✓ **Identification of plastics from household-, packaging and engineering/electronics waste**
- ✓ **Contactless and non-destroying measurements**
- ✓ **Application like incoming material inspection**
- ✓ **Detailed spectra overview for easy evaluation**
- ✓ **8 additional materials/spectra can be added**
- ✓ **7 separated outputs for signal generator**

According to different demands in recycling matters, customers can arrange to have the system calibrated using their own samples (e.g. foils: **PP, PE, PS, PET, PVC, PLA, Cellulose, Multilayers**).