

mIRoSpark2.0

Combined Device for Polymer type identification – also for black parts, fire retardants and additives

A combination of a **NIR-Infrared spectrometer (mIRo-part)** and a patented **sliding spark atomic emission spectrometer (Spark-part)** is now combining the benefits of both analysis methods technologies in one portable unit!



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



The basic principle of the **Sliding Spark technology** is the thermal vaporization of a small amount of the plastic surface using a train of defined high-current sliding sparks between the electrode gap within ~1sec. The polymer- and additive-components in the spark plasma are vaporized, atomized, ionized and activated to emit spectral characteristic VIS/UV-light radiations.

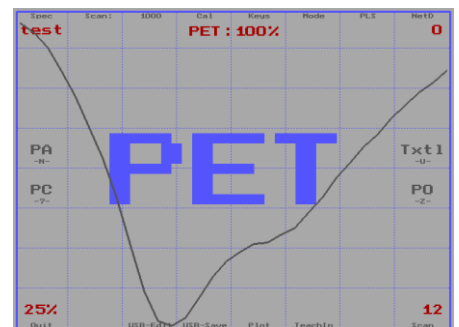
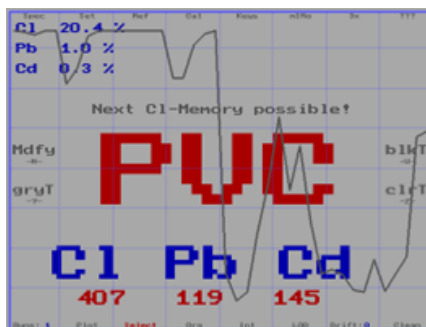


With this technology combination practically all common types of plastics, regardless of color, size, structure like films, foils, granules, solid, carpets and textiles can be identified with additive elements like fire retardants and heavy metals.



For plastic identification one of the measuring pistols is simply pressed on to the sample surface. The analysis begins by pressing the start trigger of the pistol grip. After one second an integrated color TFT-screen displays the recognized polymer. The measuring pistols each are connected to the instrument with a 2 m cable and protective hose. The optical signals are transported via fiber cable to the spectrometer systems. Parameter settings as well as control can be effected by an integrated touchscreen.

An integrated Mini-Plotter prints out the result. An USB-interface allows the data transfer/export.



Following polymer types and carpets/textiles are in the database:

- PA6/PA66 * PA12 * PE * PP * PS * ABS * PPO * SAN * PET * PBT *
- PMMA * PC * POM * PVC * Cellulose * PLA
- Blends of: PC+ABS * PC+PET * PVC+ABS
- Foil/Films-Multilayers: PE+PET * PE+PA * PP+PET
- Textiles/carpets: PA * PP * Polyester * Cotton * Polycotton *
- Acrylic * Silk * Wool * Acetate

Following significant elements can be detected:

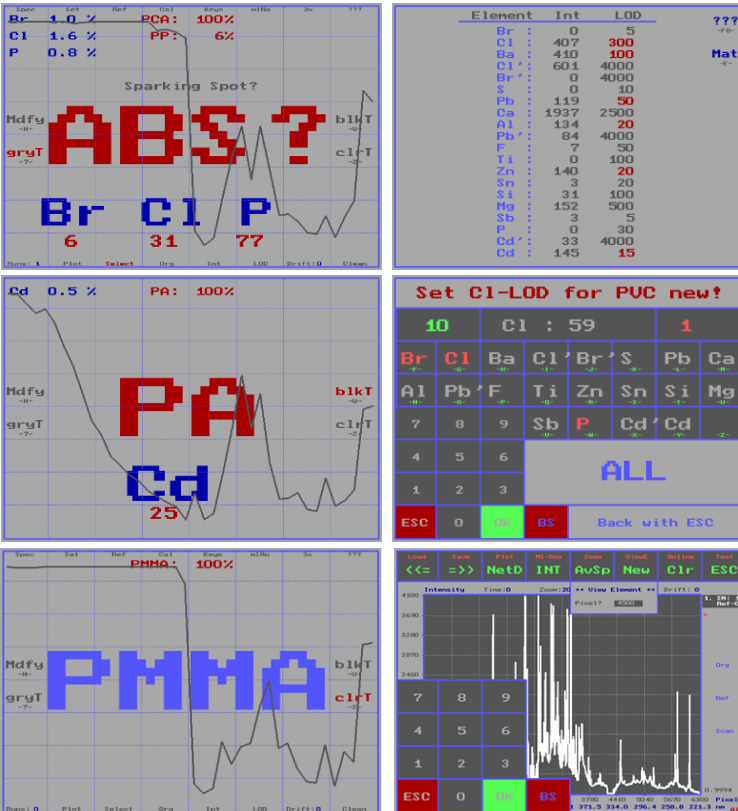
Bromine, Chlorine, Fluorine, Phosphorus, Lead, Cadmium, etc.



The **identification of different plastic types** for both spectrometers is the result of a trained pattern recognition with a specially developed **neural network models** inside a database with several counter-checking. The result of the calculation (ai) is a list of the most probable polymer types identified within a **probability between 0 and 100%**.

Also a trained comparison is used due to gained experiences because plastics have no norms and standardizations compared to metals!

Additive detection is performed by the characteristic atomic emission for an element of the additives in the optical spectra. The **intensities of defined spectral lines** are compared with preset threshold values. An element is detected if the preset threshold value is exceeded. After calibration with known samples, the system enables **semi-quantitative analysis of inorganic contents in the sub-% concentration range of down to 0.1% !**



- * Identification of plastics from household- and electronics waste as well as carpets and textiles
- * On site analysis e.g. in disassembling areas
- * Identification of black plastics with the Spark-part
- * Detection of significant halogen-containing fire retardants and heavy metal containing additives
- * non-destructing measurement with the miRo-part
- * Less than 1 sec. measuring time
- * Measurement of foils and granulates possible
- * Detailed spectra overview for easy evaluation
- * 8 additional materials/spectra can be added
- * Printout of the identification result with the integrated mini-plotter



According to different demands in recycling matters, customers can arrange to have the system calibrated using their own samples. The software allows detailed spectra viewing, loading, saving and comparing. This possibility helps to develop own measuring applications besides the standard ranges.

Technical Data:

- * Power Supply: 100, 115, 230 VAC, 50/60 Hz
- * Dimension: 364 x 200 x 376 mm
- * Weight: 14 kg

For the analysis sample preparation using the Spark-part, it is advisable to remove dust and dirt or paintings. The sample surface can be easily cleaned by scratching with a knife.



For easy transportation of the device there is a bar-handle. Both pistols are inserted in side holders and the gray conduit cables are fixed in their clips at the left and at the right side.

