# NIR Spectroscopy Systems
for the revolutionary industrial analysis method

LABORCHEMIE

NIR spectroscopy has established itself during the last years as one of the most important tools of modern industrial analysis, especially online and inline analysis. Reasons that it yields essentially real time results, is reagentless and non destructive and informs about model compliance. Nevertheless it is so new, that its basics are not yet tought at universities. Therefore knowledge of this technology has to be brought to markets by instrument suppliers, international conferences and consulting firms. NIR is a correlative technique, which means that instruments are calibrated against existing lab methods or slow online methods. Sample presentations include transmission cells, reflection and transflection probes, "free space" distant reflection, interactance, ATR and others. Depending on the required information we have a choice of different spectrometers with wavelength ranges from NNIR to mid-IR, resolutions and instrument performances. Choice also depends on payback times possible with the intended solution. Systems are offered complete with sample interface solutions, chemometric modelling plus training and user software.

Chemometric Software

Especially in Reflectance spectroscopy the recorded spectra have to be pretreated before being used for prediction. Smoothing eliminates noise, derivation corrects surface influence, scatter correction reduces different particle size influence. Models are being built by doing PCR, PLS or simple ML Regression. The CAMO Unscrambler is one of the most efficient and sophisticated packages to do data analysis, visual and graphical presentations, regressions, predictions, cross validations, even experimental design and features the OLUP and OLUC modules for automatic predictions.
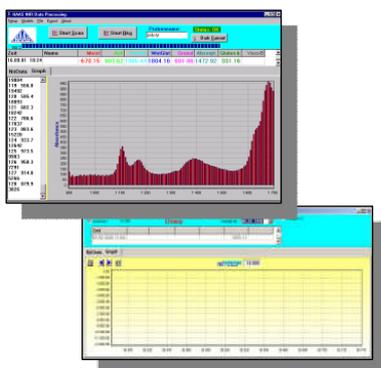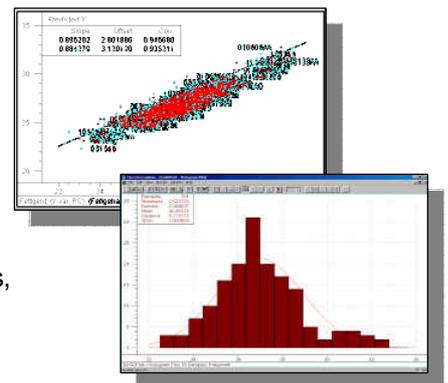
Customer Application Software

Depending on the application and the use in the factory each system is fit with its specific user software. The basic concept ensures, that each instrument deliveres its spectrum in ASCII readable form to the data station where through chemometric models prediction is performed, spectra are recorded for inspection, multi channel trend charts displayed. Various software surfaces exist to meet operational and security needs as required. Data are stored, log files created, output signals delivered for process control. If required, full validation documentation is supplied.

Flow Cells and Fiber Optic Probes

Corresponding to the various modes of measurements there are both optibus and fiber optic bound flow cells and probes: transmission and transflectance (light is reflected from an inert surface giving double path length) in case of liquid samples, diffuse reflection and interactance (light entry and exit are separated to ensure certain entry depth) when dealing with solid or pastous samples, in certain cases ATR probes made from special materials are used.
Probes come for high temperature use and withstanding high process pressures already mounted onto standard industrial flanges, even fiber coupled solutions above conveyor belts and within extruders.

Multiplexers

In cases where an expensive instrument is supposed to process data from several sources, signals from the spectrometer to several flow cells (up to 16 channels) or probes – even reflecton spheres – are multiplexed and led back to the same detector with little energy loss.

Low cost NIR spectrometer

Fiber optic based, Czerny-Turner design, InGaAs detector array With 256 pixel resolution in the 1000 to 1750 range. Light is brought into the system using a light fiber with SMA905 Coupler, data output and control via USB 2.0 high speed interface. This enables the use of light fiber based probes and spectroscopy tools such as reflection probes, integration spheres, flow cells, etc. Using external ASCII models for result prediction

512 pixel Diode Array Spectrometer

Different versions available: High resolution system with 512 pixel TE-cooled Diode Array or 256 pixel instrument with extended wavelenght range from 1100 to 2200nm (for measurement of carbohydrates). High wavelength accuracy and low noise level. USB interface, 230VAC power supply

NIR Reflectance Spectralyzer

Is the ideal and cost efficient analyzer for at line or laboratory NIR analysis. Powder or pastous samples are presented on a turning sampler below the illumination head, light is collected by light fibers and the spectrum collected on a 128 or 256 pixel InGaAs detector array. The "production floor" user software runs on a separate PC used for instrument quality control and uses externally built models to predict and document quality of produced goods.

Portable AOTF Spectrometer

Dual beam reflectance type instrument, extreme speed at 16000 measurement points per second. Various wavelenght ranges. Different attachments: solid dip in with sapphire ball, liquid probe with selectable pathlength, Laboratory stand with rotating cup. Battery or mains operated, ethernet connection;
Optional: direct display on optical module
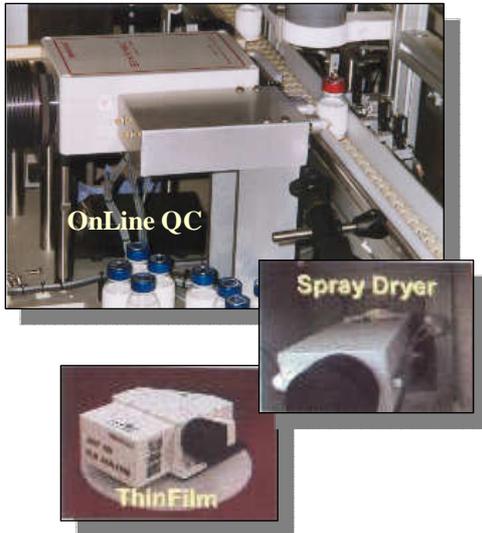
OnLine Free Space Analyzer

AOTF (acousto optic tunable filter) is the fastest dispersive spectroscopic sytem available, collecting up to 16000 spectral data points per second. This speed allows adding many scans to form spectra yielding both extremely good signal/noise and representative results even from inhomogenous samples. Brimrose offers a complete line of truly revolutionary process analyzers using all solid state technology with no moving parts. Instruments have embedded industrial solid state PCs and communicate via ethernet using TCP/IP protocol. Different spectral ranges go from 650 nm into the mid-IR, TE cooled detectors, photometric range up to 3.5A.U., 16bit ADC. Optional is the high precision multiplexer, allowing almost simultainous monitoring of up to 16 channels - both in transmission and/or reflection modes.

OnLine Industrial FT-Analyzer

based on industrial quality the Analect/Orbital line of industrial FT-midIR and FT-NIR systems feature independent electronic and sample enclosures and therefore can be used in hazardous environments. Different spectrometers with various detectors cover the NIR to mid-IR range, optibus or fiber optics can be used with all kinds of sample interfaces. An automatic sampling conditioning and outlier capture unit is available and permits fully automatic and unattended operation. CPSA software ensures extreme stability of chemometric models. Multi stream systems with up to 12 parameters per stream are possible. Precision is high enough to permit calibrations to be developed on same type lab instrument and transferred. Common applications are found in petrochemical, refining and polymer industries where pay back times of a few months can be found. Instruments eqipped with gas cells are used for work area safety control.