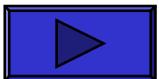


Spectral Sensors



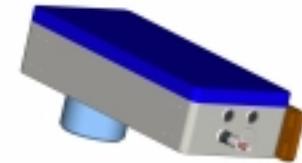
CORONA - The compact sensor unit for universal use



Spectral Sensors



- **CORONA** is a compact application-oriented diode array sensor unit based on well-proven and innovated units like MMS1, MMS NIR, OMK500, OFR und TSPEC electronic unit
- Rugged and reliable optical and electronic units permit use in production control, on-line quality control, mobile applications and even mounted on agricultural harvesting machines.
- **CORONA** is the first industrial proof spectral sensor unit allowing spectral scans between 360 - 2200 nm in few milliseconds.
- Several versions with application designed measuring optics available
- Interface compatible with ZEISS Diode array system MCS500



CORONA Benefits

CORONA compact - many advantages at a glance:

- **modern diode array technology**
- **Fast, precise and robust**
- **Large wavelength range in milliseconds detectable**
- **Permanently aligned due to no moving parts**
- **Reflection and Transmission measurement possible**
- **easy and fast installation**
- **Large software package from color measurement until chemometric algorithms**



CORONA Highlights

■ Compact, application oriented sensor unit

- based on reliable, proven and innovative moduls from ZEISS like
- MMS1, MMS NIR, OMK500 and TSPEC

■ Robust optical and electronical components

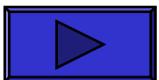
- guarantee reliable application in production, in-line spectroscopy, agricultural equipment
- and quality control

■ CORONA is the first in-line reflections/transmissions measuring head,

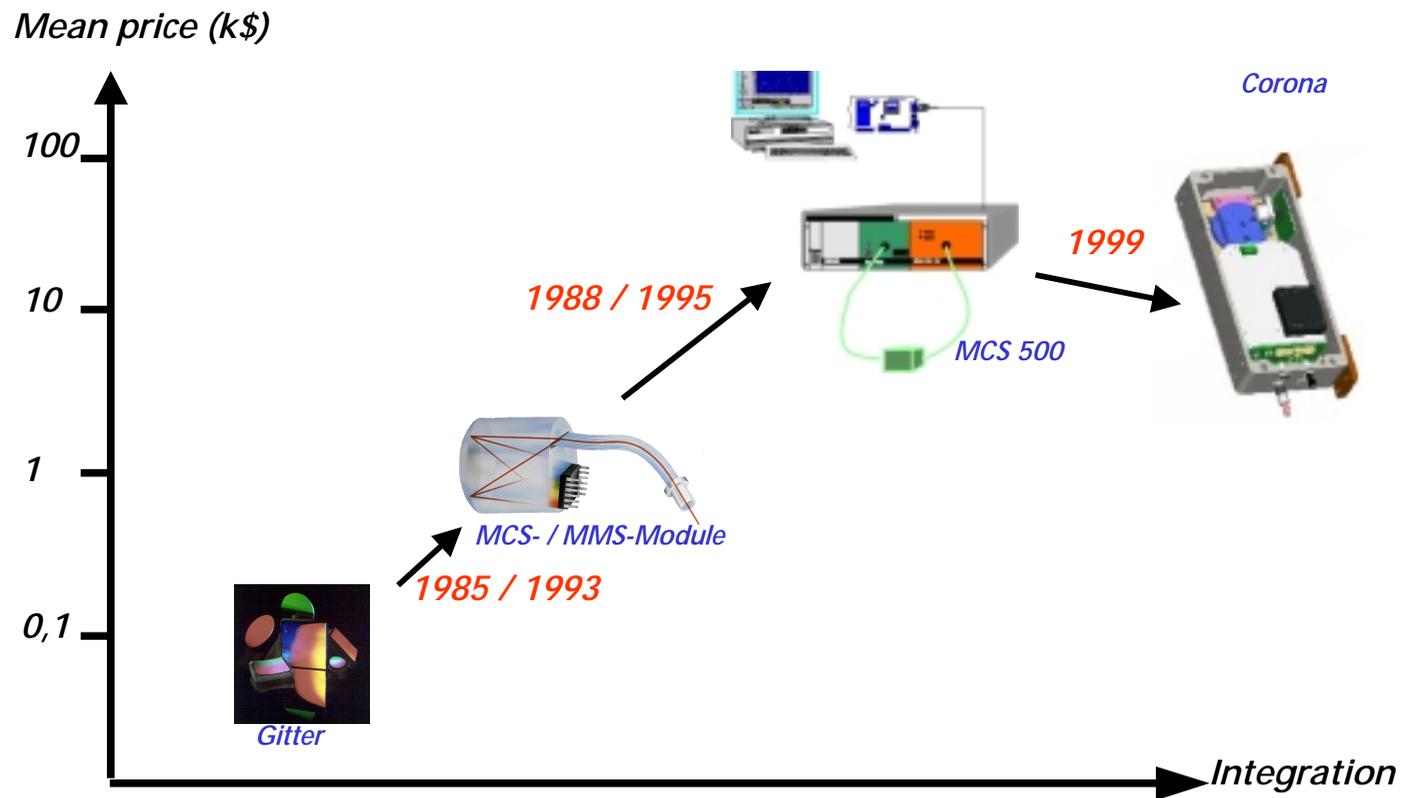
- which allows simultaneous measurement in the VIS- and NIR-range within milliseconds

■ New applications like the combination of color **and** moisture measurement

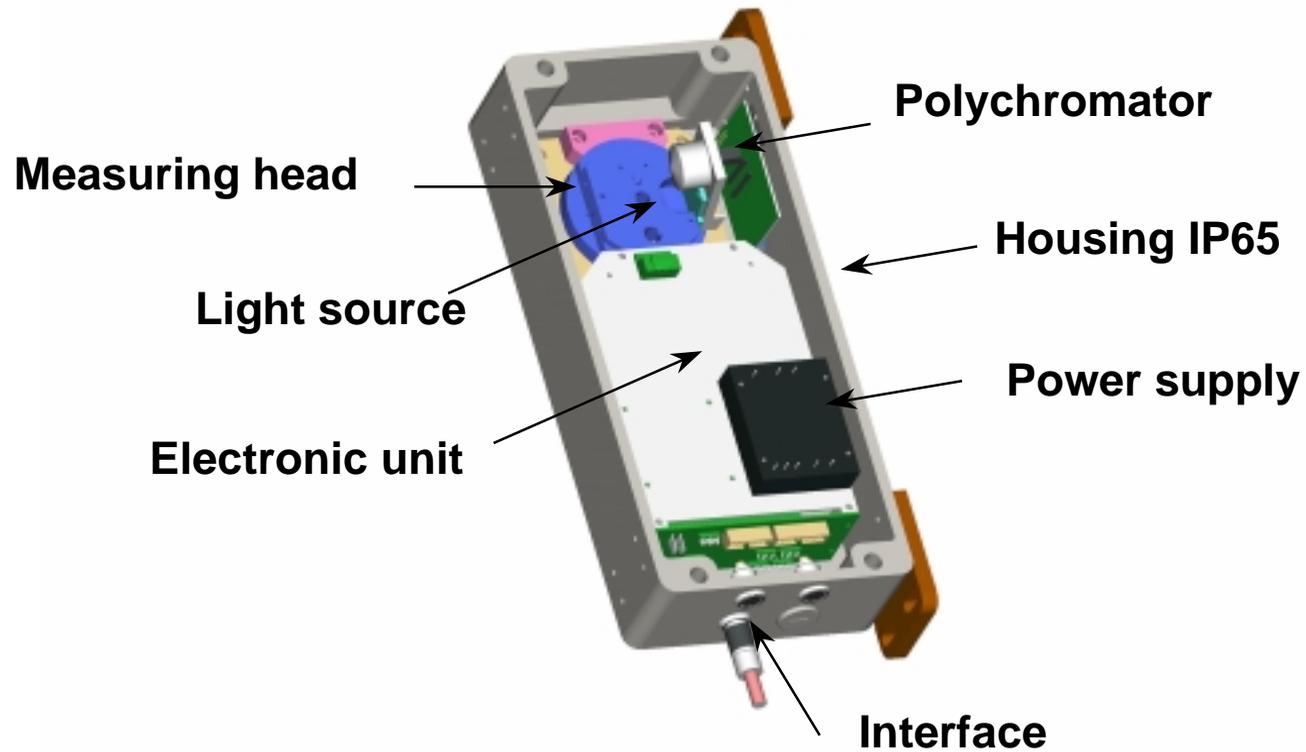
- in the textile industry
- during harvesting of corn



CORONA Family Tree



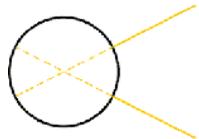
CORONA Components



Spectral Sensors



The standard of all things: Precision to the smallest detail



Light source

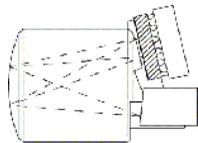
- Halogen lamp , 10W,
- Colour temperature 2900 K

Electronics

- 16 Bit resolution
- 200 kHz measuring frequency
- integrated microprocessor

Interface

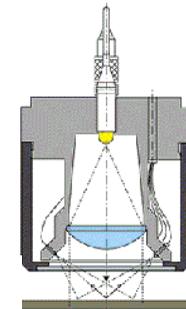
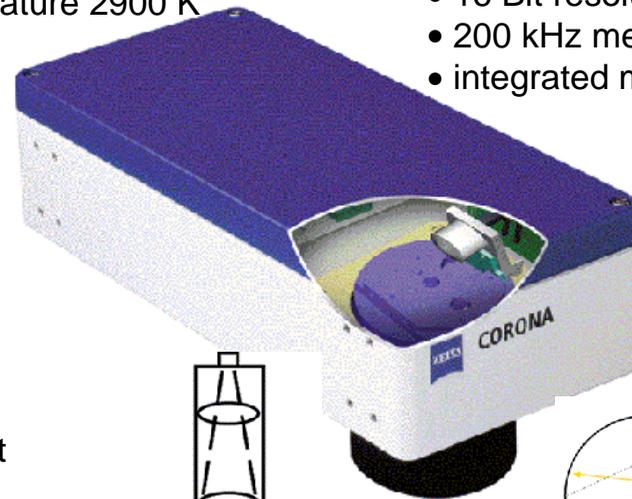
- RS 422
- RS 485
- RS 232



Polychromator

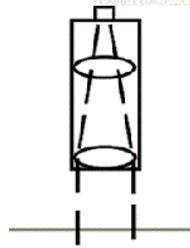
The module consists of a spectral measuring body, bonded with a concave grating that corrects aberrations, a fibre cross-section converter as an optical input and a diode array detector.

- Compact, permanently aligned design
- Robust and thermally stable
- Small
- High degree of light sensitivity



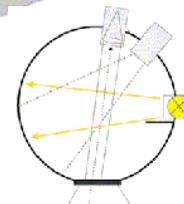
OMK

Measurement of diffuse reflection.
Lighting 0°
Observation 45° circular
Effective measuring area 20 mm



Reflection/transmission optics

Projection 1:1
Measuring area 3mm
Projection 1: infinite
Measuring area 15 mm



Reflectance sphere

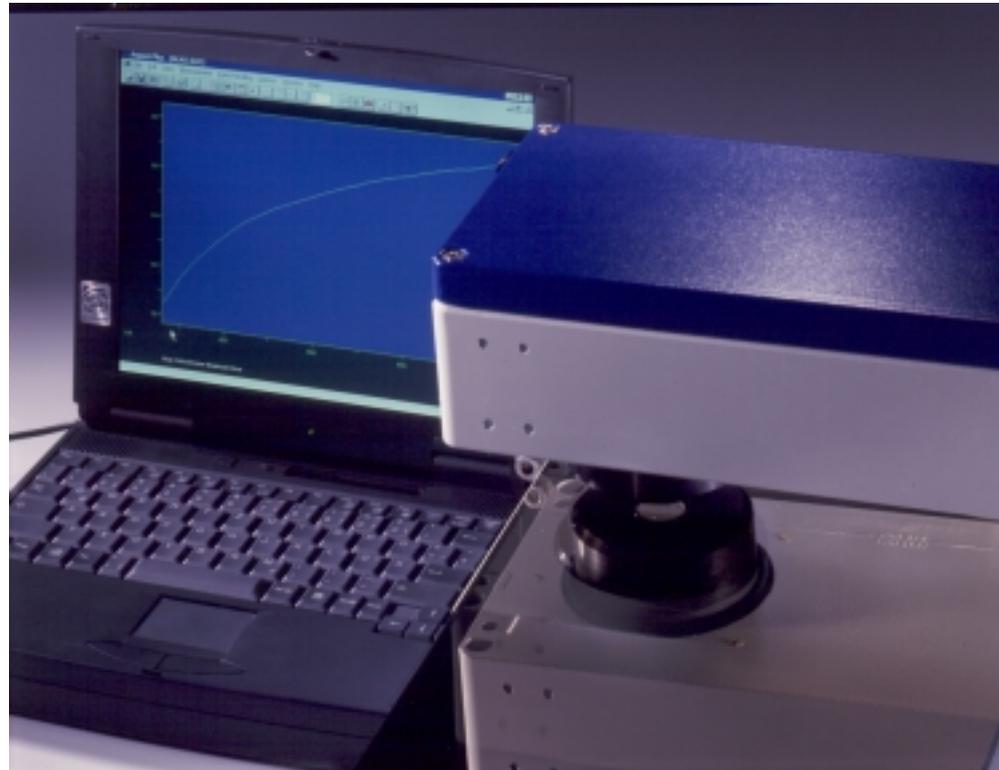
Lighting diffuse
Observation 0° or 8°
Diameter of sphere \varnothing 55 mm
Effective measuring area \varnothing 15 mm



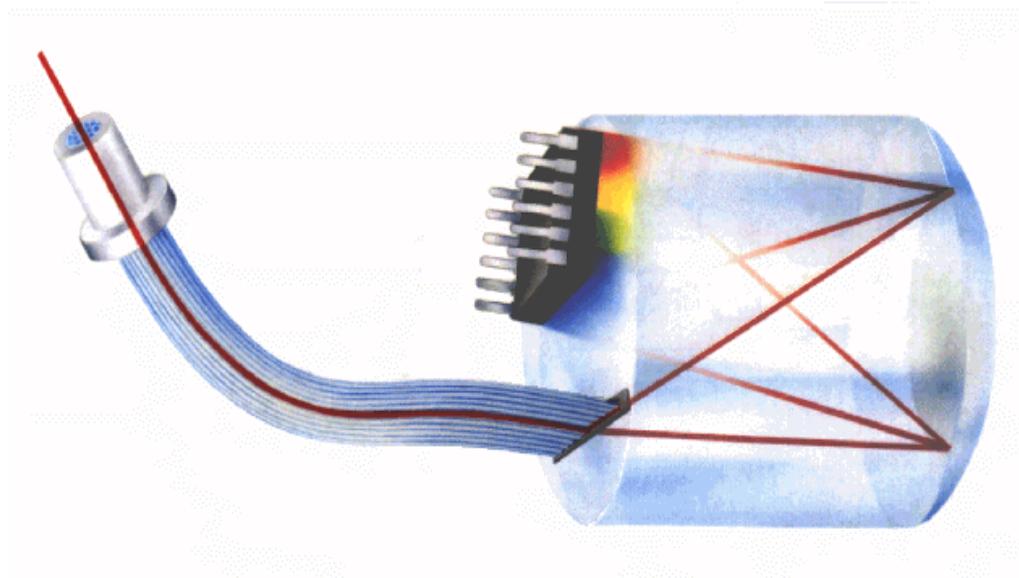
Spectral Sensors



Configuration example for transmission measurement



MMS Design Principles



- Fiber cross-section converter as optical input, SMA connector
- Holographically recorded and blazed imaging grating
- Photodiode Read-out
- Robust housing, no moving parts



Spectral Sensors



CORONA Family

Model	Wavelength range	Measuring geometry	Application
CORONA 45 VIS	380-1050 nm	Reflexion	Color
CORONA 45 NIR	950-1700 nm	Reflexion	moisture protein fat dry substance
CORONA 45 VISNIR	380-1700 nm	Reflexion	color + moisture
CORONA D VIS	380-1050 nm	Reflexion	Reflection of Coated foils
CORONA D VISNIR	380-1700 nm	Reflexion	Reflection of Coated foils
CORONA T VIS	380-1050 nm	Transmission	Transmission
CORONA T VISNIR	380-1700 nm	Transmission	Transmission
CORONA TF VIS	380-1050 nm	Reflexion/Transmission	Reflection / Transmission
CORONA TF VISNIR	380-1700 nm	Reflexion/Transmission	Reflection / Transmission
CORONA FOCUS	380-1050 nm	Reflexion	Reflexion

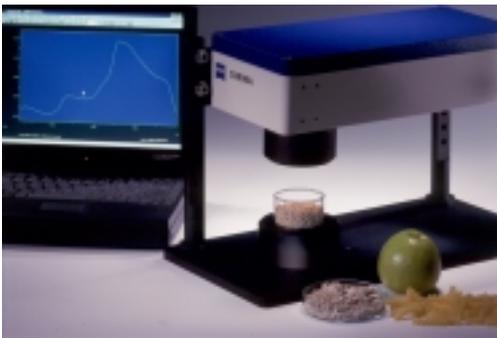


Applications CORONA

- Combine harvester with diode array sensor (VIS-NIR)
- Measurement of moisture, protein, color, oil, ...



Applications CORONA

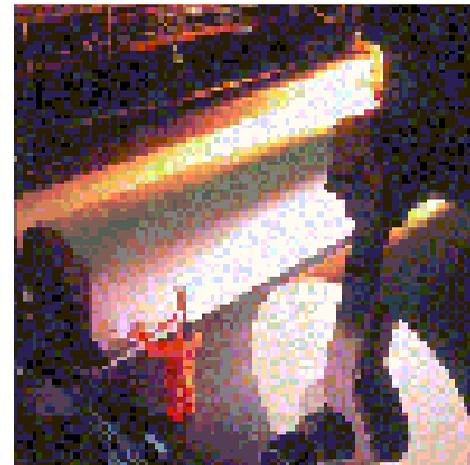


Investigation of foods

- Determination of fat, starch and proteins in food
- Detection of the moisture of products
- Monitoring of drying processes
- Incoming inspection of powder-based products such as flour or milk powder

Measuring running conveyor belts

- Determination of moisture and colour in paper manufacture
- On-line colour of textile and plastic lines
- Determination of colour and heat protection degree of architectural glass
- Measurement of layer thickness of foils



Applications CORONA



Optical industry

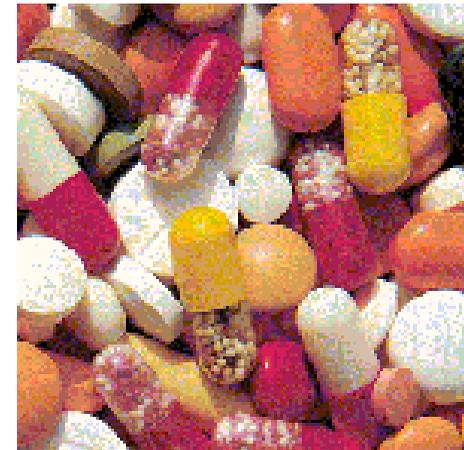
- Reflection and transmission properties of coated glass
- Colour properties of optical coatings

Plastics technology

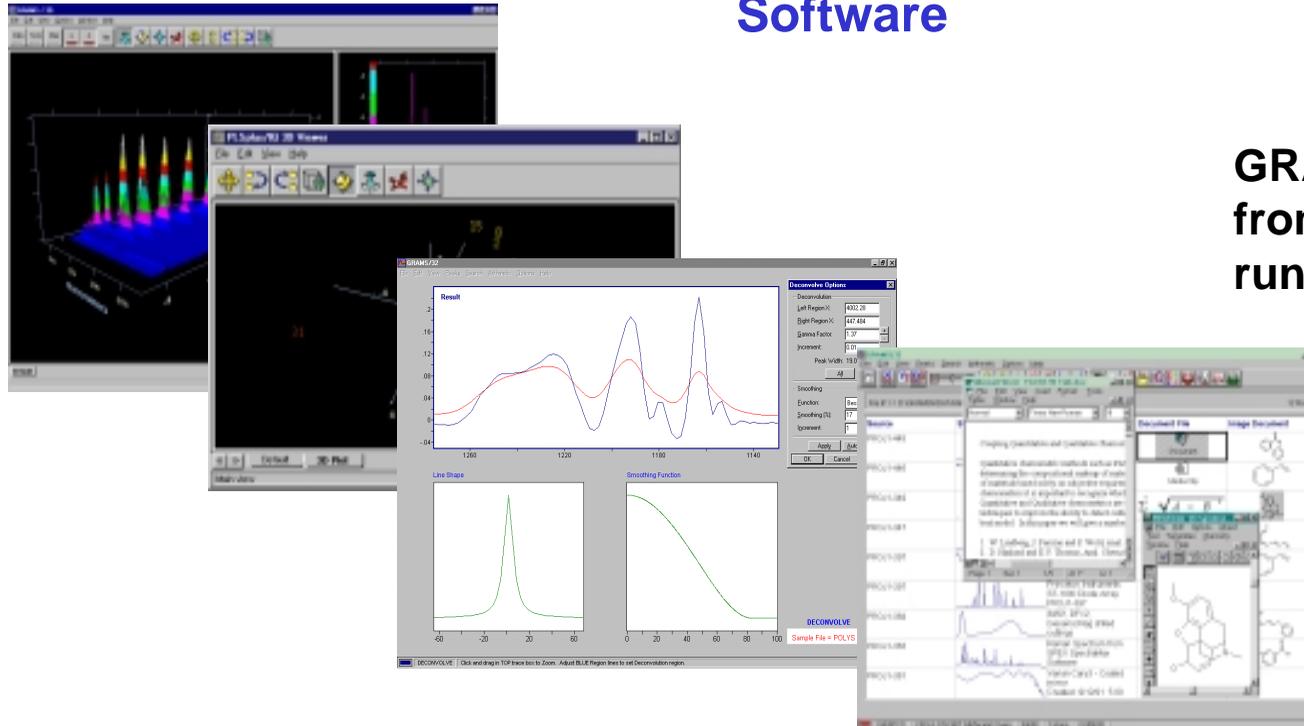
- Identification of plastics
- Colour of plastic lines or components
- Specification of layer thickness of transparent coatings

Pharmaceutical industry

- Identification of raw materials
- Powder blending



Software



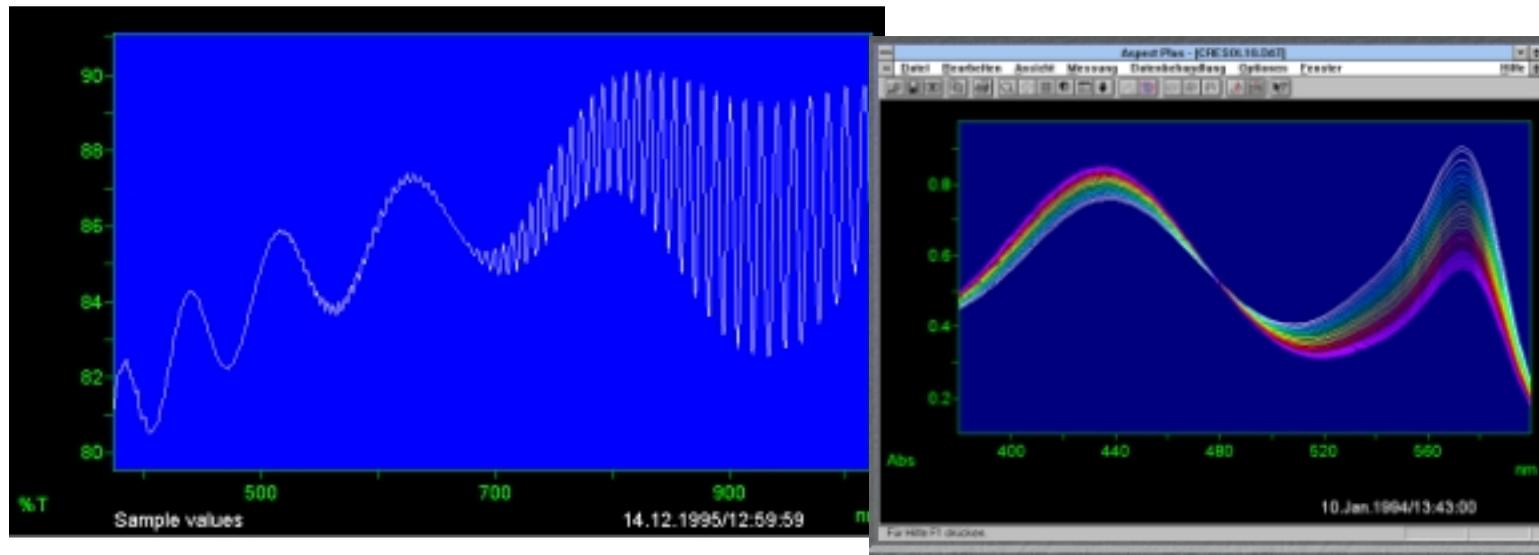
GRAMS 32
from Galactic
running with CORONA

- Detection of spectral ranges and data processing
- Macro programming
- UV/VIS/NIR application package
- 3D visualisation
- Chemometric routines for the creation of calibration models
- Library administration



Software

ASPECT PLUS The ZEISS standard package for Spectroscopy



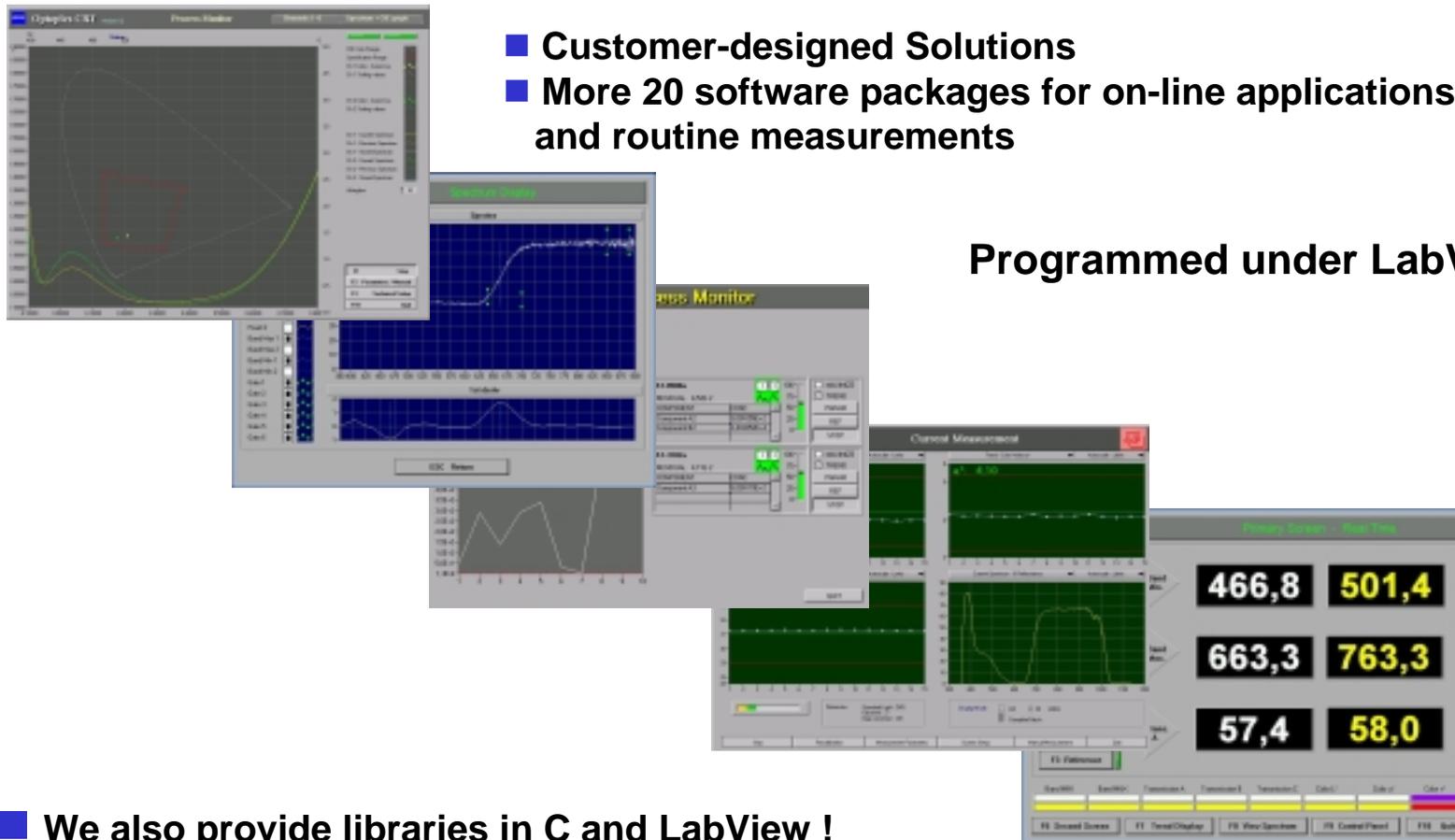
- Macro programming for the creation of automated sequences
- Multi-component analysis
- Extensive mathematical functions
- Options for colour and calculation of layer thickness
- Data export to ASCII, JCAMP, GRAMS formats



Software

- Customer-designed Solutions
- More 20 software packages for on-line applications and routine measurements

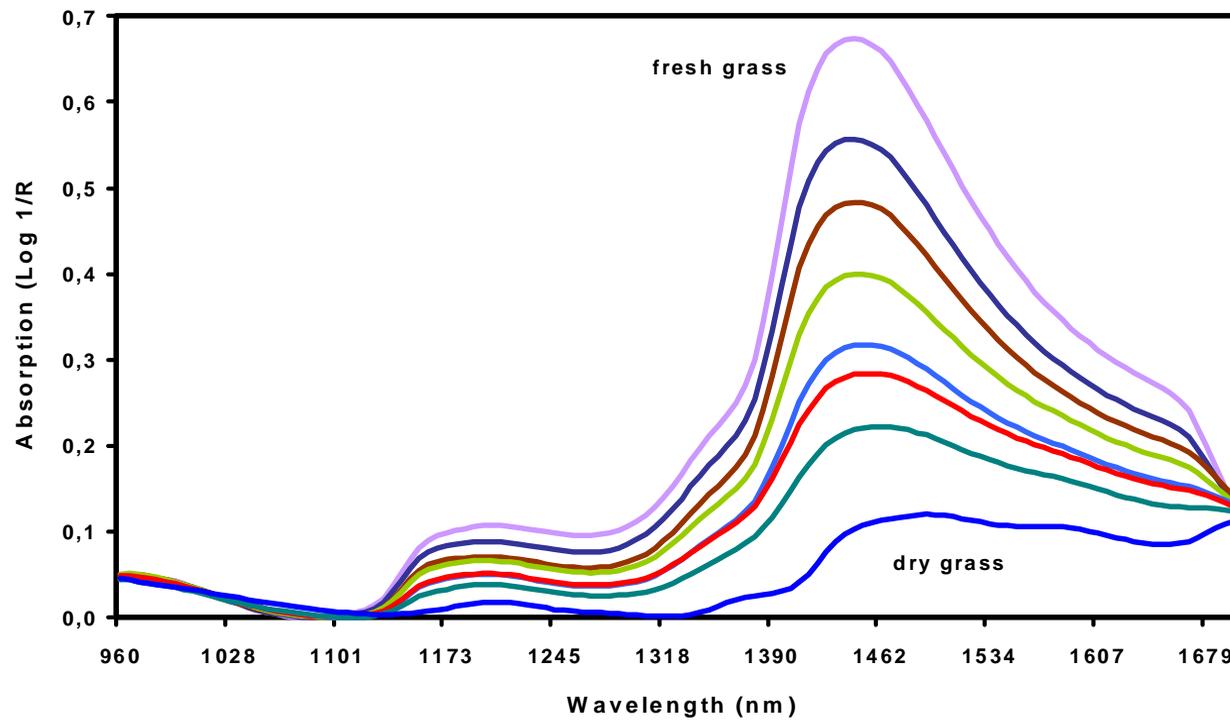
Programmed under LabView from NI



- We also provide libraries in C and LabView !



Spectra of Fresh Grass with Different Dry Matter on the ZEISS CORONA (MMS-NIR 1.7)





Calibration Comparison of Dry Samples on the NIRSystems (scanning) and the ZEISS (Diode array)

Equalized Wavelength Range 958-1678 nm			NIRSystems 6500		ZEISS MMS-NIR	
Constituent	n (6500/MMS)	Range (%)	Terms	SE	Terms	SE
Dry Matter	94 / 97	93,8 - 98,7	5	0,43	7	0,46
Crude Protein	92 / 94	8,7 - 23,7	8	0,52	8	0,57
Crude Ash	65 / 64	7,6 - 12,6	6	0,61	5	0,67
Crude Fibre	94 / 94	16,7 - 34,1	8	0,99	8	1,22
WSC	194 / 193	3,3 - 15,5	12	0,63	10	0,87
EULOS	93 / 93	116,5 - 388,3	8	15,99	8	19,21