Bruker Optics

MATRIX-MF with a diamond ATR probe (patented)

The MATRIX-MF is based on the award winning MATRIX design and concept. It is the FT-IR version (mid IR) of the proven MATRIX-F FT-NIR spectrometer (near IR). The MATRIX-MF was designed for solving tasks in the chemical research laboratory, pilot plants and in process. It is a compact and rugged analytical device for fiber coupled measurements inside a reactor.

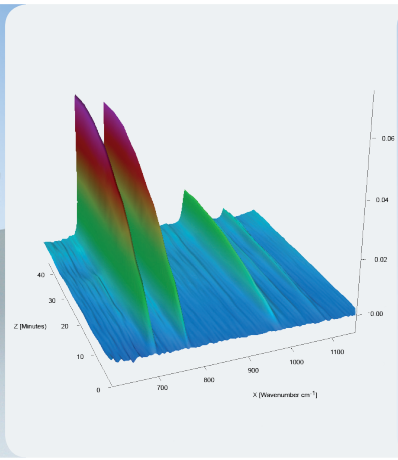
- Accurate in-line results in seconds
- Non-destructive analysis
- Multiple components per measurement
- Built-in 6-port multiplexer
- High resolution
- Rugged and insensitive to vibrations
- Ethernet connectivity and industry standard communication protocols.

The MATRIX-MF top quality components offer best signal averaging, high performance and a small foot-print to deal with challenging applications where ever they come up. State of the art optics for outstanding sensitivity and stability, combined with the proven MATRIX-F design provides high quality results, a new look into reaction details by mid-IR informative spectra collection. Full support of industry standard communication makes even the integration in a process environment simple. Bruker Optics innovative Quick connector design (BQC) is the easy and simple way of exchanging fiber optics with really reproducible results. The BQC-adapter is Bruker Optics answer for a rugged fiber optics connection to fullfill not only the daily laboratory, but also the process needs. The MATRIX-MF widens the proved MATRIX -F, -I, and -E line and adds the informative MIR fingerprint region to process control.

Maintenance

The MATRIX-MF was designed for reliability and easy maintenance. Individual consumable components are on pre-aligned mounts and can be quickly exchanged by the user without any realignment of the optics.

6-port Multiplexer with Bruker Quick connectors (BQC)



3D representation of increasing trans-stilbene concentration

Diamond ATR Probe head

On-line diagnostics monitor the performance of the electronics and consumable items and advise the user of a failing component. The instrument can be serviced quickly for minimal disruption of the manufacturing process.

Instrument Performance Validation

At a click of a button the proper operation of the entire system can be assured. The MATRIX-MF comes equipped with an automated filter wheel which houses standard materials and filters for testing instrument performance. The OVP (OPUS Validation Program) software executes a series of performance tests using the standards in the filter wheel. This program evaluates the instrument performance and determines if the instrument is operating within specifications - the precondition for applications in the pharmaceutical industry.

Connectivity

The OPUS/PROCESS software offers an industry standard interface (OPC) which allows OPUS to be integrated in any process control environment, using a wide range of standard communication interfaces and protocols, including:

- TTL
- RS-232
- RS-485
- 4-20mA
- Modbus
- ProfibusDP
- Ethernet
- OPC
- DDE

MIR fiber probes

ATR (attenuated total refection) is a very common technique for infrared spectroscopy. First mentioned by N.J. Harrick(1) in 1960 the success of the technique was limited until the 1990ties. With the availability of high sensitive FT-IR spectrometers in combination with single bounce micro ATR units, to measure the IR-spectrum of even any kind of material was made it a child's play. This innovative technique is limited by its use in the sample compartment of the spectrometer and therefore the sample itself has to be placed into the spectrometer. Light guiding fibers are the solution to handle probe heads flexible and to run the measurement even in a laboratory reaction bulb. The IN350-T combines a two reflection diamond ATR probe head with the excellent performance of MIR-silver halide fibers. Standard fiber length is 1.5 m; whereas fiber lengths up to 4.5 m are available.

(1) Phys. Rev. Lett. 4, 224 (1960)

MIR light guiding fibers - the silver halides -

Silver halide fibers are made from AgClBrI solid solutions. The production methods for crystalline silver halide fibers differ fundamentally from those used for fabrication of silica fibers. Core clad silver halide fibers are manufactured by direct or inverse hot extrusion of a composed bullet under compressed condition. Optimized parameter for the fiber extrusion combined with special crystal preparation technologies lead to a significant increase in fiber quality. Optical losses, in former times especially caused by micro voids, silver clusters, colloids and residual impurities are minimized by new technologies. These technologies start from ultra pure silver halide single crystalline material offering nowadays best optical and mechanical properties for polycrystalline silver halide fibers. These silver halide fibers show significantly better mechanical properties than the often used brittle chalcogenide glass fibers. They are more flexible and non-brittle to even liquid nitrogen temperature.Although the theoretical estimations of minimum fundamental optical losses in silver halides are 0.4 to 0.04 dB/km lower than in current silica glass fibers, the nowadays crystalline silver halide material show real optical losses some order of magnitude higher but less than 1 dB/m in the wavelength range from 4µm to 18µm, excellent for use with fiber length up to a few meters.

Laser class 1 product.
Bruker Optics is ISO 9001 certified.

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