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art photonics
broad spectra fiber solutions

NIRaman probe System

Near-infrared (NIR) and Raman spectroscopy are increasingly used to measure process and product characteristics in real-time, as these methods allow fast and non-destructive measurements without sample preparation.

The reason for the high interest in these two methods as process analyzers is their ability to provide universal and multidimensional information.

The interaction of light with molecular vibrations are the basis of these methods. They excite different types of vibrations and thereby are complementary. Molecules producing good signals in NIR spectra can produce weak signals in Raman spectra and vice versa.

Raman and NIR spectra contain qualitative and quantitative information on the chemical composition and physical properties of the substance. Both are able to supply critical product and process information during production.

Fiber-optic probes connected to spectrometers can be integrated directly into the process flows, which allows continuous monitoring during the process.

Multichannel fiber optic probes (patent pending), have been developed by art photonics GmbH in cooperation with Measure Analyze Control. The first commercial version was designed for in situ NIR diffuse reflectance and Raman measurements of solids, powders, or liquids. The unique feature of the probe is that NIR and Raman channels can work simultaneously providing hybrid modelling opportunities that were impossible in the past. The probe shaft is electrical heated to prevent moisture condensation on optical windows.

NIRaman System is compatible with process-interfaces to be cleanable and to enable reaction monitoring in lab, pilot plant and run full automated process control.

Applications:

- ✔ Reaction monitoring in real time
- ✔ Process Analytical Technologies (PAT)
- ✔ Analytical Characterization
- ✔ Biopharmaceutical Analysis

Features:

- ✔ NIR and Raman channels can work simultaneously
- ✔ On-line diffuse reflection spectroscopy
- ✔ High throughput in any part of UV –VIS and VIS-NIR spectra

Probe Shaft

Material: Stainless Steel 1.4435 (316L)
Outer Diameter: 19,0+0/-0,1mm
Length: 170mm

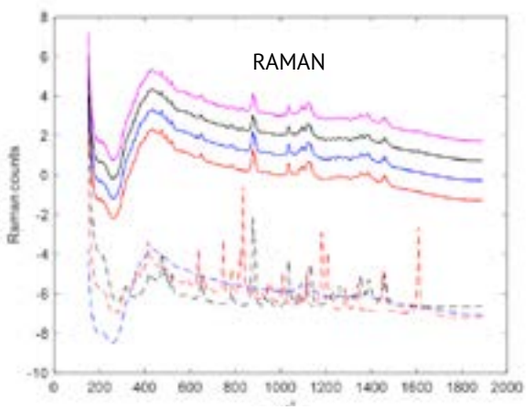
Window: Sapphire or Cubic Zirconia, heated
Glue: Epotek 353ND or similar
Separate NIR and Raman channels

Raman – Channel

Fibers: low OH silica fibers with metal coating to suppress laser induced fluorescence
Laser Wavelength: 785nm
Connector 1: FC (launch fiber - 105µm core)
Connector 2: MTP-Male with 48 x 105µm fibers
Other connectors on request.
Capable to pass USP requirements (tested on Kaiser RXAndor DVA420A-OE and RXn4 Raman-Spectrometer).
Fiber Length: 3+/-0,1m

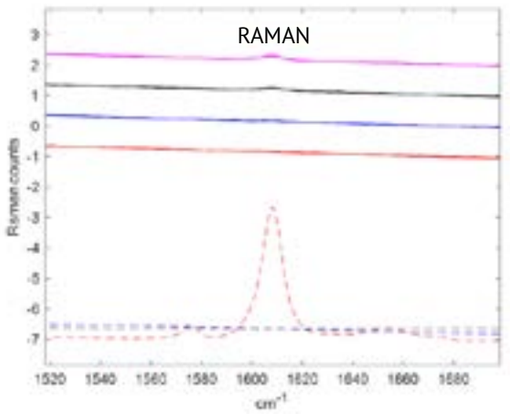
NIR – Channel

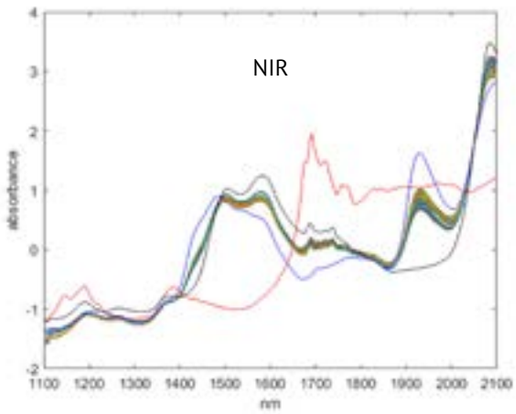
Fibers: low OH silica fibers
Stray Light: less than 1%
Illumination bundle: 32x NIR400/440 NA=0.22
Detection fiber: 1x NIR400/440 NA=0.22
Connector 1: SMA905
Other connectors on request
Connector 2: 5mm ferrule
Capable to pass USP requirements
(tested on Sentronic Sentropat system)



5% Ibuprofen blend;
3% Ibuprofen blend
1% Ibuprofen blend
0.25% Ibuprofen blend

Pure ibuprofen
Pure MCC
Pure mannitol





Ibuprofen blend spectra span from 0.25% to 5% (w/w)
Pure ibuprofen
Pure MCC
Pure mannitol