FT/IR-4X

Fourier Transform Infrared Spectrometer

JASCO

Achievement of downsizing while maintaining research-grade

FT/IR-4X

Fourier Transform Infrared Spectrometer

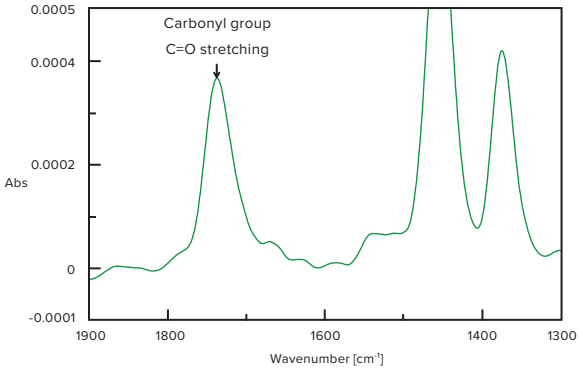
JASCO has its roots in the Institute of Optics - Tokyo University of Education which developed Japan's first infrared spectrophotometer, Model DS-101, in 1954. Since the establishment of the company in 1958, we have inherited the spirit of our predecessors in infrared spectrophotometry and have completed the FT/IR-4X as the culmination of our work. The size is only 386 (W) × 479 (D) mm, and we have also achieved a 30 % reduction in power consumption compared to conventional models. It is research-grade in performance, functionality and expandability, and supports high resolution, high S/N, high sensitivity detectors, extending measurement wavenumber, microscopy with linear array detector, and rapid scan. The sample compartment is 200 mm wide, the same width as that of a large model, and can accommodate conventional accessories, including those from third parties.

Comparison with conventional models (FT/IR-4000 series)

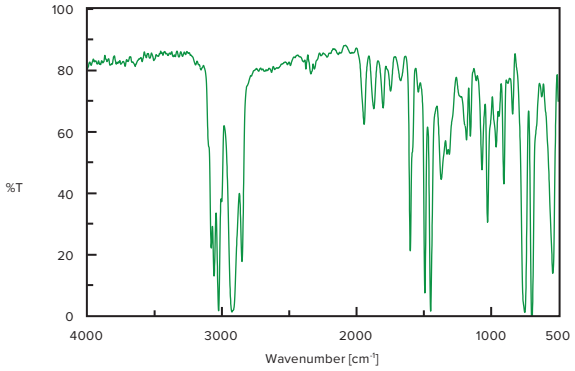
It saves about 40 % of the space in the installation area.

High S/N ratio

A 24-bit A/D converter, a low-noise electrical system, a high-intensity light source, a high-performance detector, and a high-throughput optical system all contribute to a high S/N of 35,000 : 1, enabling to perform small volume samples measurement and microscopy measurement with high sensitivity.



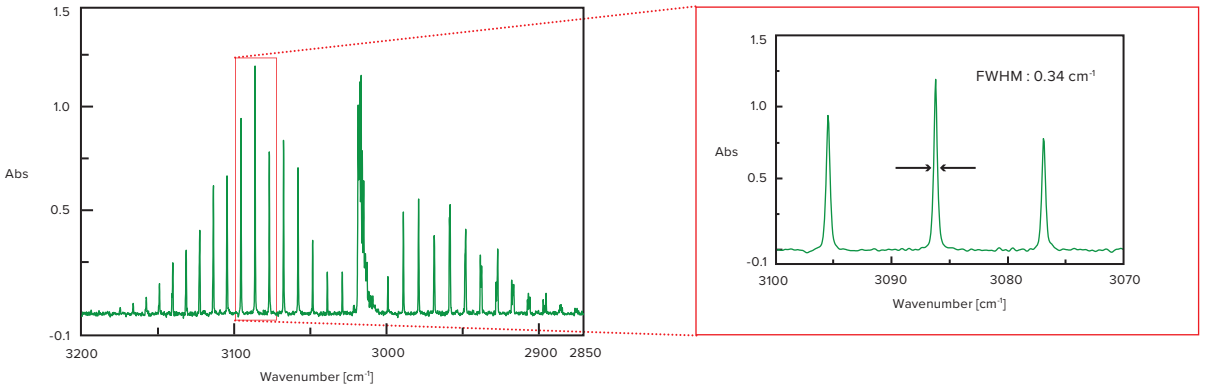
Coating on food packaging wrap film (ATR measurement)



PS film with φ0.5 mm size (Transmittance measurement)

High resolution

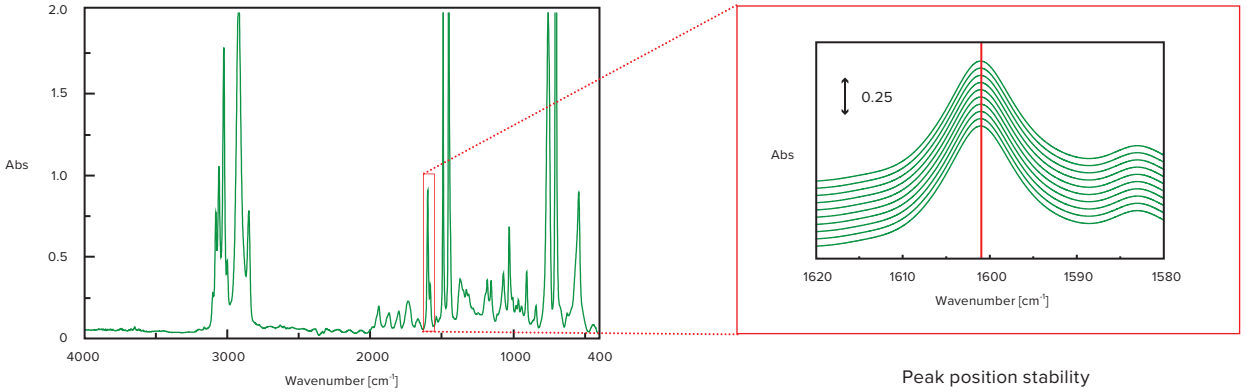
The maximum resolution is 0.4 cm^{-1} and the vibrational spectrum of gas can be measured. In addition, the automatic aperture wheel sets the optimal aperture size according to the resolution.



Transmittance spectrum of CH_4 (methane) gas (using a 10 cm gas cell)

High wavenumber precision

The specially controlled diode laser (VCSEL) has realized a long-life time and contributes to the downsizing of the instrument. By oscillating the laser with high precision using the XLD method, the FT/IR-4X has a wavenumber precision of 0.0005 cm^{-1} which is equivalent to that of a He-Ne laser.



PS film data (overlaid 10 measurement spectra)

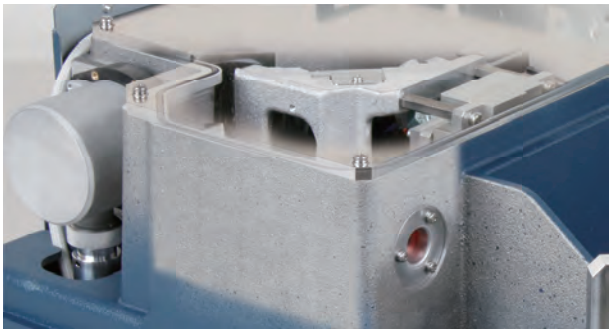
Peak position stability
(Stacked display of 10 measurement spectra)

Enhancing robustness and expandability

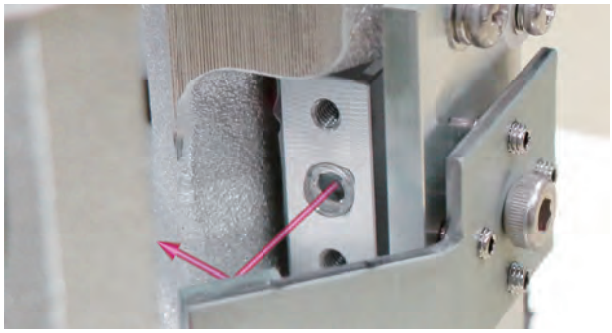
The FT/IR-4X is a compact unit with a high robustness. The main optical components are guaranteed for 3 years. The expandability is also the same as research grade-class.

Maintenance-free design

The overnight energization and periodic replacement of desiccant to protect the optical components are not required because of the proven robust sealed interferometer. The window plate of the interferometer is made of KRS-5, which has excellent humidity resistance. In addition, a long-life diode laser is used and a corner-cube mirror is used for the interferometer mirror.



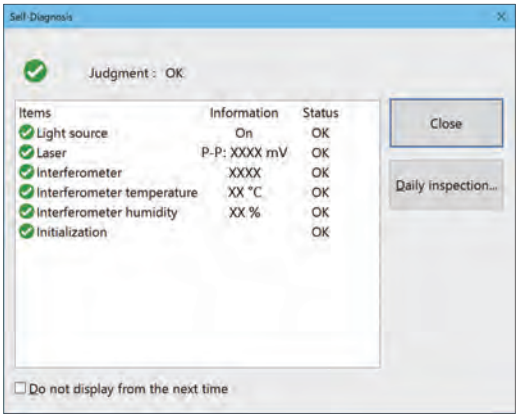
The high sealability interferometer protects the humidity-sensitive optical elements. A built-in sensor constantly monitors temperature and humidity.



The diode laser is used as a sampling laser, and it has a high wavenumber precision of 0.0005 cm^{-1}, which is equivalent to a He-Ne laser by the XLD method.

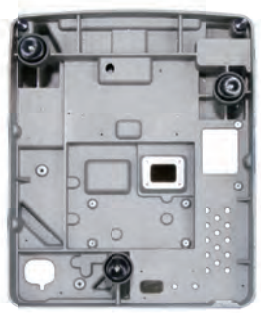
Self-diagnosis function

The self-diagnosis function checks the status of the FT/IR-4X at startup. If there is any problem, it will be detected immediately. The diagnosis results are automatically recorded, and it is possible to track the temporal change. Therefore, if there is a problem with the data, you can retrace and check.

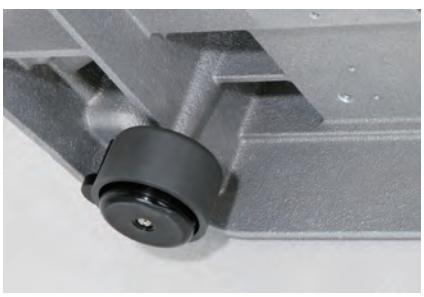


Base isolation structure

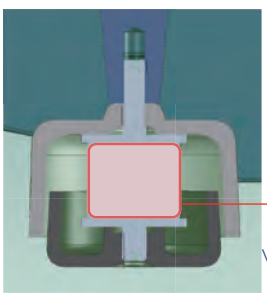
The highly rigid optical bench is manufactured from the cast aluminum with a ribbed structure. This optical bench is supported by vibration-free mounting to prevent the transmission of external vibrations.



Optical base (bottom)



Vibration-proof mounting

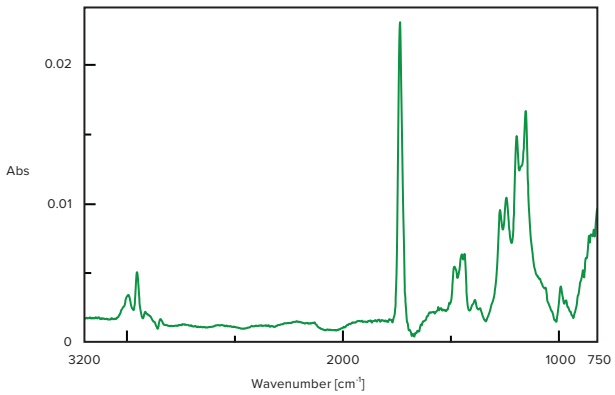


Leg structure

Outstanding expandability to support a variety of applications

Optional detectors

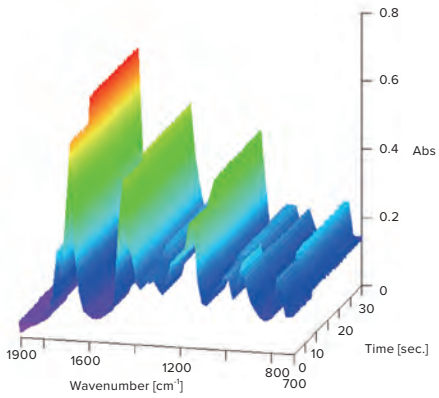
A variety of changeable detectors (MCT, InGaAs, etc.) can be added. Users can replace additional detectors.



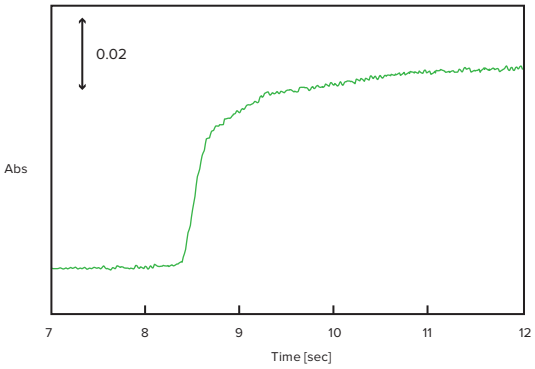
RAS measurement of PMMA thin film with MCT detector

Rapid scan option

The FT/IR-4X is applicable for the rapid scan measurement at 80 spectra/sec. (16 cm^{-1} resolution), and the rapid reaction processes can be reliably obtained.



3D map

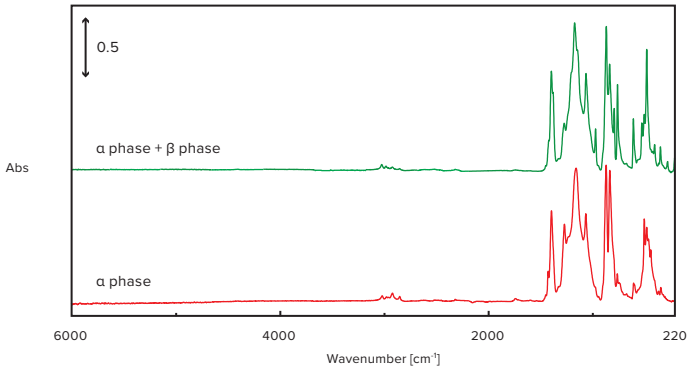


Peak change at 1427 cm^{-1}

Reaction process of the UV-curing resin (using the MCT detector)

Expandable measurement wavenumber range

In addition to the standard Mid IR, options are available to change to Near-Mid IR (11500 to 375 cm^{-1}) and Mid-Far IR (6000 to 220 cm^{-1} or 6000 to 50 cm^{-1}) by replacing the light source, beam splitter, window plate, and detector.



Measurement for PVDF in Mid-Far IR range

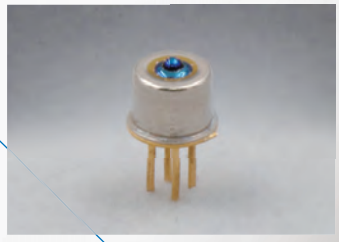
Highly sophisticated and functional optics

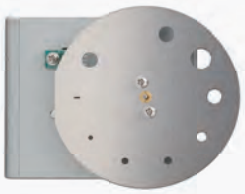
Automatic aperture switching wheel

• Aperture size can be switched automatically for set resolutions

Specially controlled diode laser (3 years warranty)

• Compact and long life diode laser with high wavenumber precision





Automatic validation wheel

• Equipped with NIST traceable PS

• Enables to perform the daily check automatically

KRS-5 window

• Moisture-resistant KRS-5 is used for interferometer window

Compatible with microscope

• Compatible with IRT-7200 with linear array detector

FT/IR-4X + IRT-7200

Large space sample compartment

• Sample compartment width of 200 mm allows for use of large accessories

• iQX accessory automatically sets measurement parameters for each accessory

• Smart Purge enables purging by simply setting compatible accessories

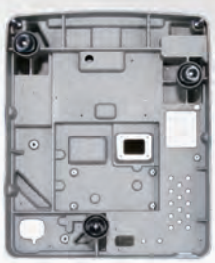
• Easily detachable sample compartment lid

FT/IR-4X + 12 m Gas cell

Optical base

• Ribbed aluminum casting optical base with vibration-proof mounting

• Stable measurement over a long period of time is possible



Long life and high-intensity ceramic source (3 years warranty)

• Halogen lamp can be mounted together

Sealed structure interferometer

• High throughput Ge/KBr beam splitter (3 years warranty)

• High-quality corner cube mirrors

• High precision moving mirror block (3 years warranty)

• Realize a highly accurate moving mirror scanning by DSP control

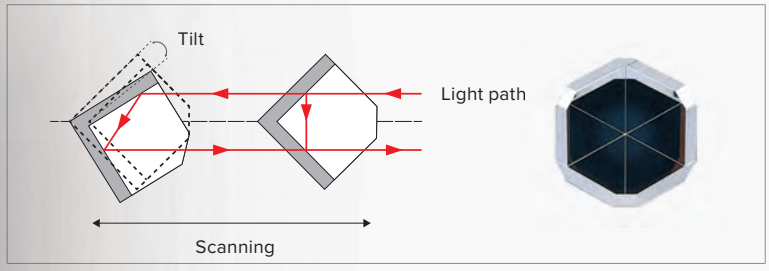
• Hermetically sealed structure protects the optical elements inside

• Constant monitoring by built-in temperature and humidity sensor

• No need to replace desiccants periodically

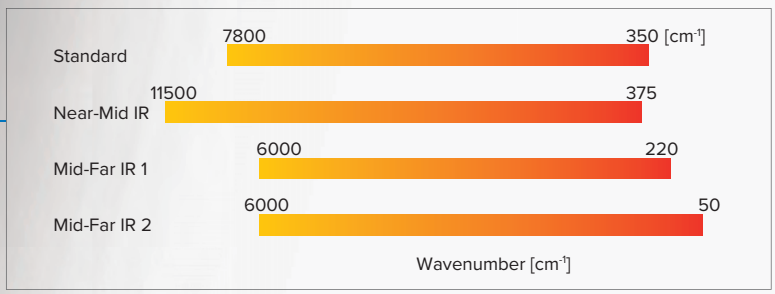
Corner-cube mirrors

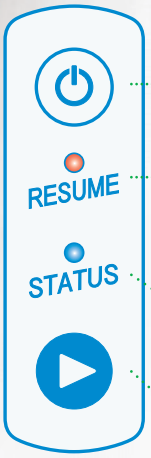
• Corner cube mirrors automatically correct for any light path deviation



Wavenumber expansion

• Compatible with Near-Mid IR and Mid-Far IR options





Control panel

• Power switch

• Resume indicator
Turing on the FTIR in the Resume on state, enables measurement in stable condition immediately

• Status indicator
Indicating the instrument status

• Start button
Allows immediate start of sample measurement

High sensitivity electrically cooled DLATGS detector

• The Peltier element maintains the optimum temperature to maximize performance

• KRS-5 window helps high durability

External detector unit

• Automatically switching 2nd detector (MCT, InGaAs, etc) is also available

• Users can replace the external detectors

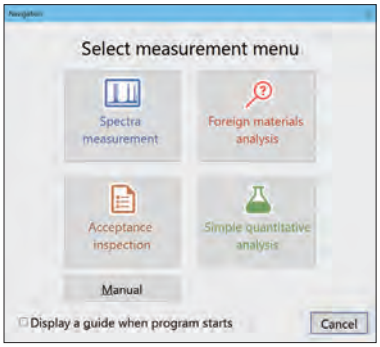
FT/IR-4X + MCT detector

Improved software for performing same analysis as experts

Spectra Manager Ver. 2.5 is equipped with a navigation function that allows even those who are unfamiliar with IR analysis to perform measurements in the same way as experts. The parameters set by the navigation function enables starting measurement by simply opening them after registering in the method.

Navigation function

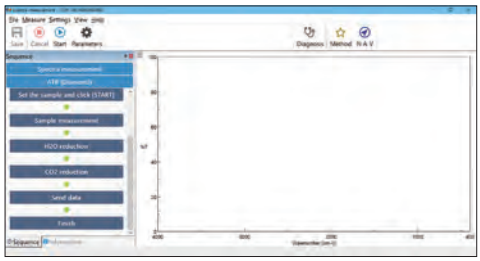
Measurement parameters suitable for your measurement purpose can be set by selecting menu according to the navigation.



Mount the ATR and start the navigation

Select Spectra Measurement

Confirmation of ATR

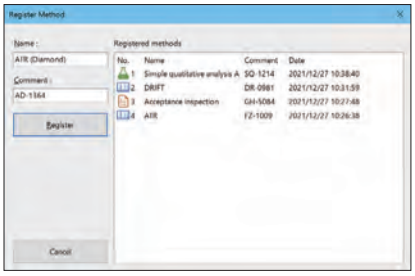


Measurement screen

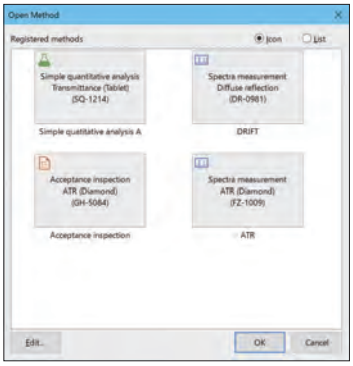
Setting is complete

Method function

Registering frequently used measurement parameters in the method, you can perform the measurement by just selecting the target method from the next time.



Registering method

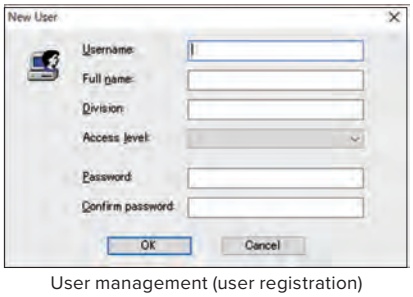


Selecting method

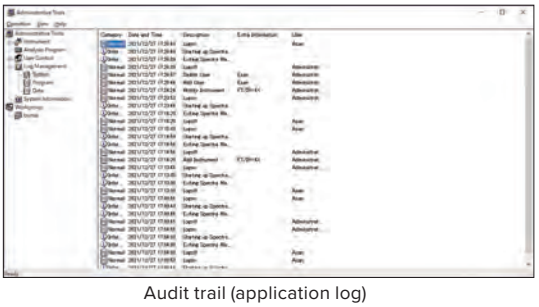
Supports data integrity

Based on the ALCOA + principle, which is a requirement of data integrity, the Spectra Manager Ver. 2.5 CFR is available to support complete and accurate data creation.

*Note: The Spectra Manager Ver. 2.5 CFR partially differs from the Spectra Manager Ver. 2.5 in terms of the contents and operations of measurement/analysis.



User management (user registration)

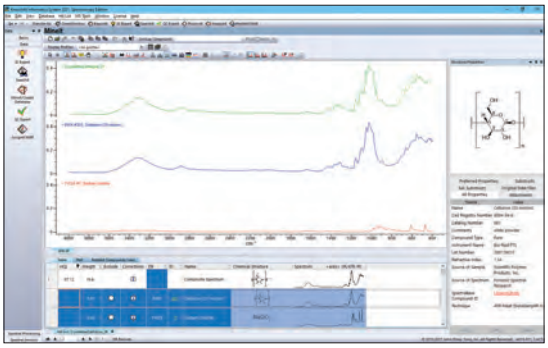


Audit trail (application log)

KnowItAll Spectra Search Program

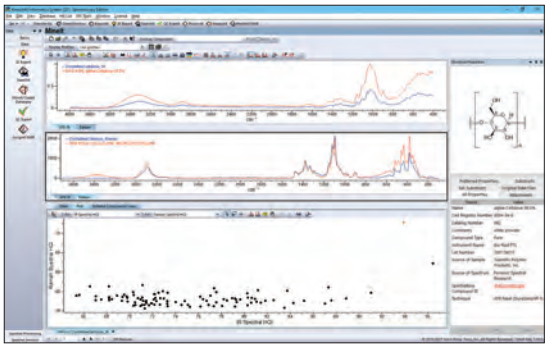
JASCO adopts Wiley KnowItAll as JASCO Spectroscopy edition.

- Wiley's original 12,600 data and JASCO's original 400 data is included as the standard package
- Multi-component search function that can search for a mixture sample of up to 5 components
- Supports for functional group analysis of infrared, Raman, and polymer infrared
- Multi-techniques that can be searched simultaneously with the Raman spectra
- User database ability
- ID expert function that executes a spectral search, mixture search, and functional group search at the same time
- Database provided by Wily (approx. 264,000 IR spectra) can be added



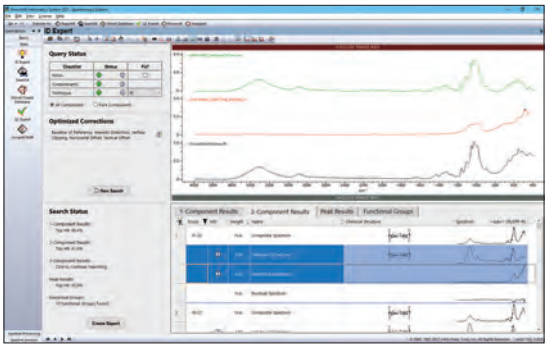
Multi-component

Identification of the spectrum about each component from unknown sample containing up to 5 components. The good search algorithm makes it possible to search in a short time.



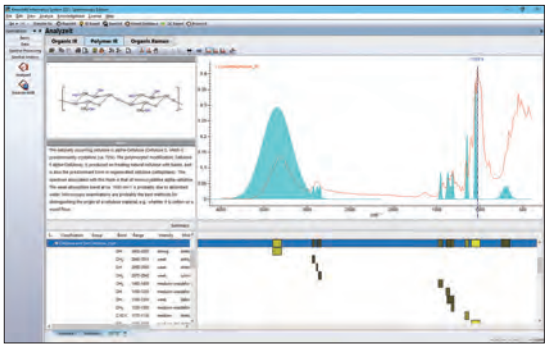
Multi-technique

Simultaneous search function for IR and Raman spectra about the same sample and plot function of the hit rates of each search result against each other.



ID expert

Spectral search, mixture search, peak search, and functional group search are all performed automatically, providing important clues for analysis of unknown samples.

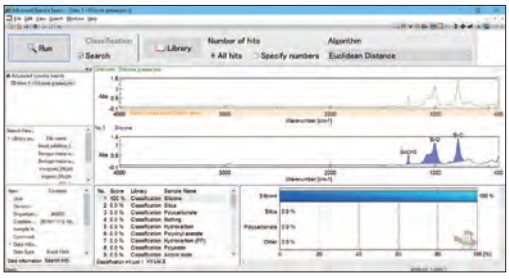


Functional group analysis support

Search for the peak of the spectrum by comparing it with the information of the functional group registered in the database. Supports functional group analysis for IR/Raman, IR polymer materials.

ADSS-4000 Advanced Spectra Search program

Spectra search support program makes it possible for anyone to perform spectral analysis like an expertise operator. An epoch-making search program that uses machine learning techniques to perform classification without using a database. It has the function of classifying the spectrum of an unknown sample into 35 categories and the function of searching using a data library (approx. 600 data), and both two functions can be executed at the same time.



Spectra classification results

Carboxylic acids	Silicone	Urethanes
Carboxylic acid salts	Epoxy resins	Silica
Carboxylic acid esters	Polyethers	Silica (talc)
Carboxylic acid esters (oil)	Polyethers (polyacetal)	Silica (kaolin)
Proteins	Fluorides	Carbonates
Polyamides	Styrene	Sulfates
Cellulose and sugar	Polycarbonates	Polyimides
Hydrocarbons	Nitriles	Phosphates
Hydrocarbons (polyethylenes)	Phenolic resins	Water
Hydrocarbons (polypropylenes)	Polyvinyl acetates	Acetone
Acrylic resins	Polyvinyl chlorides	Alcohol
Polyesters	Polyvinyl alcohol	

Classification categories

Development philosophy

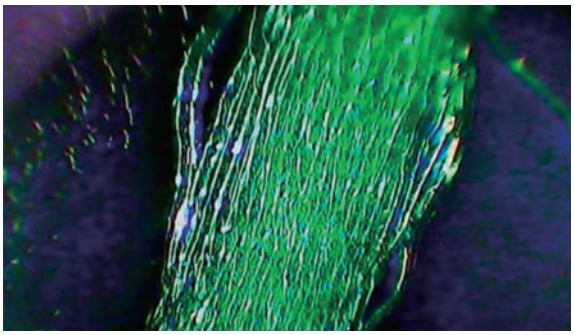
for ease of use to improve work efficiency and obtain high-quality data

Better operability on ATR PRO 4X/VIEW

Operability is significantly improved by the design that integrates with the main unit. Various samples including large size sample can be measured easily because the crystal surface is higher than the top surface of the main body. The iQX accessories automatically set the measurement parameters suitable for the ATR.

Remove the sample compartment lid and set ATR PRO 4X VIEW. This setting is very easy.

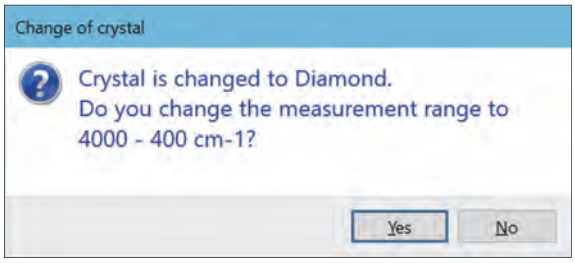
iQX automatically recognizes accessory and activates the measurement parameters used last time.



ATR PRO 4X VIEW allows you to check the image of the sample surface in close contact through the diamond crystal by the built-in high-resolution camera, and it is saved together with the measurement data.

ATR PRO 4X VIEW allows you to measure a large size sample without interfering with main unit because of its integrated design.

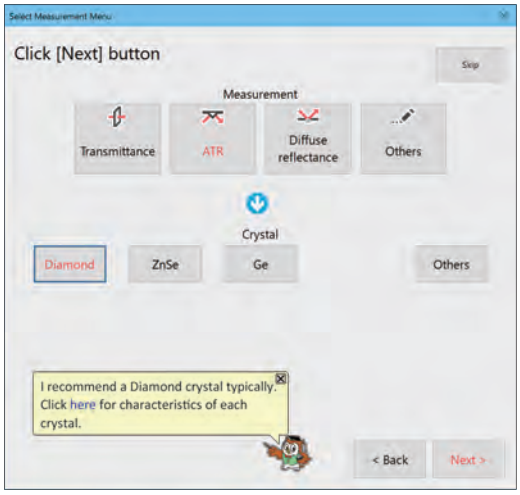
ATR PRO 4X VIEW has ZnSe, Ge and Diamond crystals that can be easily replaced.



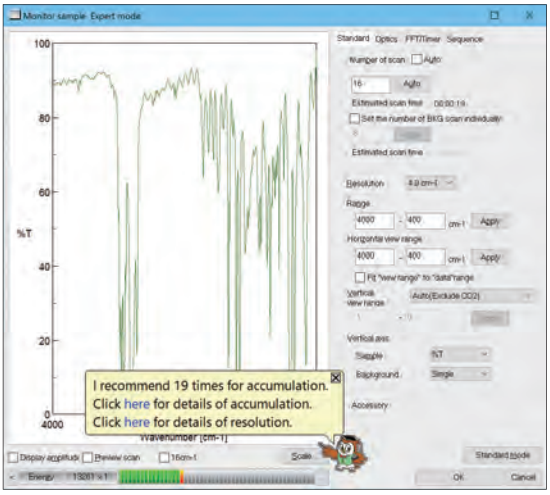
When the crystal is replaced, the spectrum of the crystal will be recognized and a message will be displayed on the screen.

User guide function

Real time advice function is included as standard, which provides useful advice for parameter setting and measurement.



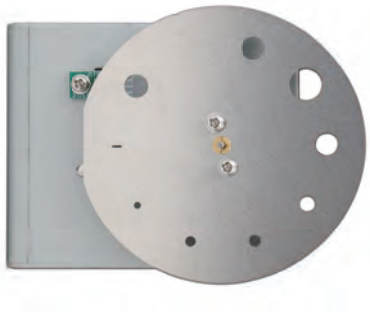
Example of advice on navigation



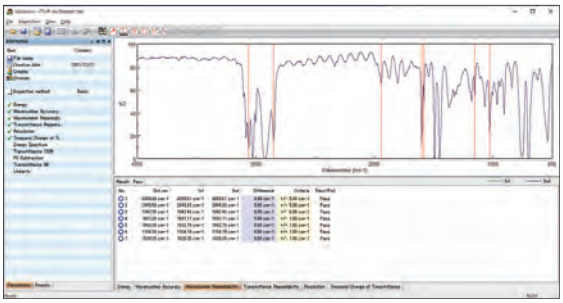
Example of advice on parameter setting

Auto validation

Built-in NIST traceable polystyrene film for easy validation. The status of the instrument can be checked daily and can be confirmed the reliability of analysis results.



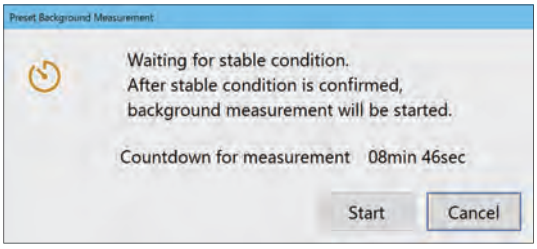
Automatic validation wheel



Validation result

Preset background measurement function

This function performs background measurement automatically after the instrument is stabilized. In addition, you can always acquire stable data by setting background re-measurements in regular intervals.



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DE6507-2201-01