

# *FT/IR-6X/8X*

Fourier Transform Infrared Spectrometer



# High-grade FTIR for IR spectroscopy analysis

The FT/IR-6X and FT/IR-8X spectrometers offer a highly configurable optical system applicable to virtually any FTIR application, from simple mid-IR measurement to more complex analysis in the farthest reaches of the electromagnetic spectrum. Research-based measurements are easily performed on the FT/IR-6X or FT/IR-8X spectrometers with options such as full-vacuum, gold-coated optics, rapid & step scan and FT-Raman for more advanced experiments.

Exchangeable elements combined with full automation can be used for spectral measurement from 25,000  $\text{cm}^{-1}$  to less than 20  $\text{cm}^{-1}$  without touching the system. Utilize a range of vacuum and configurable emission ports to perform experiments outside the sample compartment. Pair the FT/IR-6X or FT/IR-8X spectrometers with our comprehensive range of FTIR microscopes, shown on page 6.

## FT/IR-6X

FT/IR-6X is the powerful FTIR spectrometer for research application, which has excellent signal-to-noise ratio (47,000:1) and high resolution (0.25  $\text{cm}^{-1}$ ). It has the capability for extending the measurement wavenumber range (25,000 to 20  $\text{cm}^{-1}$ ), and also has the option for applying the IR measurement under vacuum condition. FT/IR-6X with superior performance, functionality and flexibility provides the optimal solution.

### Features

- Excellent signal-to-noise ratio (47,000:1)
- High resolution (0.25  $\text{cm}^{-1}$ )
- Rapid scan option
- Wavenumber range extension option (25000 to 20  $\text{cm}^{-1}$ )
- Vacuum option



FT/IR-6X

## FT/IR-8X

FT/IR-8X is our flagship FTIR spectrometer, which has excellent signal-to-noise ratio (55,000:1) and high resolution (0.07  $\text{cm}^{-1}$ ). FT/IR-8X can be used with options for rapid scan measurement and step scan measurement with nanosecond time resolution (up to 10 nsec.). In addition, measurement wavenumber region can be extended as option, and it is possible to upgrade FT/IR-8X to vacuum model.

### Features

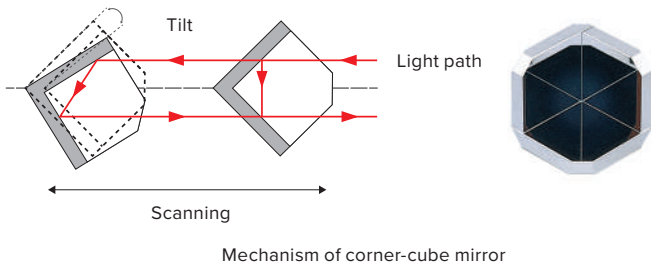
- Excellent signal-to-noise ratio (55,000:1)
- High resolution (0.07  $\text{cm}^{-1}$ )
- Rapid scan option / Step scan option
- Wavenumber range extension option (25000 to 20  $\text{cm}^{-1}$ )
- Vacuum option



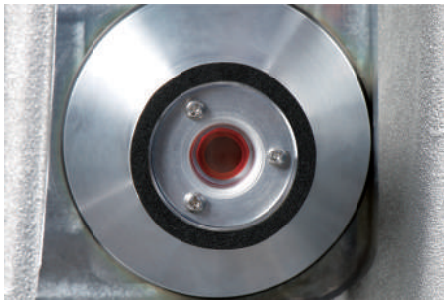
FT/IR-8X

## Stable interferometer

High-quality FTIR measurements start with the precision and stability of the interferometer. That is why the FT/IR-6X and FT/IR-8X spectrometers utilize a Michelson interferometer with corner-cube mirrors for permanent alignment to prevent light-path deviation, eliminating the need for dynamic alignment.



Since the interferometer housing has excellent sealing property, it protects the inner optical components, and improves their lifetime. Reliable measurement for a long time is available by high luminance ceramic light source with long lifetime, DLATGS detector with temperature control and wet resistant KRS-5 window.



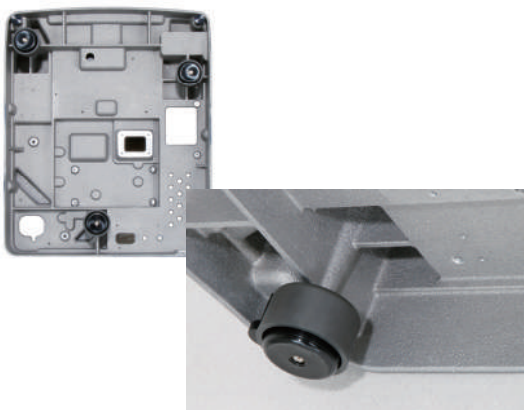
KRS-5 window

## AccuTrac™ DSP control

FT/IR-6X and FT/IR-8X spectrometers control the interferometer drive using the latest Digital Signal Processing (DSP) technology. Compared to analog control of the moving mirror, DSP system shortens the time interval for speed control. This mechanism provides precise moving mirror control, and enhances the constant-speed performance of the mirror drive.

## Stable optical bench

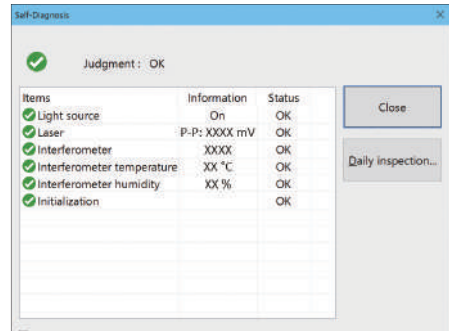
The optical bench's vibration-proof mounting prevents interference from sources of vibration.



Optical base (left) and vibration-proof mounting (right)

## Self-diagnosis function

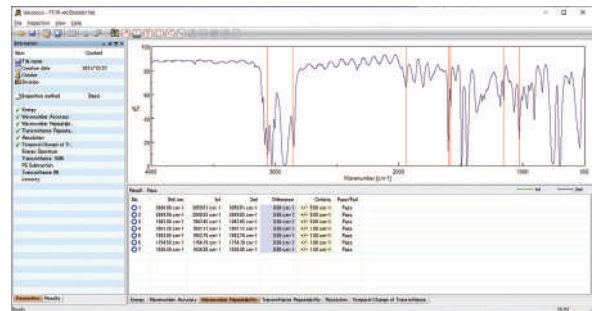
The Self-diagnosis function checks the status of the FT/IR-6X or FT/IR-8X at startup. If there is any problem, it will be detected immediately. The diagnosis results are automatically recorded, and it is possible to track the temporal change. Therefore, if there is a problem with the data, it can be retraced.



Self-diagnosis result

## Auto validation

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



Validation result

## iQX accessory

When an accessory with an iQX Accessory™ identification chip is fitted in the sample compartment, the measurement program automatically loads the information (model name, serial number, etc.) and automatically selects optimal measurement parameters. This accessory data is also recorded in the measured spectrum.



iQX accessory window

## Excellent signal-to-noise ratio

Both the FT/IR-6X and FT/IR-8X achieve exceptional signal-to-noise ratios using DSP control and a 24-bit A/D converter. The FT/IR-6X starts with an signal-to-noise ratio greater than 47,000:1 (FT/IR-8X - 55,000:1).

## High resolution measurement

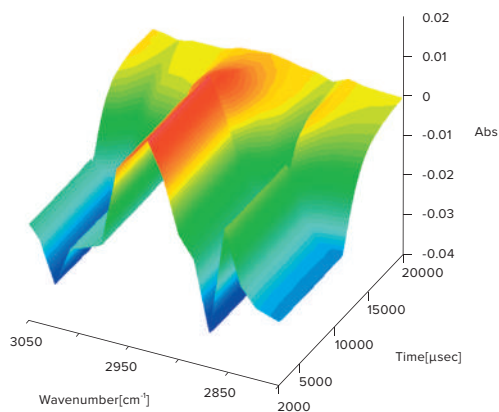
The highly accurate 28 degree Michelson interferometer and near frictionless moving mirror offers class-leading resolution down to  $0.07\text{cm}^{-1}$ .

## Rapid scan and step scan options

For time-resolved measurements, rapid scan option is available for FT/IR-6X and FT/IR-8X. Rapid scan provides measurement up to a maximum of 40 Hz.

Step scan measurement options are also available for FT/IR-8X. Step scan offers microsecond and/or nanosecond measurement options. Step scan measurements require an infinitely repeatable and reproducible experiment. Some key application examples include:

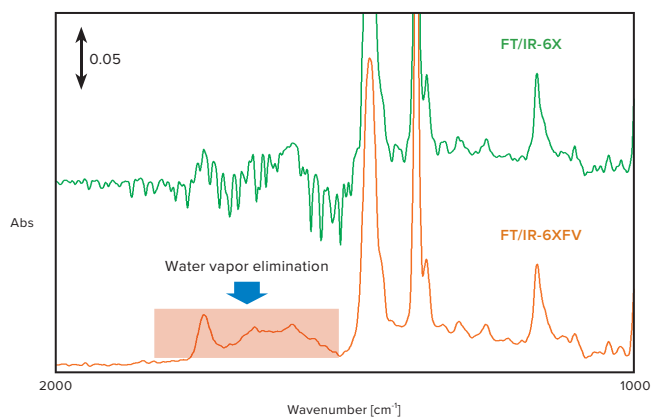
- Depth profiling with PAS
- Thin film measurements with PM-IRRAS
- Chemical transitions in the electric field orientation of liquid crystals
- Materials rheology with polymer stretching
- Protein folding



Dynamic response measurement of liquid crystal (5CB)  
(Time resolution:  $250\ \mu\text{sec}$ .)

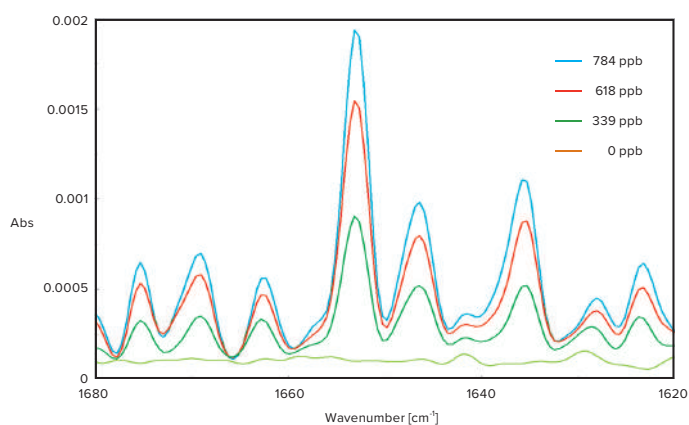
## Vacuum option

When measuring in the IR range, eliminating the effects of water vapor in the instrument is extremely important for obtaining high-precision data. Although purging with dry air or nitrogen gas is the conventional solution to this problem, the FT/IR-6X and FT/IR-8X have options for a full or partially evacuable optical system. This system can be used for performing low ppb-level water vapor monitoring, thin-film measurement and dilute solution measurement. Where measurement across wide spectral regions is required, automatic window and/or beam-splitter exchange can be included for uninterrupted spectral acquisition.



Water vapor elimination by vacuum option

Since vacuum option enables to remove the influence of atmosphere effectively comparing to purge option, it enables to detect the weak peak and to perform far-IR measurement with high accuracy. The figure below shows the spectra of ultra-low concentration water vapor. Vacuum option is powerful tool to monitor the low concentration gas (less than ppm) and to measure the thin film.



Spectra of ultra-low concentration water vapor

# Wavelength range

The FT/IR-6X and FT/IR-8X spectrometers can be configured for any spectral region within the measurement range 25,000 cm<sup>-1</sup> to less than 20 cm<sup>-1</sup>. Automatic beam splitter and window exchange allow uninterrupted measurement across the entire spectral range.



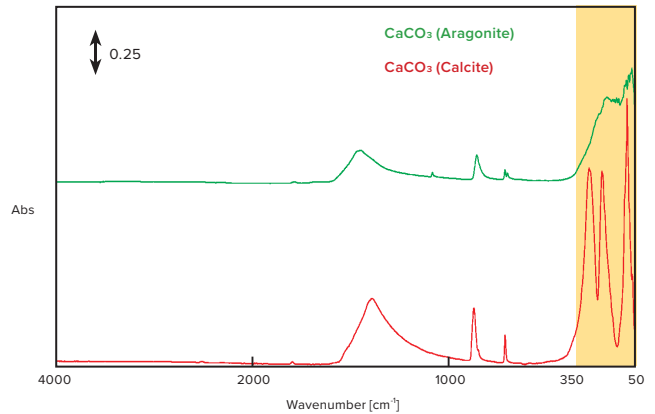
FT/IR-6XFV



Automatic beam splitter changer

JASCO can also provide the FTIR system which enables to perform the broad band measurement (6,000 to 30 cm<sup>-1</sup>) without switching optical elements. In addition, its system can be applied to vacuum system, which can get the entire spectral data from mid-IR to far-IR without the influence of water vapor and CO<sub>2</sub> in atmosphere shortly.

The figure below shows the spectra of CaCO<sub>3</sub>. Since FTIR system with broad band beam splitter and broad band detector can get the entire spectral data from mid-IR to far-IR at once, its system can distinguish the crystal structure difference of CaCO<sub>3</sub>.



Spectra of CaCO<sub>3</sub>

## Optional optical elements

	25000	15000	5000	1000	400	20 (cm <sup>-1</sup> )
Light source	Halogen lamp (25,000 - 2,200)		High-intensity ceramic source (7,800 - 20)			
	Quartz broad band (25,000 - 4,000)		Si/CaF <sub>2</sub> (15,000 - 1,200)			
Beam splitter	KBr broad band (12,000 - 375)		Ge/KBr (7,800 - 350)			
	Mid-far IR broad band (6,000 - 20)		Mylar broad band (680 - 30)			
			Mylar 5 μm (630 - 150)			
			Mylar 12 μm (240 - 50)			
			Mylar 25 μm (110 - 20)			
Detector	Si Photodiode (Visible) (25,000 - 10,000)		Si Photodiode (Near IR) (15,000 - 8,600)			
			InGaAs (12,000 - 4,000)			
			InSb (11,500 - 1,850)			
			MCT-N (5,000 - 750)			
			MCT-M (12,000 - 650)			
			MCT-W (12,000 - 450)			
			MCT-S (Step Scan detector) (12,000 - 850)			
			MCT-HS (10 nsec Step Scan detector) (5,000 - 900)			
			DLATGS (Mid IR) (15,000 - 350)			
			DLATGS (Far IR) (15,000 - 220)			
Window			DLATGS (Broad band) (15,000 - 30)			
			DLATGS (PE Window) (700 - 30)			
			Si Bolometer (650 - 20)			
			Diamond (25,000 - 20)			
Mirror	CaF <sub>2</sub> (25,000 - 1,200)					
			KRS-5 (Mid IR) (15,000 - 350)			
			KRS-5 (Far IR) (15,000 - 220)			
Mirror			PE (700 - 20)			
	Al coating (25,000 - 20)		Au coating (19,000 - 20)			

\*1 When extending the wavenumber region of FT/IR-6X to visible region, He-Ne laser option is also required.

\*2 Mylars (5/12/25/50 μm), MCT detector for step scan option and Au coating option are not available at FT/IR-6X.

# Single platform for every instrument - Spectra Manager™ software suite -

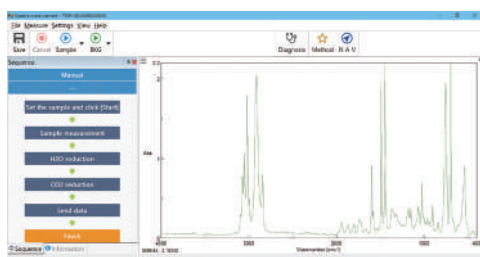
JASCO has developed the unique and powerful, cross-platform Windows® software package to control the widest range of optical spectroscopy instrumentation. Spectra Manager™ is a comprehensive lab companion for measuring and processing data, eliminating the need to learn multiple software programs and allowing data from many instruments to be analyzed and displayed together on the same platform.

## Instrument control

Drivers are included to control each spectroscopy instrument and parameter dialogs allow easy editing of pre-saved parameter files. Data acquired from each instrument is automatically loaded into the analysis program to free up the PC and control software to acquire more data during post-acquisition processing. Each instrument driver also has its own dedicated application for instrument hardware diagnostics and validation.

## Flexible display features

User-friendly features include overlay printing in colors and patterns, autoscale mode, and style and font, as well as customized toolbars.

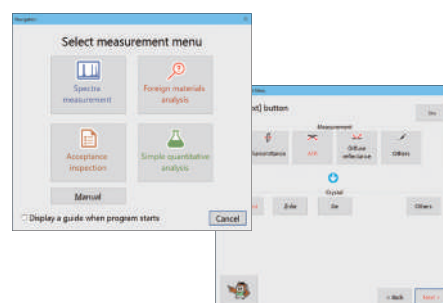


## Data processing and spectral analysis

View and process several types of measurement data files (UV/Vis/NIR, FTIR, Raman, Fluorescence, CD) in a single window, using a full range of data processing functions. Features include arithmetic operations, derivatives, peak detection and processing, smoothing, and baseline correction.

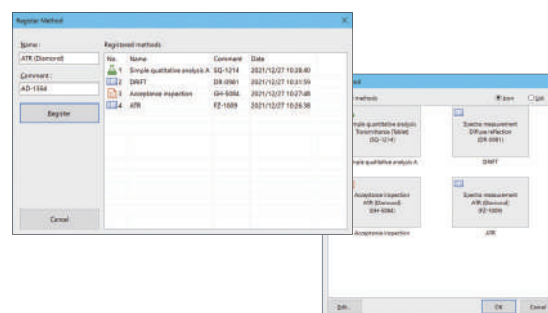
## Navigation

Navigation function allows even those who are unfamiliar with IR analysis to perform measurements in the same way as experts. Suitable measurement parameters can be set by selecting menu according to the navigation.



## Method

Registering frequently used measurement parameters in the method, allows quick measurement from the next time.



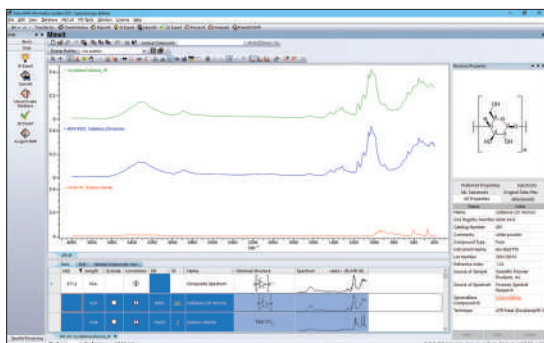
## Report publishing

JASCO Canvas allows users to create layout templates of spectral data and results to meet individual reporting requirements.

# KnowItAll Spectra Search Program

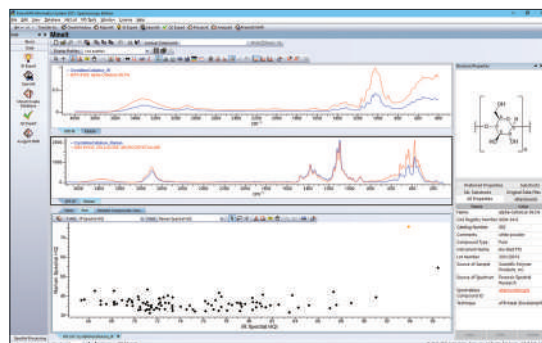
JASCO adopts Wiley KnowItAll as JASCO Spectroscopy edition.

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



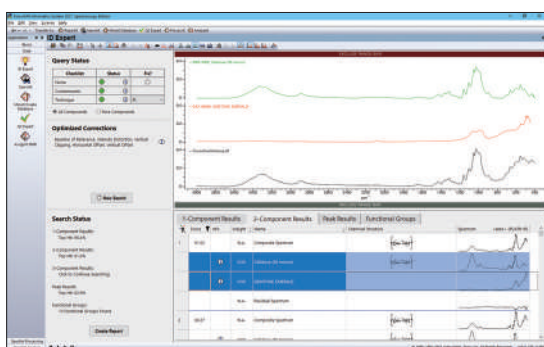
## Multi-component

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



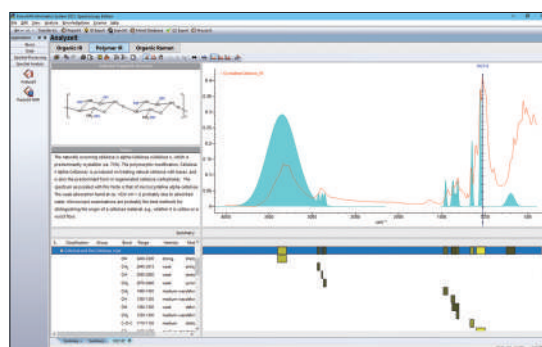
## Multi-technique

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



## ID expert

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

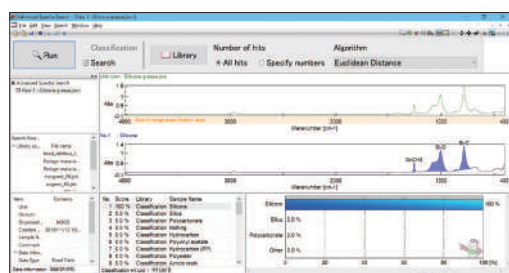


## Functional group analysis support

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 that makes it possible for anyone to perform spectra analysis like well 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.



Spectrum 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



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