

## Split Confocal Raman Microscopy Imager

## ATR8700

### Features

- Fully automatic Raman imaging experiment, auto focusing, auto scanning.
- 532, 638, 785, 1064nm and other excitation wavelengths are available.
- Split design, the spectrometer can be used alone.
- Compact design, no optical fiber, simple and space saving.
- Large-area rotating grating design, both wide range and high resolution.
- -70°C deep cooling detector.
- Ultra-large range imaging (100×100mm), automatic image stitching.
- Unique software controls switching light path.
- Quick positioning, quickly find the focus position.
- High-quality objective lens, micron-level spot.
- 5-megapixel cameras, clear and accurate images.
- USB3.0 interface directly connected to computer.

### Application

- Nanoparticles and new materials
- Universities and research institutes
- Biology
- Forensic Medicine Identification
- Material science
- Medical Immunoassay
- Agriculture and food identification
- Water pollution analysis
- Gem and inorganic mineral identification
- Environmental science

### Description

Optosky new generation ATR8700 type split confocal Raman microscopy imager equipped with a precision adjustable confocal needle apertures, ultra-high resolution spectrometers, high-definition digital cameras, and -70°C depth cooling detector and other advanced optical components. It combines the advantages of the microscope and Raman spectrometer. The Raman microscopy detection platform makes it possible to "what you see is what you measure". The visual and precise positioning of the Raman detection platform allows observers to detect Raman signals of different surface states on the sample, and can simultaneously display the The microdomain morphology of the detected location on the computer, greatly facilitates Raman microdomain detection.

The high-end version of ATR8600 can fully auto-focus, fully-auto scan, and operate with one click. It can perform batch experiments, uniformity scanning, etc. without waiting, and can obtain highly reliable scanning imaging Raman data.

The ATR8600 is equipped with an objective lens specially designed for the Raman system, which makes the laser spot close to the diffraction limit. It overcomes the problem in ordinary Raman systems that the focal plane for collecting Raman signals is slightly higher or slightly lower than the actual optimal focal plane, thereby improving the quality of the Raman spectrum.

ATR8600 is equipped with a spectrometer specially optimized for Raman microscopy systems, and can achieve optimal spectrum up to  $0.5\text{cm}^{-1}$  resolution. The spectrometer has multiple built-in gratings. The gratings and their rotation angles can be set by software to meet the requirements of different resolutions and different wave number ranges.



## 1. Ordering Information

Table 1 ATR8700 product selection table

Model	Spectrometer focal length	Excitation wavelength/nm	Power/mW	Wavenumber range <sup>*1</sup> /cm <sup>-1</sup>	Minimum resolution/cm <sup>-1</sup>
ATR8700Pro-FL 210	210mm	532	100	50~10000	2.2
		638	80		2.2
		785	350		2.5
		1064	500		6.2
ATR8700Pro-FL 350	350mm	532	100	50~10000	1.4
		638	80		1.4
		785	350		2.1
		1064	500		5.2
ATR8700Pro-FL 510	510mm	532	100	50~10000	0.9
		638	80		0.9
		785	350		1.4
		1064	500		3.6
ATR8700Pro-FL 810	810mm	532	100	50~10000	0.5
		638	80		0.5
		785	350		1.0
		1064	500		2.7
<b>ATR8700Pro-LT:</b> Deep cooling to -30°C, ultra-long integration time (up to 1.3h) <b>ATR8700Pro-SCM:</b> Scanning imaging Mapping, autofocus					

Naming example:

- ATR8700-AF-LT-FL350-532+638+785: automatic focus, long integration time, focal length of 350mm, and three excitation wavelengths: 532nm, 638nm and 785nm respectively.
- ATR8600-MP-DC-FL510-532+633+1064: scanning imaging, deep cooling detector, focal length 510mm, and three excitation wavelengths: 532nm, 633nm and 1064nm.

Note:

- \*1: The maximum wave number range is related to the selection of excitation wavelength.
- \*2: The standard configuration is a starting wave number of 150cm<sup>-1</sup>, and a low wave number version with a starting wave number starting from 50cm<sup>-1</sup> can be customized; Terahertz Raman spectroscopy versions with wavenumber ranges starting from 5cm<sup>-1</sup> are also available.
- \*3: Other excitation wavelengths can be customized.
- \*4: The optimal resolution is related to the slit width of the spectrometer; if the slit width is further reduced, the resolution can be further improved.
- \*5: The parameters in the table only represent the parameters of the company's standard products; Optosky instruments are all independently developed and produced products, and the corresponding parameters can be customized.

## 2. Technical parameters

ATR8700 performance parameters	
Spectral resolution	Refer to table 1.
Spectral range	Refer to table 1.

Excitation wavelength	Multiple wavelengths such as 532, 638, 785, 1064 nm are available, and up to 3 excitation wavelengths can be integrated simultaneously.
Maximum laser output	532nm: 80mW 638nm: 80mW 785nm: 300mW 1064nm: 500mW
Optional detector	1) Deeply cooled area array CCD: 2048×256 pixels, cooled to -70°C 2) Cooling scientific grade area array CCD, 2048×256 pixels, cooled to -30°C 3) Cooling scientific grade area array CCD, 1024×128 pixels, cooled to -30°C 4) Deep cooling area array InGaAs CCD: 512×1 pixel 5) Deep cooling area array InGaAs CCD: 1024×1 pixel
Spectrometer focal length	210 mm, 350 mm , 510 mm, 810 mm optional
Microscopic illumination	High brightness and long life white LED
Lighting method	Epi-illumination
Microscope camera	5-megapixel camera
Objective lens	Standard configuration: 4X, 10X, 20X Optional configuration: 100X, 50X
Focusing	Conjugate focus
Confocal method	Pinhole confocal, 6-hole moving pinhole and infinitely adjustable confocal pinhole optional
Spatial resolution (X, Y)	Better than 2μm
Longitudinal spatial resolution (Z)	Better than 5μm
Laser spot diameter	>1μm
Laser stability	$\sigma/\mu < \pm 0.2\%$
Laser linewidth	0.08 nm
Connectivity	USB3.0
<b>X, Y axis electronically controlled platform</b>	
Moving range	50×50mm, 100×100mm optional
Moving resolution	0.1μm
Positioning accuracy	1μm
Scanning interval	Software setting, minimum 1μm
Scan speed	20mm/s
<b>Z axis (auto focus)</b>	
Positioning accuracy	$\leq \pm 0.2\mu\text{m}$
Max. range	20mm
Focus speed	No more than 10s
<b>Working environment parameters</b>	
Voltage	100~240 VAC
Peak power	<200 W

Other motivations	No need
Emission	No
Platform requirements	Air-floating vibration isolation optical platform
Working temperature and humidity	Constant temperature ( $25 \pm 2^{\circ}\text{C}$ ), constant humidity ( $50 \pm 10\%$ )
Other options	
Fast active focus function	Built-in fast focus function module can achieve fast active focus within 2s, improving the consistency of experiments
Electric objective wheel	Realize automatic switching of the objective lens, avoid hand contact with the objective lens, causing dirt, and reduce uncontrollable problems caused by touching the instrument factor
Nanoscale piezoelectric ceramic displacement stage	Movement resolution up to 2nm and movement accuracy up to 10nm, enabling fine movement of samples





Fig.1 ATR8700 type Raman microscopy functional structure indication diagram.

### 3. Operating software interface

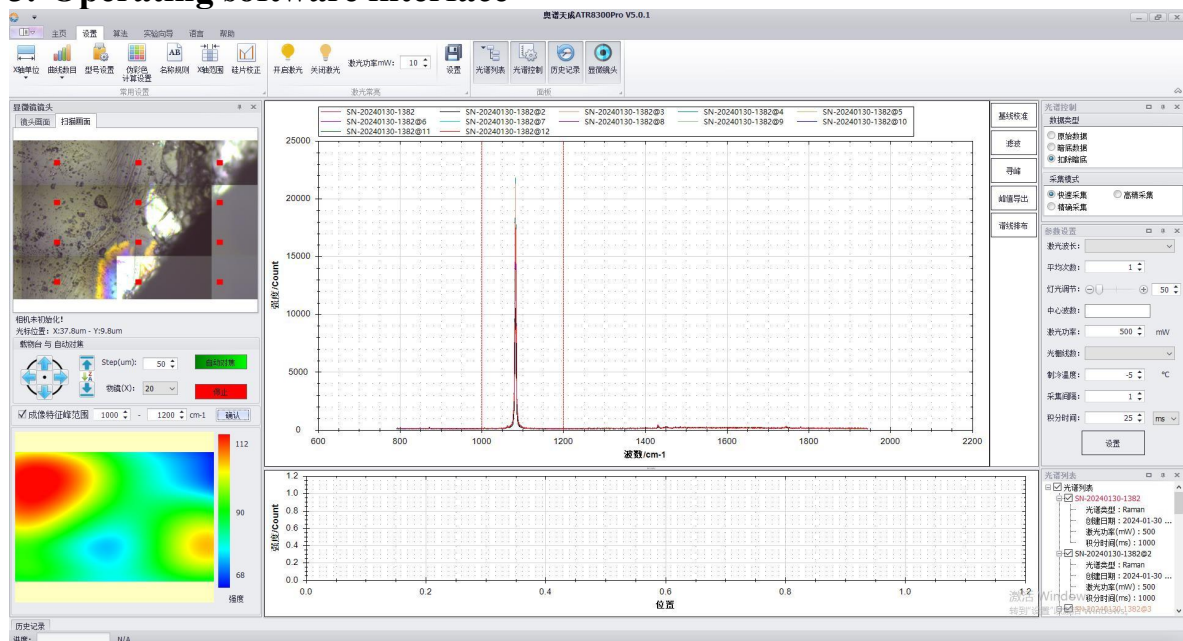


Fig.2 ATR8600 software interface.



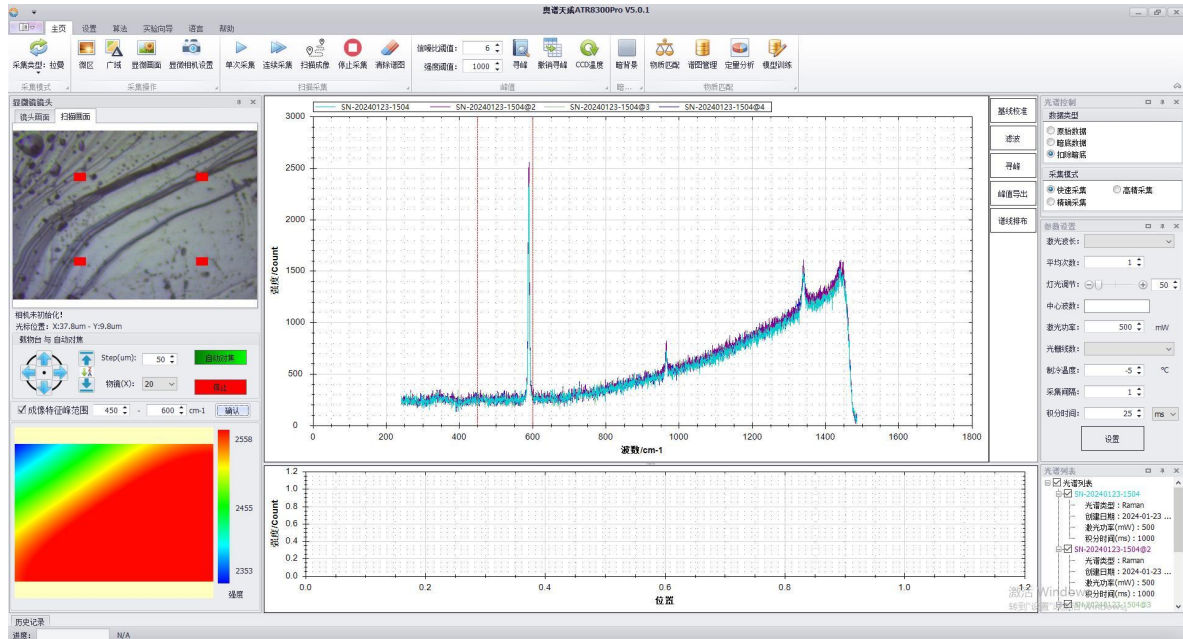


Fig.3 ATR8600 software interface.

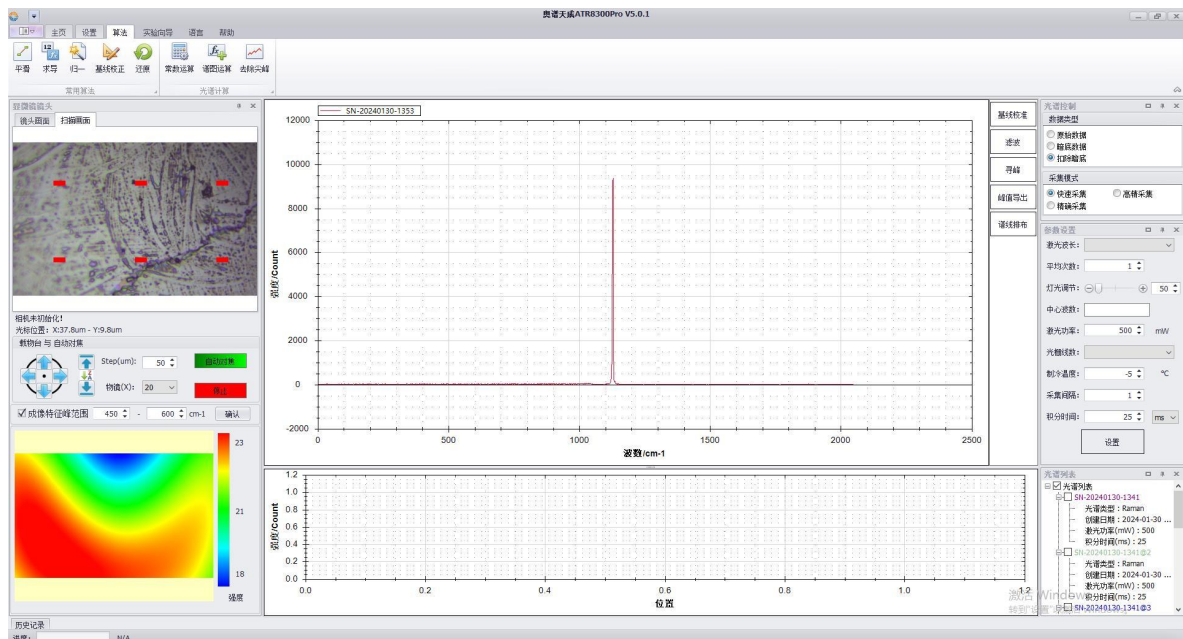


Fig.4 ATR8600 software interface.

## 4. Optical properties

Product data information is current as of publication data. Products conform to specifications per the terms of Optosky Standard warranty.

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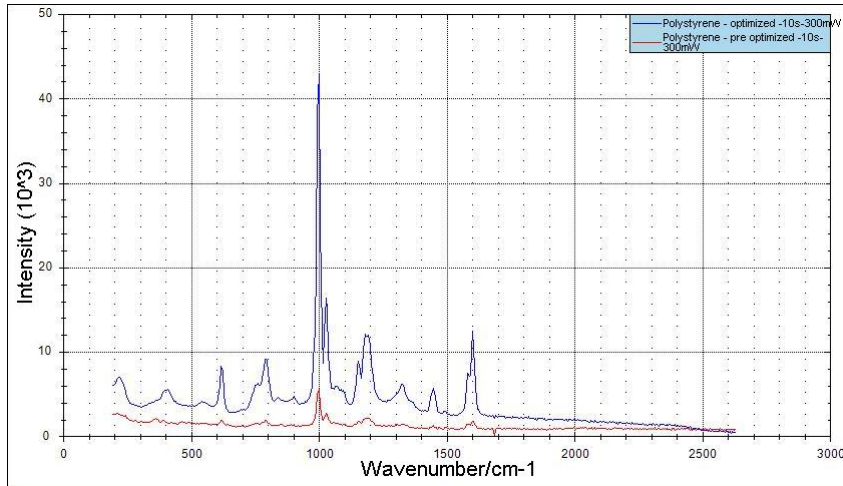


Fig.5 The optical path of ATR8700-1064 has been extremely optimized. After optimization, the efficiency of the optical path is increased by 8 times, and the signal-to-noise ratio is increased by 8 times.

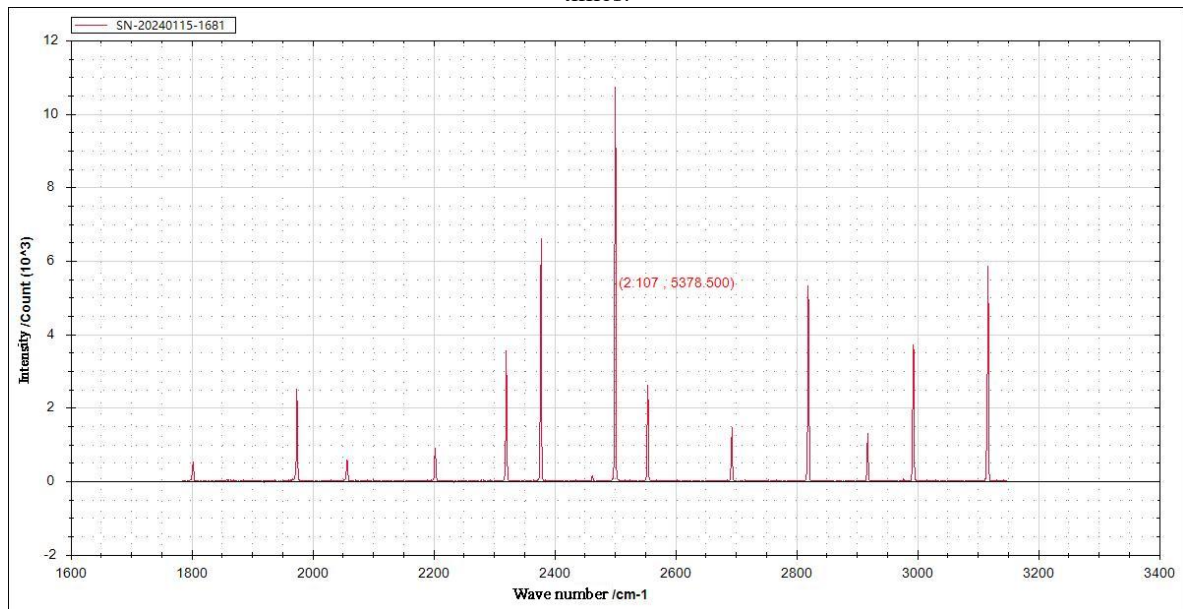


Fig.6 The test results indicate: the instrument resolution of ATR8700-FL210 reaches  $2.107\text{cm}^{-1}$ , test specification: tested according to the national standard "General Specifications for Raman Spectrometers", test light source: mercury argon lamp, spectrum collection line:  $614.31\text{nm}$ .

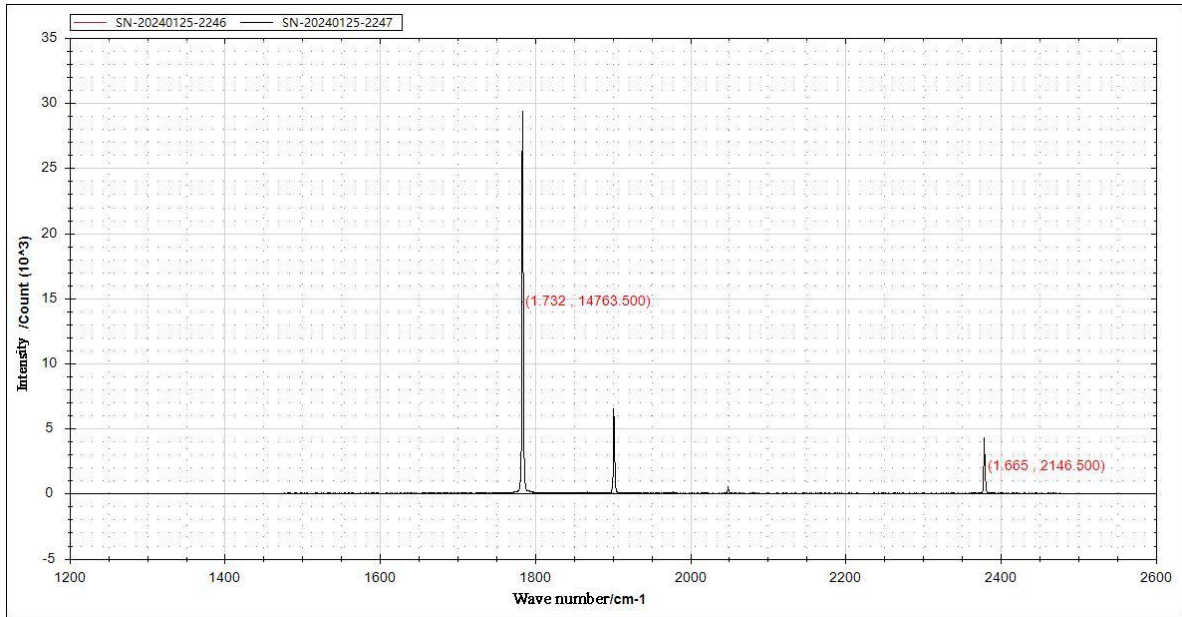


Fig.7 The test results indicate: the instrument resolution of ATR8700-FL350 reaches  $1.665\text{cm}^{-1}$ , test specification: tested according to the national standard "General Specifications for Raman Spectrometers", test light source: mercury argon lamp, spectrum collection line:922.45nm.

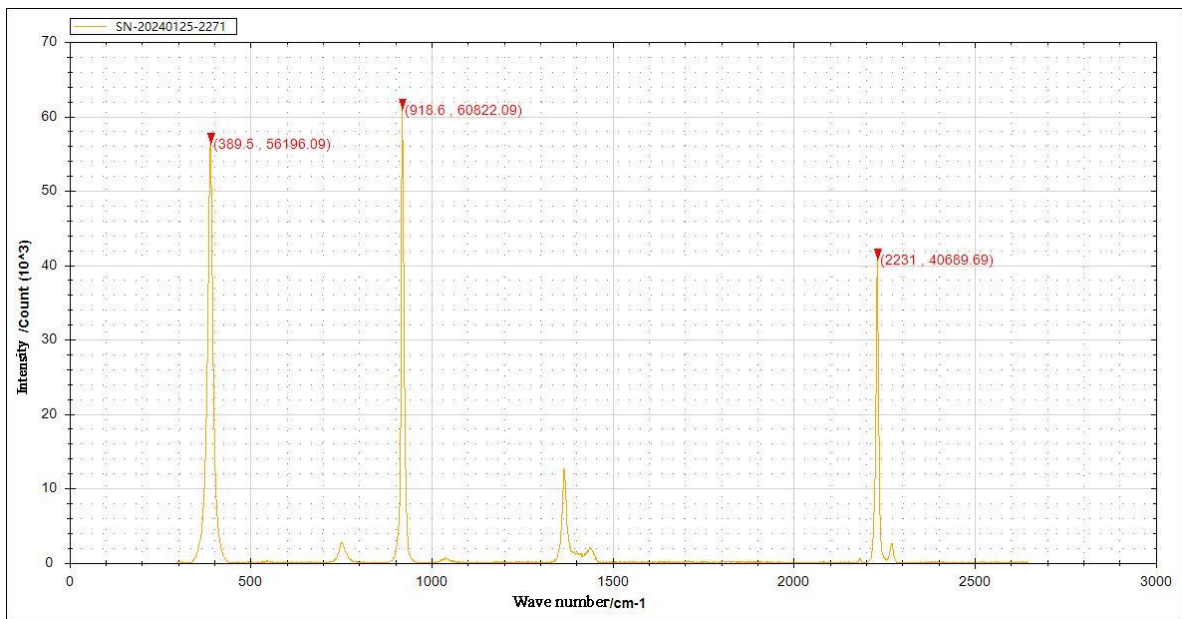


Fig.8 ATR8700 acetonitrile test results.



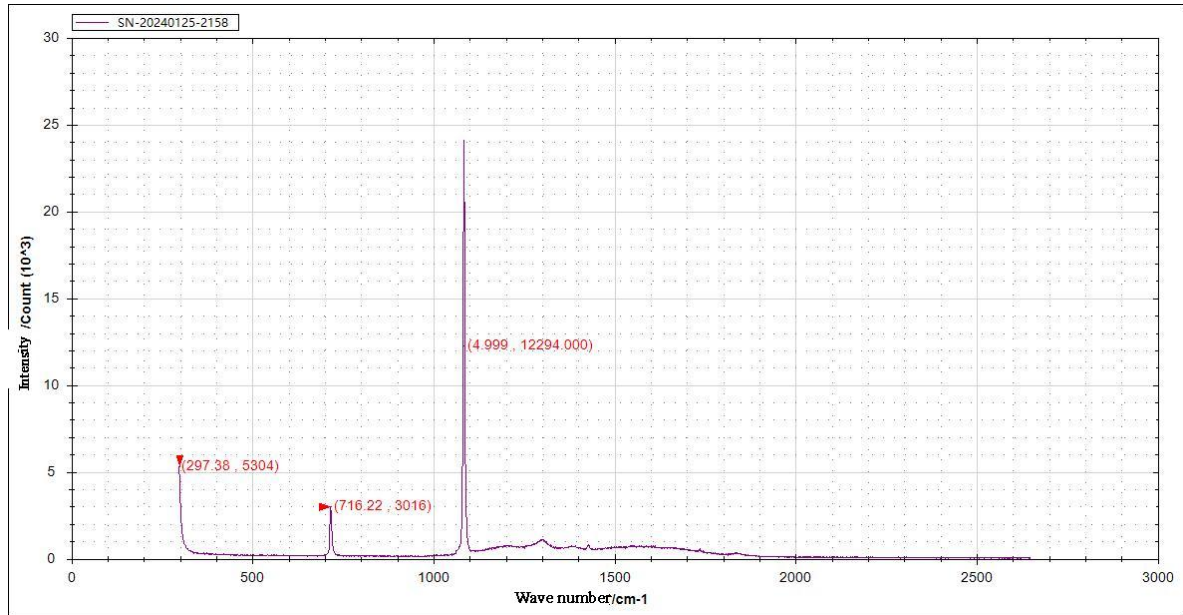


Fig.9 ATR8700 calcium carbonate test results.

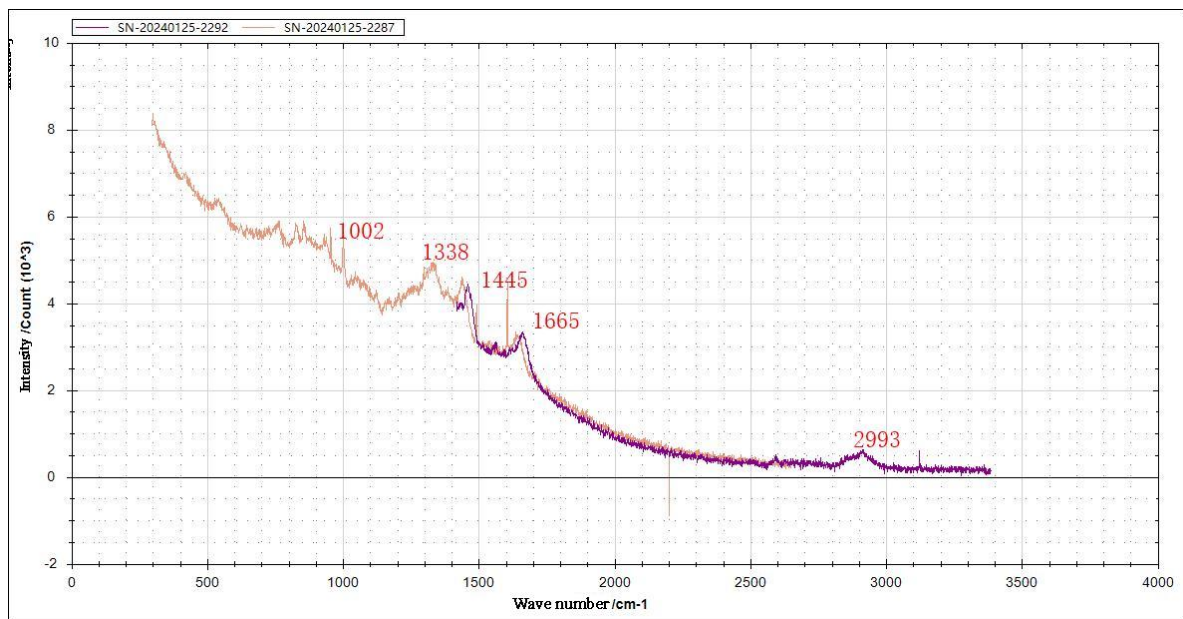


Fig.10 ATR8700 tested pork, and the characteristic peaks at 1002, 1338, 1445, 1665, and 2993cm<sup>-1</sup> were clearly visible.

## 5. Physical pictures and instrument details



Fig.11 High stability microscope stand; X, Y, Z three-dimensional high-precision adjustment; the adjustment knob has suitable damping, the adjustment feels soft, is not easily knocked over, and is very stable.



Fig.12 Raman signal high transmittance objective; objective focal length up to 8 mm.



Fig.13 The external displacement stage control rocker can be adjusted in 8 levels of accuracy.

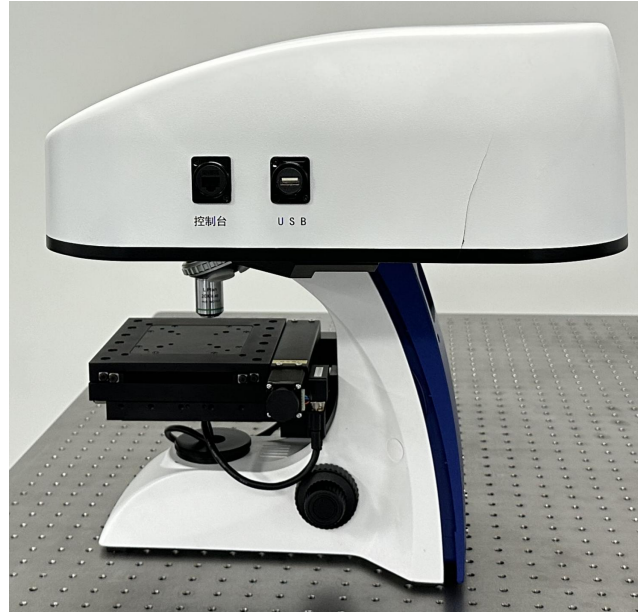


Fig.14 The right side is the stage operating rocker interface and USB interface.

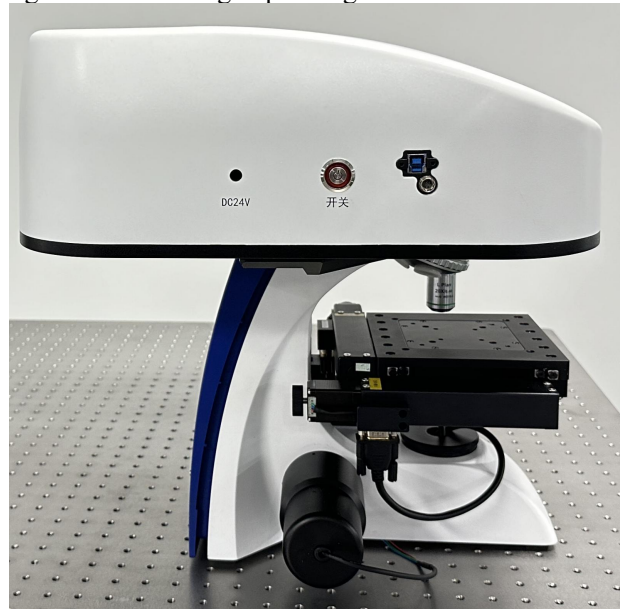


Fig.15 The left side is the camera and power interface.



Fig.16 ATR8700 connection diagram.

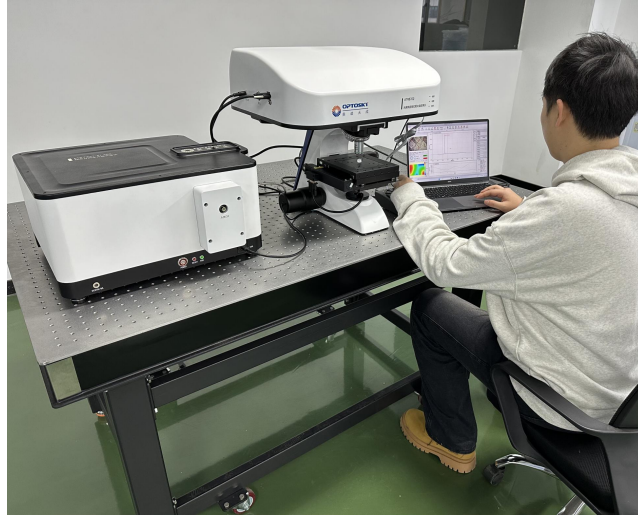


Fig.17 ATR8700 test site.