

## Microscope & Raman Spectrometer

## ATR3110XW

### Features

- Can be combined with different types of microscopes
- Fiber optic Raman probes and adapters are customizable
- Ultra-high sensitivity detector;
- The sensor is cooled to -10 °C;
- Detachable fiber optic probe
- Ultra-low noise circuit;
- Powerful PC-side spectrum analysis software;
- Peak search and display;
- USB 2.0;
- Friendly human-computer interface;

### Application

- Nanoparticles and new materials
- Research institute research
- Biology
- Forensic Medicine Identification
- material science
- Medical Immunoassay
- Agriculture and food identification
- Gem and inorganic mineral identification
- environmental science

### Description

ATR3110XW Raman spectrometer microscope adaptation version is a breakthrough high-sensitivity Raman spectrometer developed by Optosky. It uses a cooled high-sensitivity CCD, which makes the instrument have good environmental adaptability and is suitable for long integration time.

ATR3110XW contains four core components: narrow linewidth Raman laser, spectrometer, Raman Fiber Probes and microscope adapter.

ATR3110XW uses fiber probes and professionally designed microscope adapters, which are easy to use with microscopes of various brands. The micro-Raman spectrometer is easy to configure and can perform dual analysis of surface morphology and physical properties of samples, making it very suitable for laboratory scientific research. The excellent low stray light design of ATR3110XW can adapt to use in complex environments, especially in scientific research, food safety, pharmaceutical engineering applications, etc.



## 1. Order Guide

Model	Features
ATR3110XW-532	532nm excitation wavelength
ATR3110XW-638	638nm excitation wavelength
ATR3110XW-785	785nm excitation wavelength
ATR3110XW-1064	1064nm excitation wavelength (requires infrared objective lens)

Tested according to the American national standard ASTM E2529-06 method;  
The above parameters only represent the company's standard products, other parameters can be customized;

If specially customized, the resolution performance can be improved by about 1/3, but the sensitivity will be reduced;

Model	Excitation Wavelength (nm)	Maximum Laser Power (mW)	Spectral Range (cm-1)	Resolution (cm-1)	Feature
ATR3110XW-0-27	785	550	250~2700	4~6	Suitable for most applications
ATR3110XW-0-35			200~2500	6~8	
ATR3110XW-0-43			200~4300	7~10	
ATR3110XW-1064	1064	500	200~2600	13	No fluorescence interference, especially suitable for dark samples, colored samples and other samples with strong fluorescence properties, such as pigments, biological samples, etc.
ATR3110XW-830	830	550	200~3300	7	It can better penetrate human skin and is suitable for measuring biological samples, such as non-invasive blood sugar and early cancer detection.
ATR3110XW-266	266	50	200~3000	25	Suppress fluorescence

ATR3110XW-532	532	100	200~3200	11	Graphene, coal, biological samples, two-dimensional materials, SERS, etc.
ATR3110XW-633	633	80	200~3200	10	Metal oxides, new materials

ATR3110XW-PS: ultra-high signal-to-noise ratio, ultra-low temperature cooling back-illuminated CCD, integration time up to 25 minutes;

ATR3110XW-LT: ultra-high signal-to-noise ratio, -15°C ultra-low temperature refrigerated back-illuminated CCD, integration time up to 1.3 hours;

ATR3200: Dual-wavelength Raman spectrometer, 532, 633, 785, 830, 1064nm excitation light, choose two;

## 2. Parameter

Model	Item	ATR3110XW-532	ATR3110XW-638	ATR3110XW-785	ATR3110XW-1064
system	Interface	USB 2.0			
	Integration Time	4ms~15min			10ms~20min
	Voltage	DC 5V±5%			
	Operating Temperature	-10~45 °C			
	Working Humidity	< 90%RH (No Condensation)			
	Size	30×22.5×13.2 cm <sup>3</sup>			
	Weight	7 Kg	7 Kg	5Kg	6Kg
reliability	Spectral Stability	$\sigma/\mu < 0.5\%$ (COT 8 hours)			
	Temperature Stability	Spectrum Shift $\leq 1 \text{ cm}^{-1}$ (10~40 °C)			
	Spectral Intensity Changes	$< \pm 5\%$ (in 5 ~ 40 °C)			
Optical parameters	Spectral range and resolution	200~3700@12	200~3800@11 200~2700@6-9	200~2600@7 200~3500@10 200~4200@12	200~2600@14
	signal-to-noise ratio	3000: 1	3000: 1	3000: 1	10000: 1
	entrance slit	25、50、100μm			
	Optical system	Cross CT light path			
	detector	Deep Cooled CCD	Deep Cooled CCD	Deep Cooled CCD	Deep Cooled CCD

	Detector cooling temperature	-15 °C	-15 °C	-15 °C	-15 °C
<b>Excitation light</b>	central wavelength	785±0.5nm	638±0.5nm	785±0.5nm	1064±0.5nm
	Laser linewidth	0.08 nm	0.08 nm	0.08 nm	0.08 nm
	Maximum output power	≥100 mW	≥80 mW	≥500 mW	≥500 mW
	Power stability	$\sigma/\mu < \pm 0.2\%$	$\sigma/\mu < \pm 0.2\%$	$\sigma/\mu < \pm 0.2\%$	$\sigma/\mu < \pm 0.2\%$
<b>Microscope adapter</b>	Split ratio	3 : 7			
	Optical aperture	7mm			
	angle	45°			

### 3. Physical Map

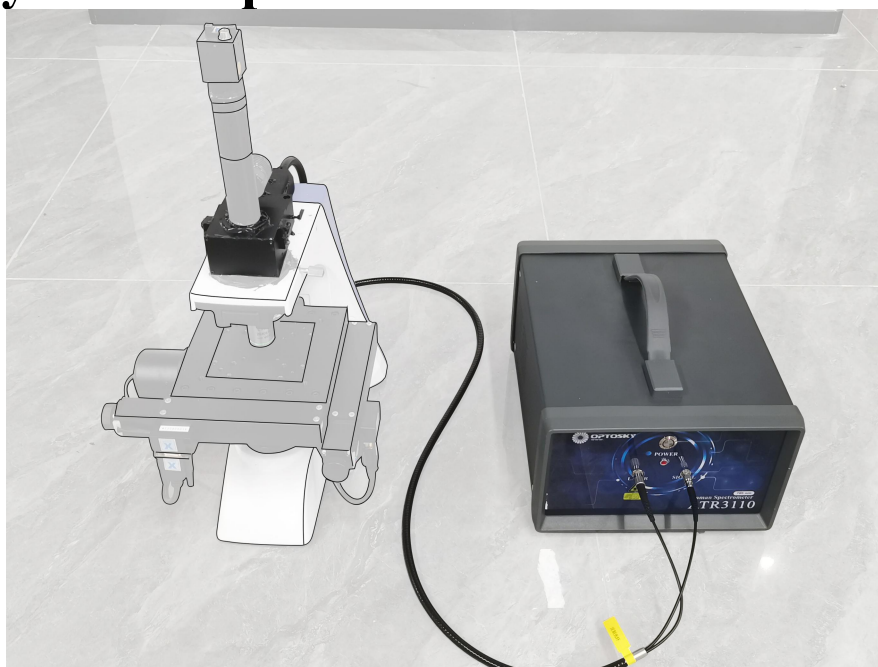


Figure 1 Physical diagram of ATR3110XW  
 (Contains four core components: narrow linewidth Raman laser, spectrometer, fiber optic Raman probe and microscope adapter, excluding microscope)

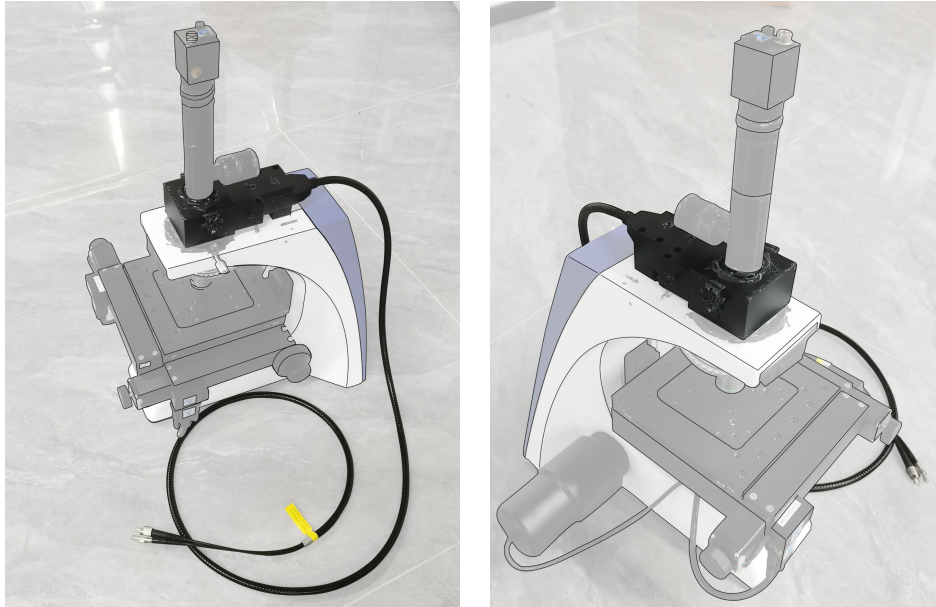
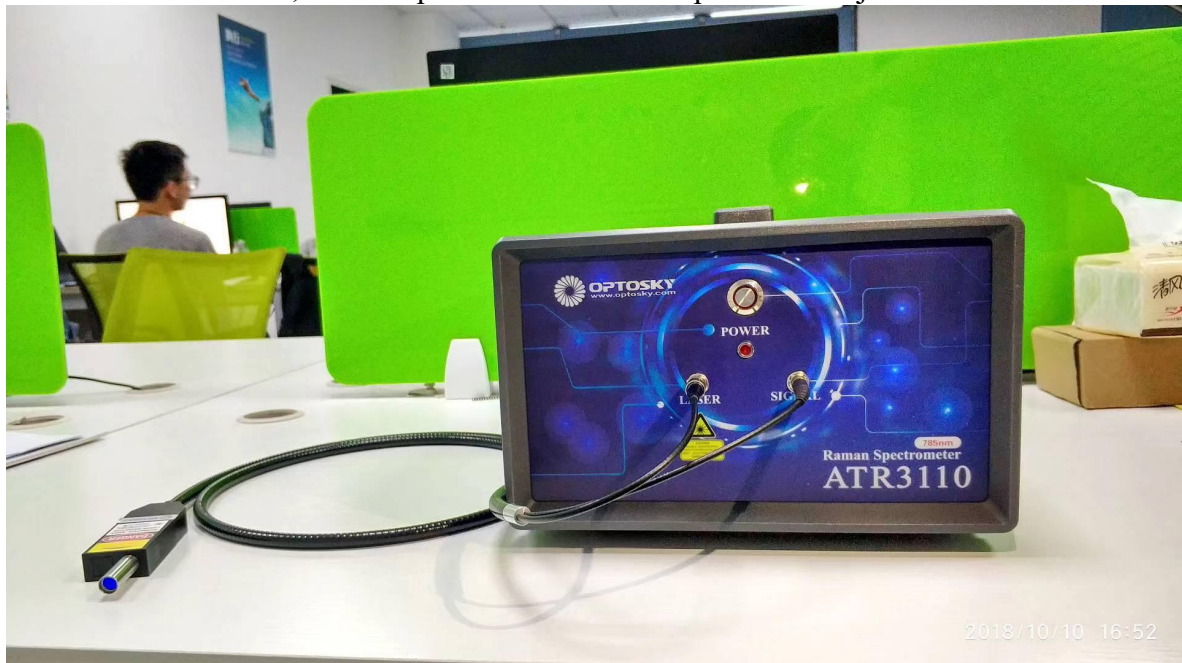
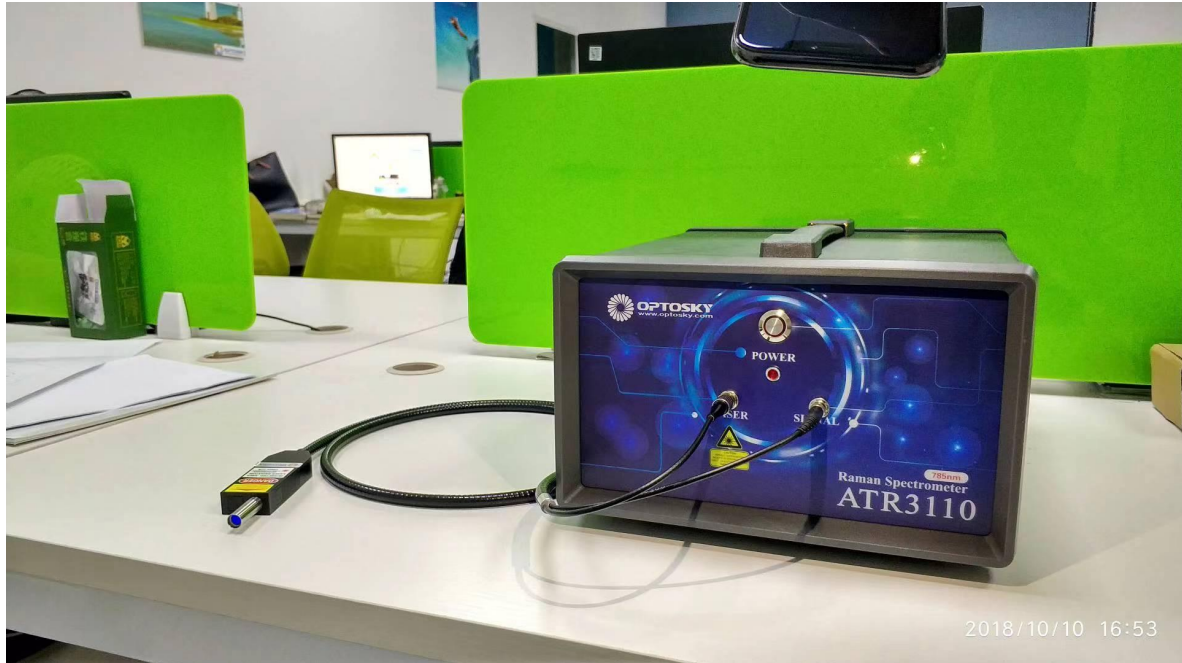


Figure 2 A physical diagram of the ATR3110XW. The fiber optic probe is detachable, very flexible, and compatible with microscopes of all major brands.







## 4. Measurement Accessories



Figure 3 Liquid sample measuring cell (Thermo bottle)



Figure 4 Liquid sample measuring cell (LC bottle, micro volume)  
(optional)



Figure 5 ATR20107 gun type Raman probe (optional)



Figure 6 Precision adjustment stand (for solid and powder measurement)

## 5. Optical Properties

### 5.1 Measured Raman signal

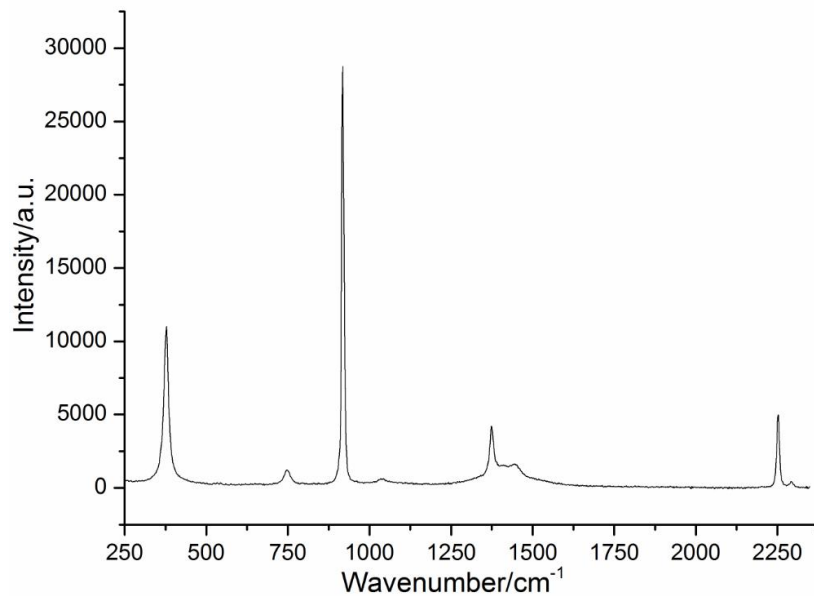


Figure 7 ATR3110XW-785 measured acetonitrile Raman signal



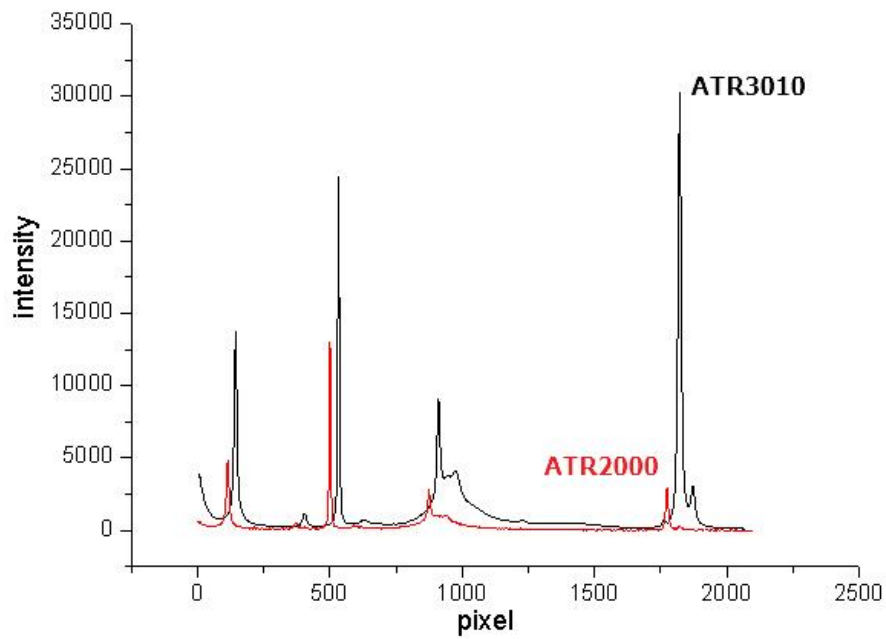


Figure 8 Actual sensitivity test of ATR3110XW

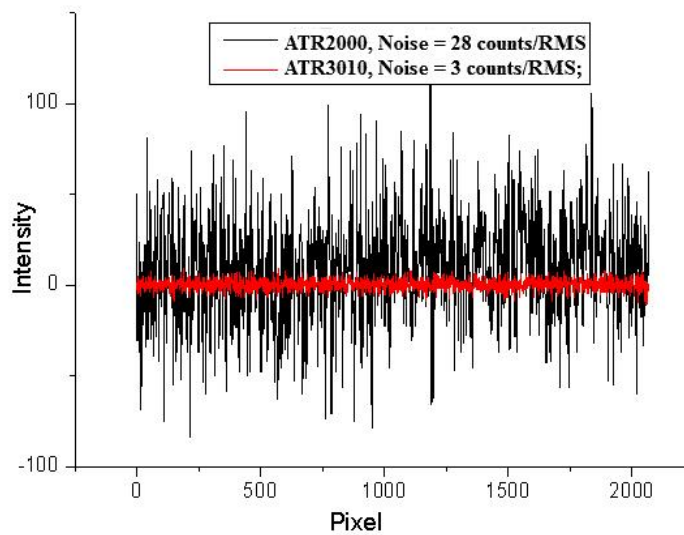
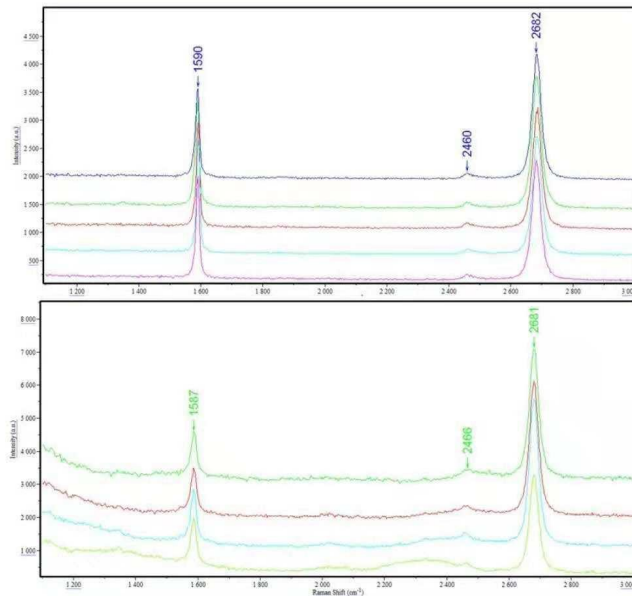


Figure 9 ATR3110XW measured noise test

## 石墨烯拉曼信号采集



样品：硅基石墨烯，取五个点  
 仪器：Xplora Plus  
 采谱条件：532nm, 10%, 1s, 1次,  
 1200T  
 2682cm<sup>-1</sup> : 1590cm<sup>-1</sup>强度比1.165

样品：硅基石墨烯，取四个点  
 仪器：奥普天成532  
 采谱条件：532nm, 100%, 20s, 2次  
 2681cm<sup>-1</sup> : 1587cm<sup>-1</sup>强度比2.51

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Figure 10 Graphene signal measured by ATR3110XW-532 (compared with Horiba Xplora microscope Raman spectrometer)

## 5.2 Spectral Resolution

### 5.2.1 Raman spectral of Tylenol

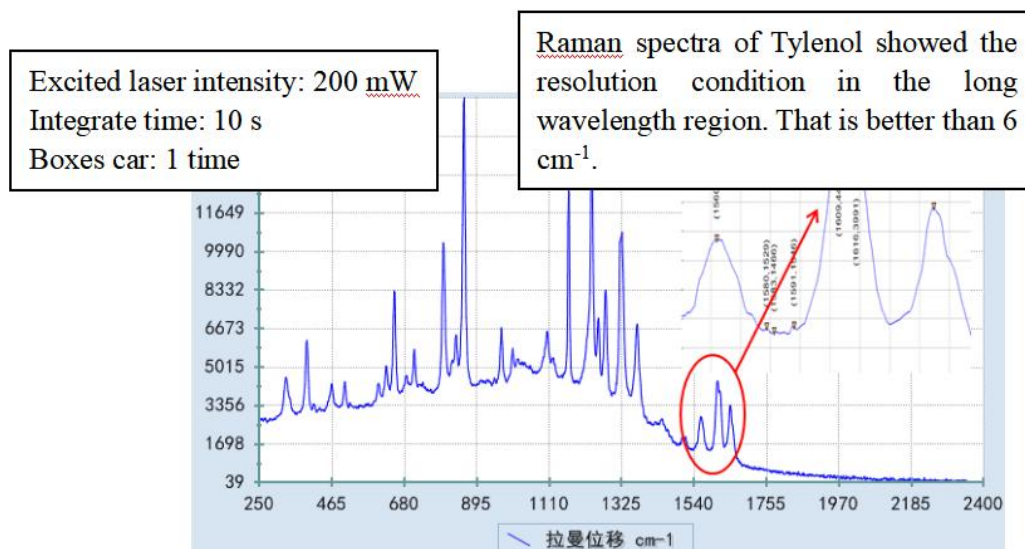


Fig.11 Raman spectrum of Tylenol, the vibration mode 1610/1615 cm<sup>-1</sup> can be resolved.

## 5.2.2 Raman spectral of petrol

Excited laser intensity: 200 mW  
Integrate time: 10 s  
Boxes car: 1 time

Raman spectra of petrol 93# showed the resolution condition in the short wavelength region.

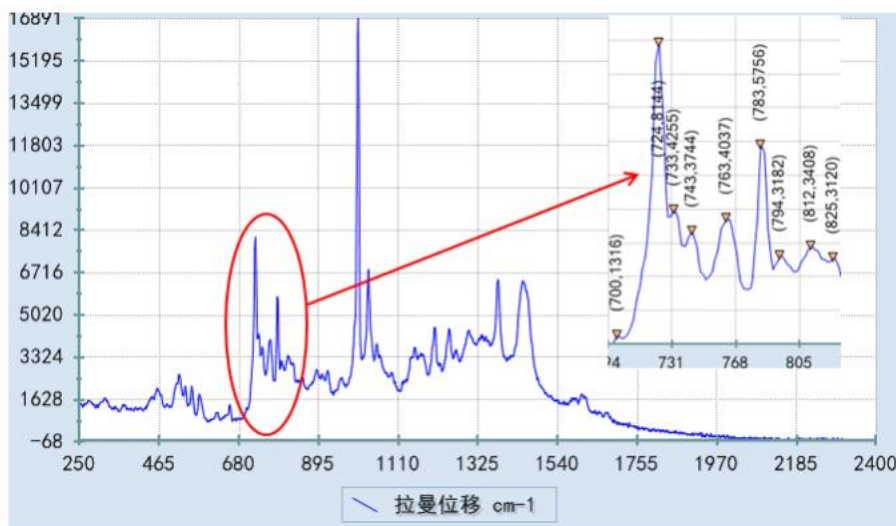


Fig.12 Raman spectrum of petrol 93#, the vibration mode 723/732/742cm-1 can be resolved.

## 5.3 Reliability

Figure 15 and Figure 16 showed the temperature reliability testing results of five ATR3110XW portable Raman spectrometers. The testing temperature range was from 5 °C to 40 °C. The spectrometer was kept more than 1 hour at every temperature spots. Acetonitrile was used as the standard sample in the testing. The testing results were calculated using 918 cm<sup>-1</sup> of acetonitrile. The wavenumber shift was 1 cm<sup>-1</sup> or less (as shown in Fig. 15). The peak intensity variation was less than 10%.

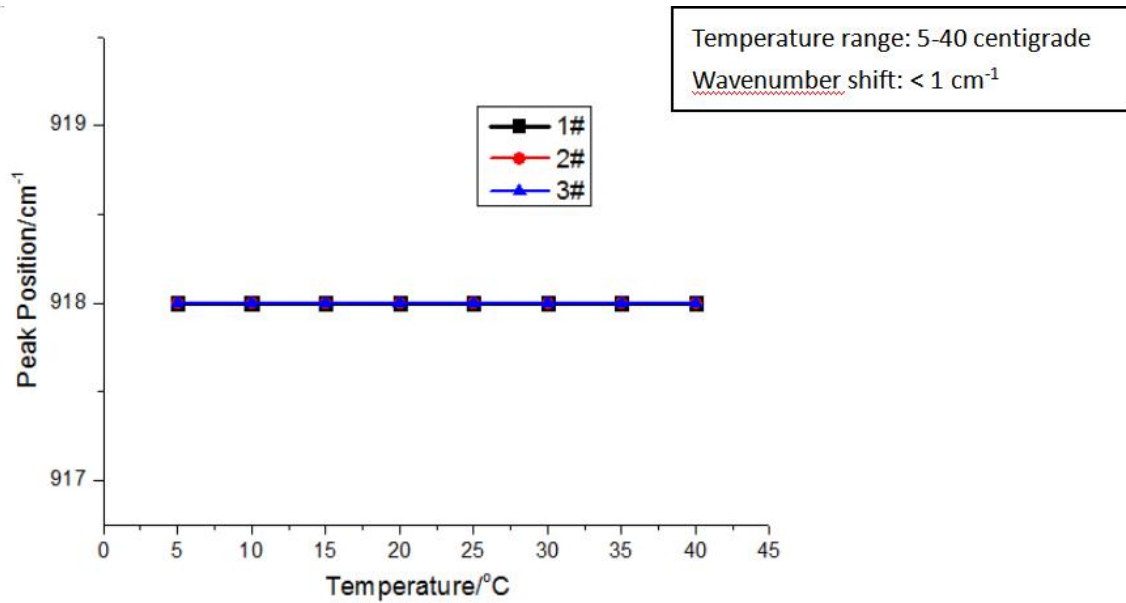


Fig. 15 Wavenumber shift results testing from 5 °C to 40 °C of five ATR3110XWportable Raman spectrometers

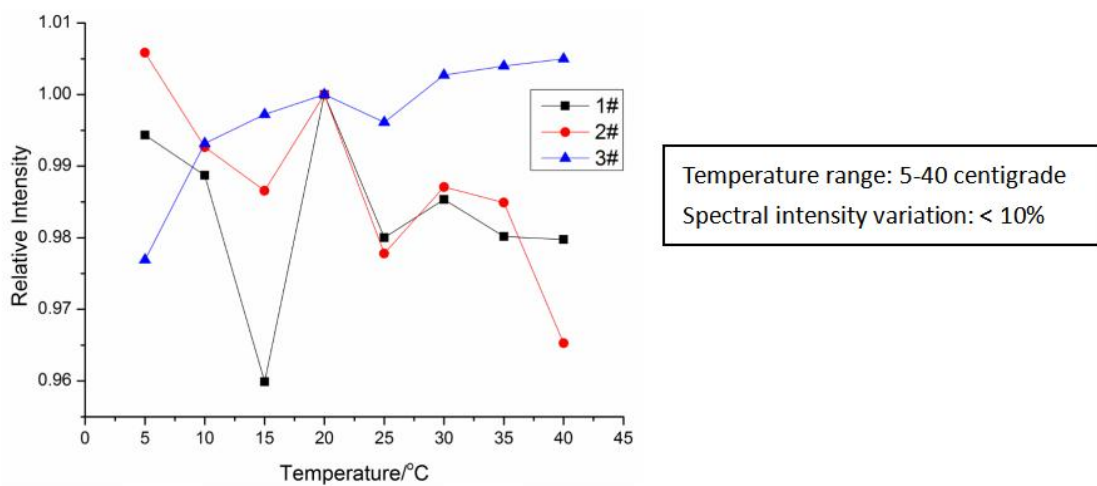


Figure 16 Intensity variation testing from 5 °C to 40 °C of three ATR3110XWportable Raman spectrometers

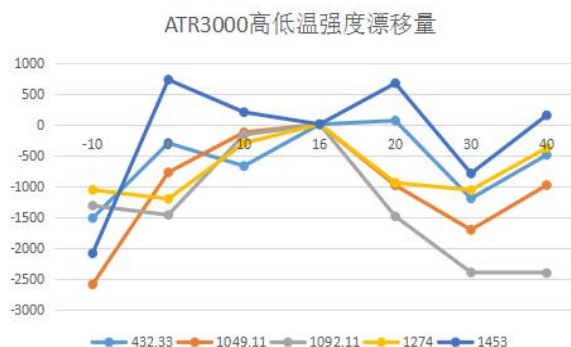


Figure 17 Intensity variation -10 °C to 40 °C of ATR3110XWportable Raman spectrometers, sample is alcohol.