

## High-sensitivity High-resolution Portable Raman Spectrometer

# ATR3000

### Feature:

- Ultra-high sensitivity FFT-CCD TE-cooled;
- low noise circuit;
- Powerful embedded software;
- Fluorescent background eliminate;
- Peak finding and display;
- 10.1-Inch LCD;
- Win 10 operation system;
- 11.6-inch capacitive touch screen, multi-touch;
- USB 2.0;
- User friendly human-machine interface;
- Battery life> 3h;
- Remote control via LAN;
- IP67 case;

### Application:

- Biological science
- Pharmaceutical engineering
- Forensic analysis
- Agriculture and food safety
- Gemstone
- Environmental science

### Description:

ATR3000 portable Raman spectrometer is suitable for field operation. The outstanding reliability makes the detection result much accurate. The excellent low stray light conditions that enable the spectrometer has a wide range of application, especially in the public safety, food safety, pharmaceutical engineering. The multi-function software facilitated the spectral analysis process in application. The remote experiment through internet access makes the test item much easier.

Item	Wavelength range (cm <sup>-1</sup> )	resolution (cm <sup>-1</sup> ) *
ATR3000-27	150-2600	5
ATR3000-35	200-3500	5
ATR3000-43	200-4300	6

### Remark:

- Measuring method is based on ASTM E2529-06;
- Available in custom design, resolution can be increased by around 1/3, resulting in lower sensitivity;



## Specifications

ATR3000 System			
Interface	USB 2.0 and WIFI		
Operating system	Android		
Screen	11.6-inch capacitive touch screen, Multi-touch		
Battery life	>4 h		
Integration time	4ms - 120s		
Power voltage	DC 19V(+/-5%)		
Operating Temp	-10~40 °C		
Operating humidity	< 95%		
Dimension(L*W*H)	40×30×18 cm <sup>3</sup>		
Weight	7.5 Kg		
Reliability			
Spectral stability	$\sigma/\mu < 0.5\%$ (COT 8 hours)		
Temp stability	Spectral shift $\leq 1 \text{ cm}^{-1}$ (10-40 °C)		
Variation of intensity (in 5 ~ 40 °C)	<±5%		
Optical parameters			
Spectral range (cm <sup>-1</sup> )	150-2600	200-3500	200-4300
resolution (cm <sup>-1</sup> )	5	5	6
SNR	>3000:1 (918 cm <sup>-1</sup> of Acetonitrile , 10s accumulation, 200mW)		
Entrance slit	50 μm		
Optical system	f/4 C-T crossed optical path		
focusing	98 mm for incidence and output		
Detector			
Item	Ultra-high sensitivity, quick cooling CCD		
Detector cooled down to	-10 °C		
Detecting range	200-1100 nm		
Effective pixels	2048*64		

Dynamic range	50000: 1
Pixel size	14 $\mu$ m $\times$ 14 $\mu$ m
Full well capacity	300 Ke <sup>-</sup>
Sensitivity	QE>40%, 6.5 $\mu$ V/e <sup>-</sup>
<b>Exciting Laser</b>	
Central wavelength	785nm (+/-1nm)
FWHM	0.08 nm
Power output	$\geq$ 500 mW
Power stability	$\sigma/\mu < \pm 0.2\%$
<b>Raman probe</b>	
Operating distance	6 mm
Rayleigh scattering resistance	OD>8
Numerical Aperture	0.3
Aperture	7mm



Fig 1 ATR3000 picture

## 2 Optical Performance

### 2.1 General spectral performance

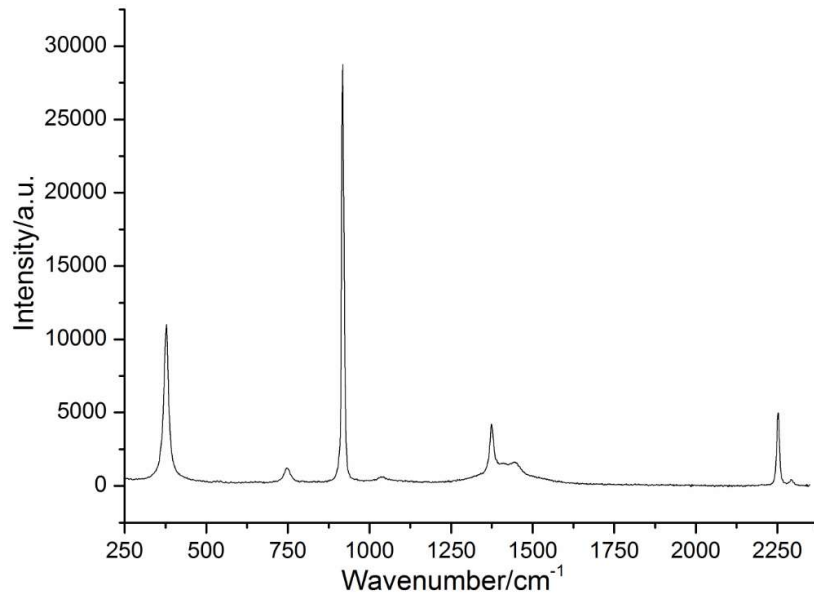


Figure 1 Raman spectra of acetonitrile

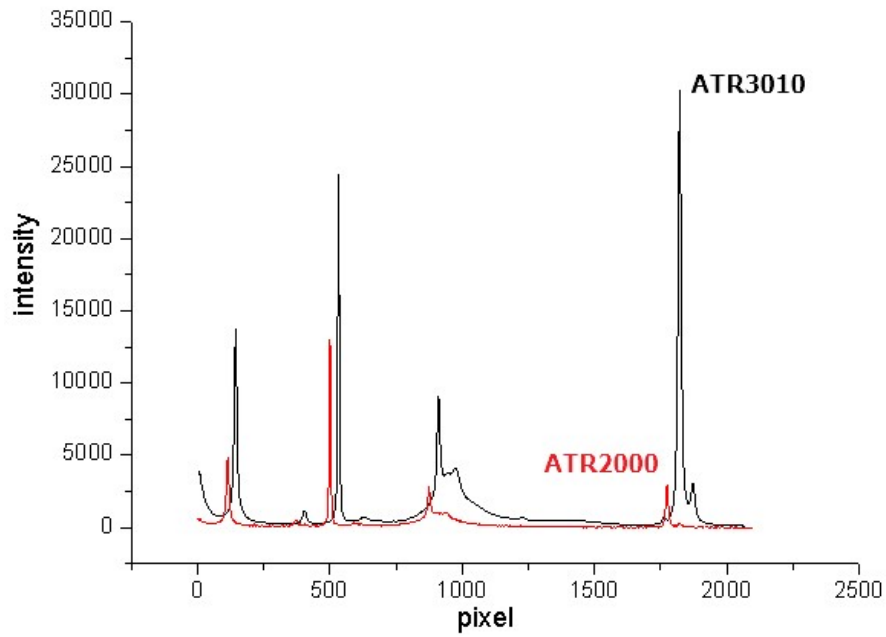


Figure 2 Sensitive of ATR3000 vs ATR2000

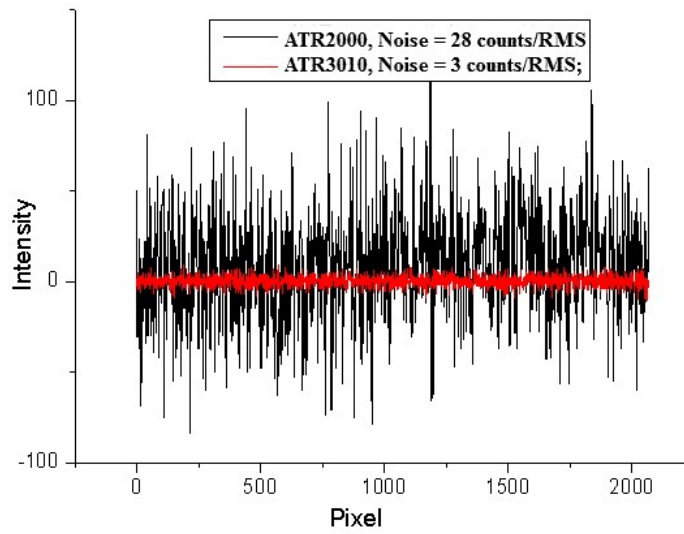


Figure 3 Noise of ATR3000 vs ATR2000

## 2.2 Spectral Resolution

### 2.2.1 Raman spectral of Tylenol

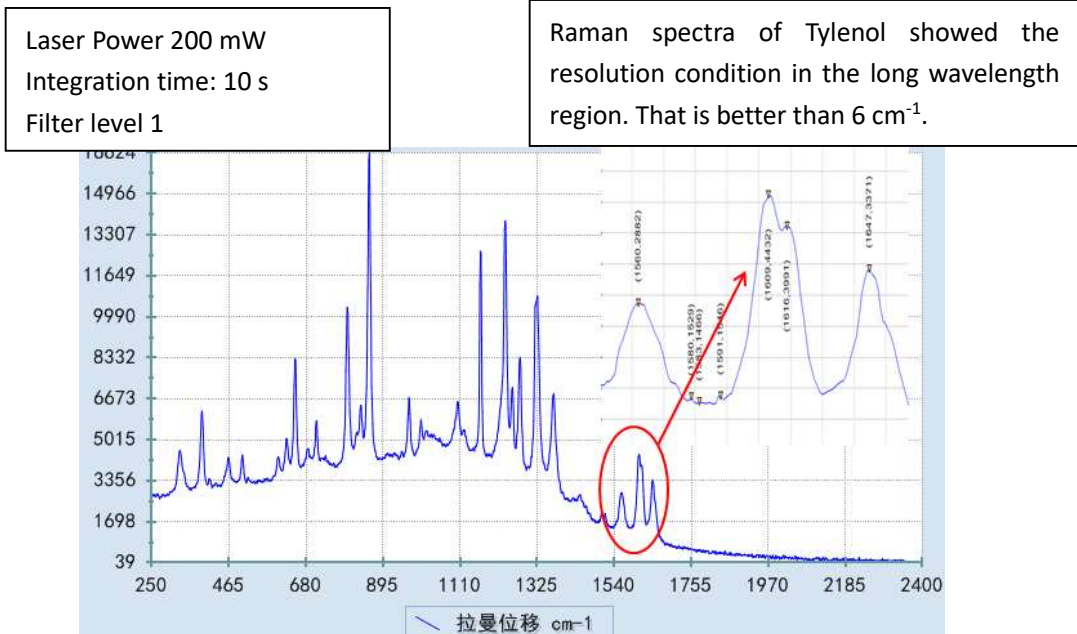
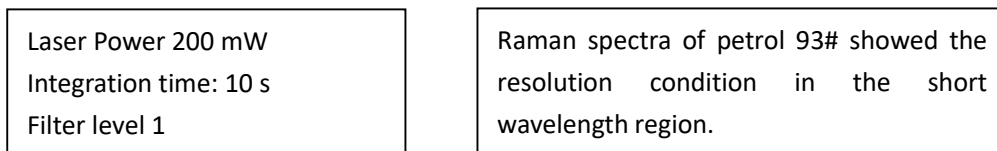


Fig.2.2 Raman spectrum of Tylenol, the vibration mode  $1610/1615\text{ cm}^{-1}$  can be resolved.

### 2.2.2 Raman spectral of petrol



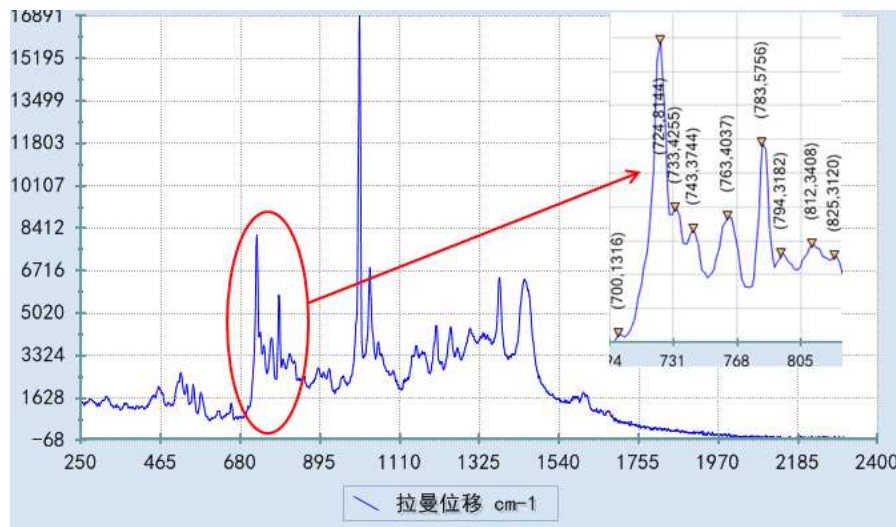


Fig.2.3 Raman spectrum of petrol 93#, the vibration mode 723/732/742cm<sup>-1</sup> can be resolved.

## 3 Reliability

Figure 3.1 and Figure 3.2 showed the temperature reliability testing results of five ATR3000 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 show in Fig. 3.1). The peak intensity variation was less than 10% (as show in Fig. 4).

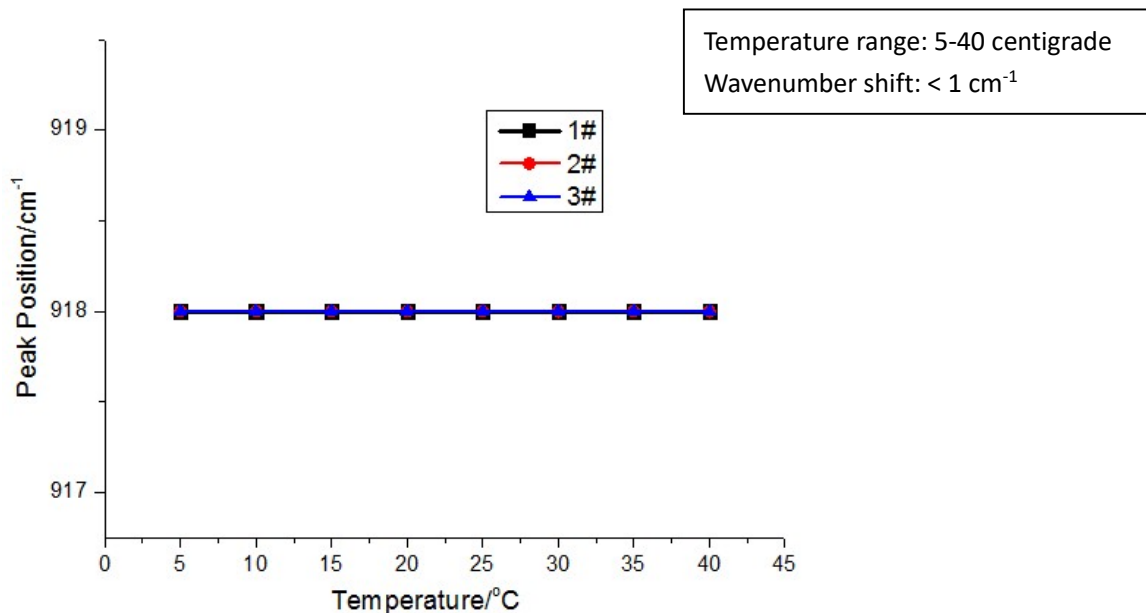




Fig. 3.1 Wavenumber shift results testing from 5 °C to 40 °C of fives ATR3000 portable Raman spectrometers

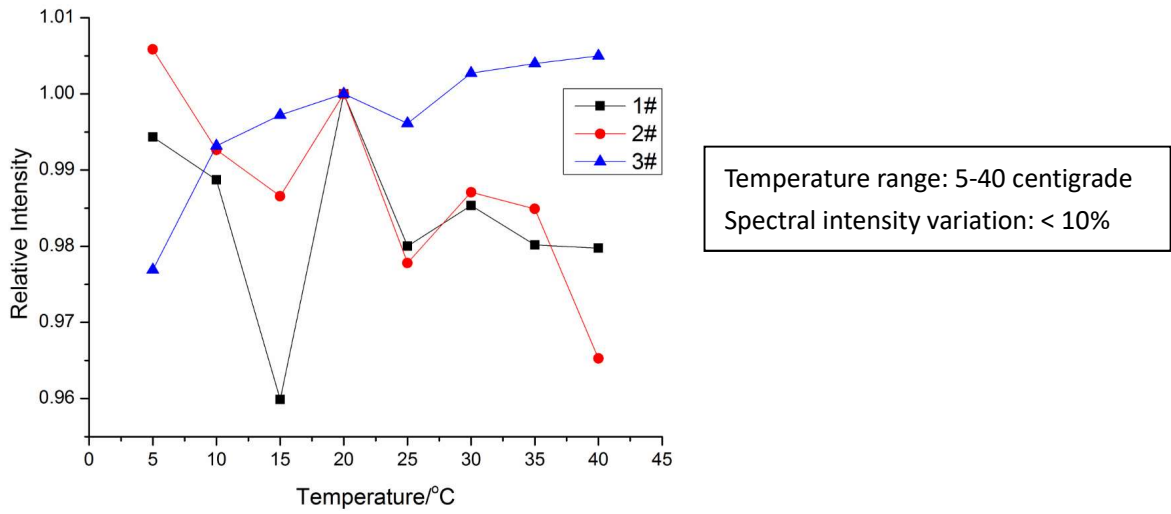


Figure 4 Intensity variation testing from 5 °C to 40 °C of three ATR3000 portable Raman spectrometers

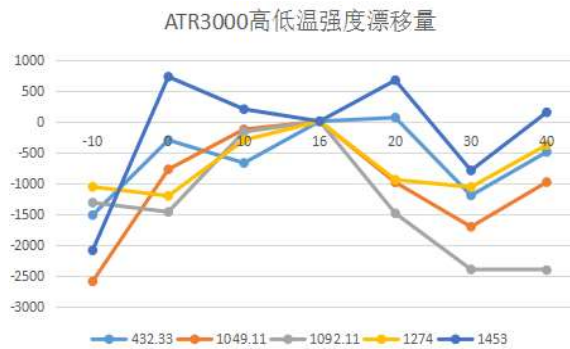


Figure 5 Intensity variation -10 °C to 40 °C of ATR3000 portable Raman spectrometers, sample is alcohol.



## 2. Measuring accessories



Fig 2 Solid, powder measuring probe

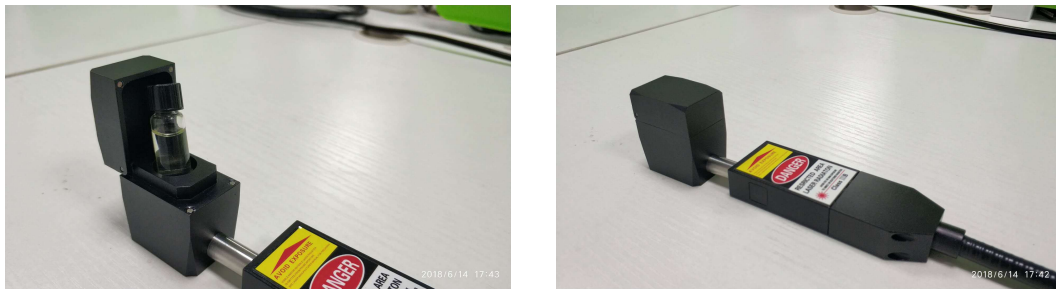


Fig 2 Fluid sample cell (Thermo bottle)

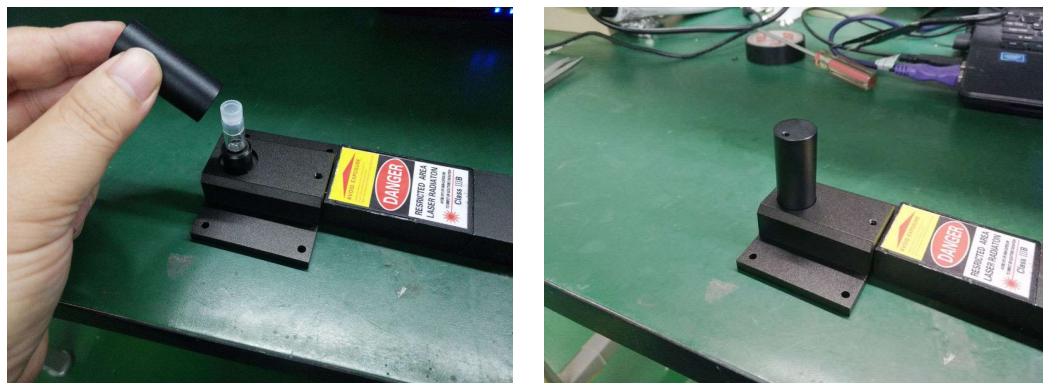


Fig 3 Fluid sample cell (Liquid chromatography bottle) (Optional)



Fig 5 Raman probe gun (optional)



Fig 6 Measuring adjustable holder (Optional)