

High-sensitivity High-resolution Portable Raman Spectrometer

ATR3100

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:

ATR3100 Raman Spectrometer is TE-cooled, high-sensitivity, enhanced designed for broadband ranges.all of optical path, PCB, signal processing method have been made optimized processed to obtain >15times higher SNR than ATR20007, nearly 100 times higher than 2000cm-1.

ATR3100 employs low noise CCD signal process circuit, noise<3counts.

ATR3100 employs 110/220V power supply,DC supply via 19V adaptor.Easy to take and field operation.

PN	Wavelength (nm)	Wavenumber range cm-1
ATR3100-473	473	150-4000
ATR3100-532	532	150-4000
ATR3100-785-27	785	250-2700
ATR3100-785-40		150-4000
ATR3100-830	830	150-4000
ATR3100-1064	1064	150-4000
Available in custom made wavelength		

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.



1 Specifications

ATR3100 System			
Interface	USB 2.0 and WIFI		
Operating system	Windows 10		
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 ³		
Weight	7.5 Kg		
Reliability			
Spectral stability	σ/μ < 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 ⁻¹)	250-2700	200-3500	200-4300
resolution (cm ⁻¹)	6	8	10
SNR	>3000:1 (918 cm ⁻¹ 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 μm ×14 μm		
Full well capacity	300 Ke ⁻		
Sensitivity	QE>40%, 6.5 $\mu\text{V}/\text{e}^-$		
Exciting Laser			
Central wavelength	785nm (+/-1nm)		
FWHM	0.08 nm		

Power output	≥500 mW
Power stability	$\sigma/\mu < \pm 0.2\%$
Raman probe	
Operating distance	6 mm
Rayleigh scattering resistance	OD>8
Numerical Aperture	0.3
Aperture	7mm



Fig 1 ATR3100 picture

2 Optical Performance

2.1 General spectral performance

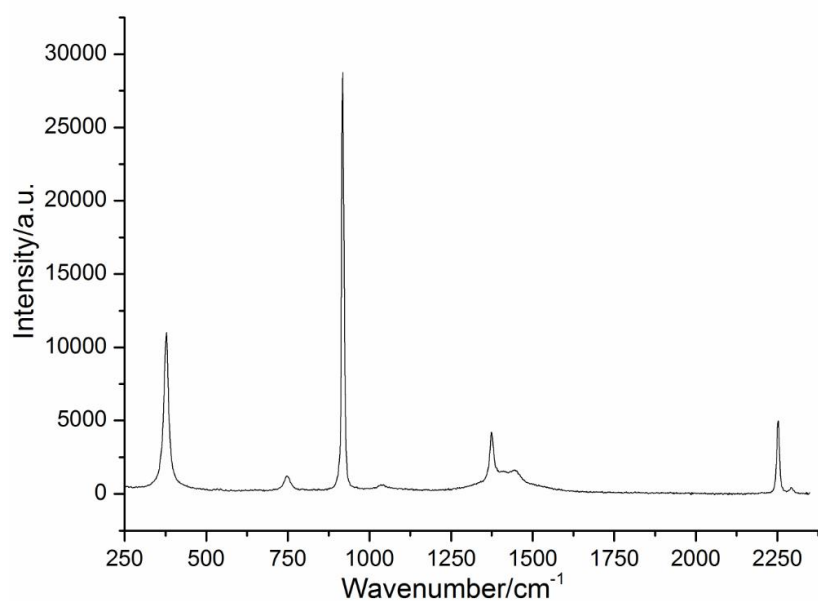


Figure 1 Raman spectra of acetonitrile

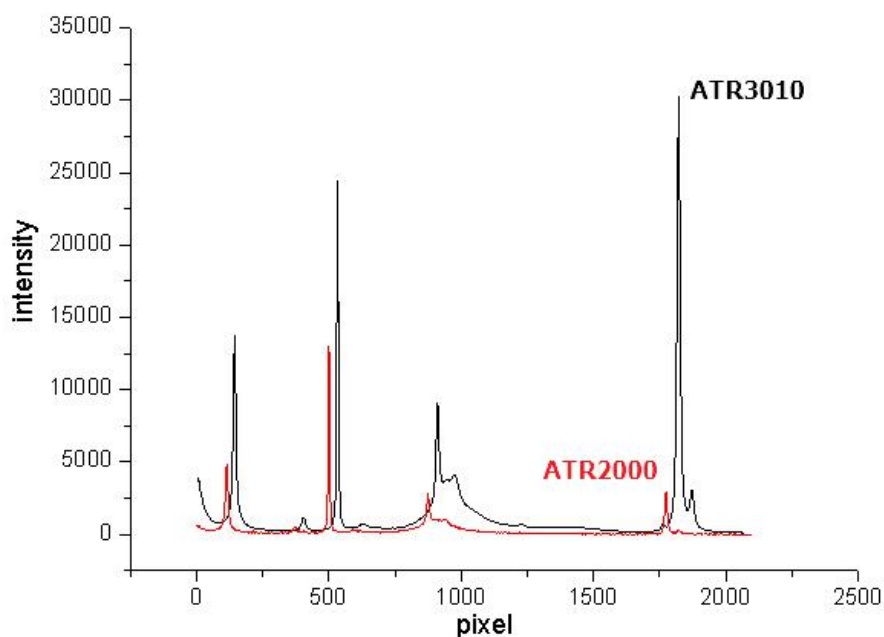


Figure 2 Sensitive of ATR3000 vs ATR2000

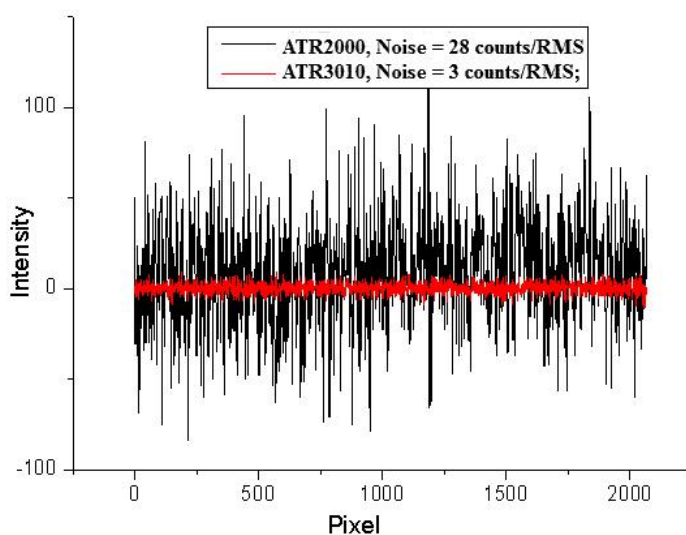


Figure 3 Noise of ATR3000 vs ATR2000

2.2 Spectral Resolution

2.2.1 Raman spectral of Tylenol

Laser Power 200 mW
Integration time: 10 s
Filter level 1

Raman spectra of Tylenol showed the resolution condition in the long wavelength region. That is better than 6 cm^{-1} .

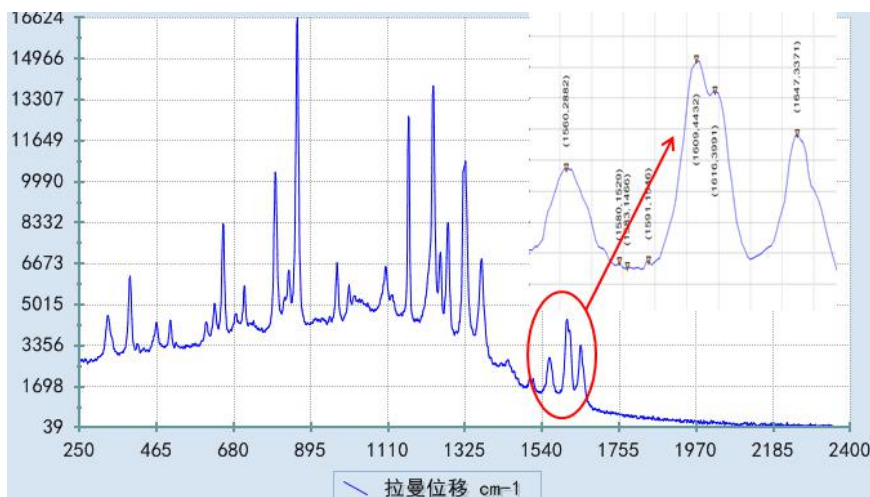


Fig.2.2 Raman spectrum of Tylenol, the vibration mode 1610/1615 cm^{-1} can be resolved.

2.2.2 Raman spectral of petrol

Laser Power 200 mW
 Integration time: 10 s
 Filter level 1

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

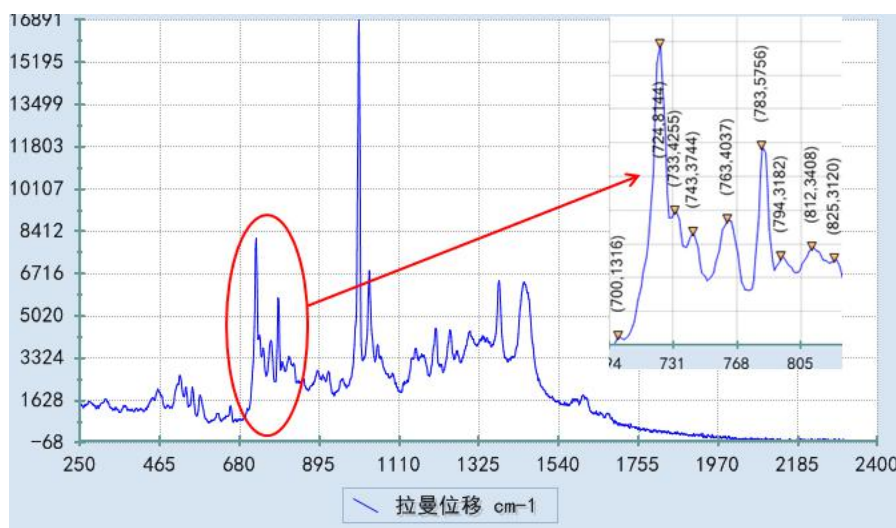


Fig.2.3 Raman spectrum of petrol 93#, the vibration mode 723/732/742 cm^{-1} can be resolved.

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^{-1} of acetonitrile. The

wavenumber shift was 1 cm^{-1} or less (as shown in Fig. 3.1). The peak intensity variation was less than 10% (as shown in Fig. 4).

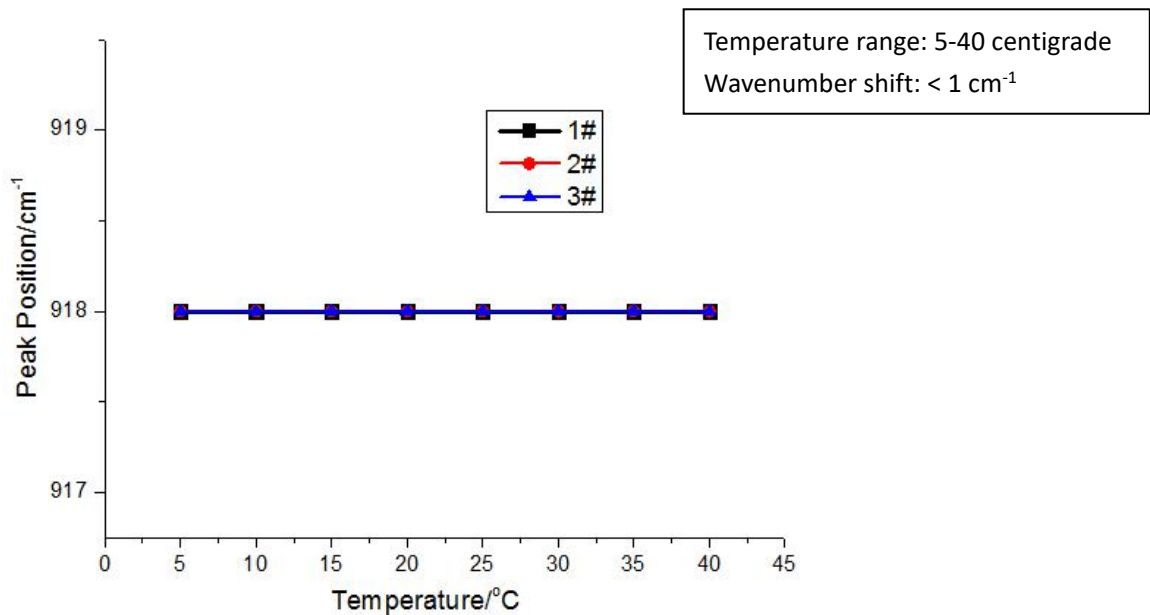


Fig. 3.1 Wavenumber shift results testing from 5 °C to 40 °C of five ATR3000 portable Raman spectrometers

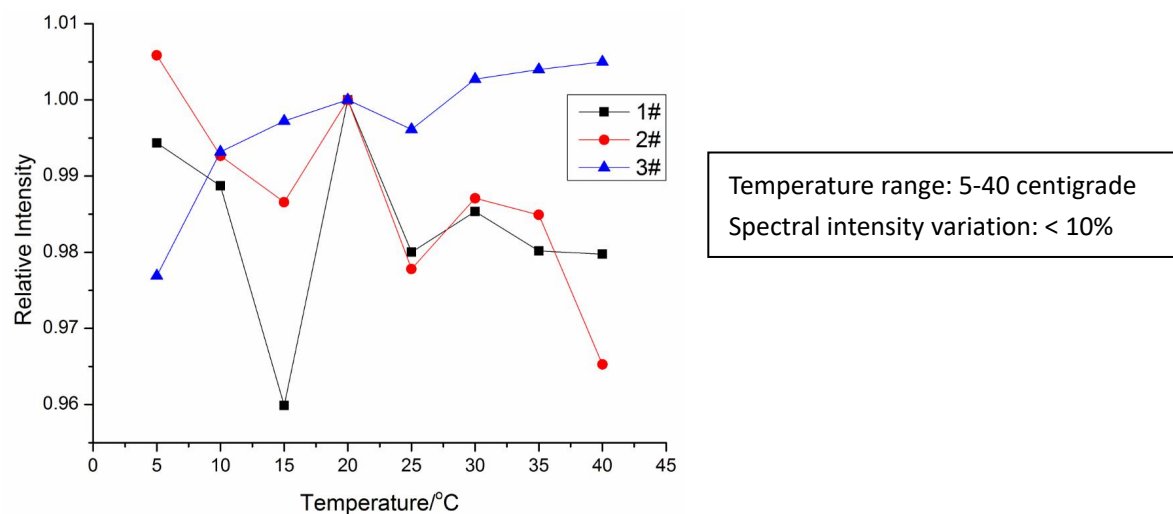


Figure 4 Intensity variation testing from 5 °C to 40 °C of three ATR3000 portable Raman spectrometers

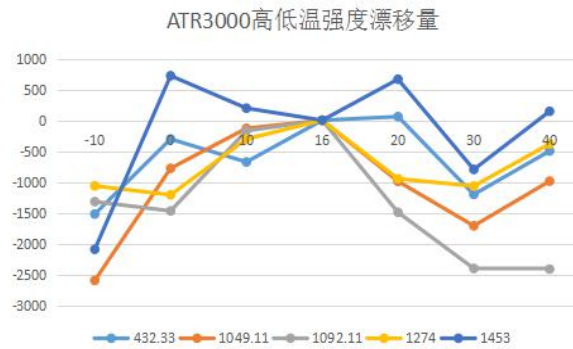


Figure 5 Intensity variation -10 °C to 40 °C of ATR3000 portable Raman spectrometers, sample is alcohol.

2. Measuring accessories

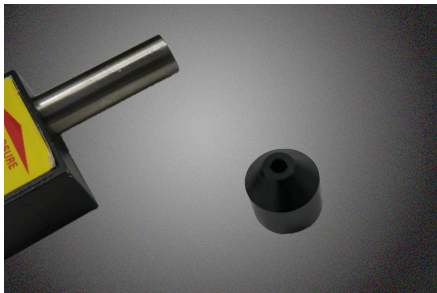


Fig 2 Solid, powder measuring probe



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)