

AvaRaman Fiber-optic Raman System

Raman spectroscopy is especially useful for reaction monitoring, product identification, remote sensing and the characterization of highly scattering particulate matter in aqueous solutions. Based on the principle discovered by Prof. Chandrasekhara Venkata Raman, it measures the result of the inelastic scattering of photons.

Avantes uses the high-sensitivity AvaSpec spectrometers in combination with a 532 nm or 785 nm laser to give you the best result for your Raman measurements. The spectrometers are appropriately configured according to the wavelength of the laser.

Now the AvaSpec-HERO is integrated in a Raman system as well.

Because of the lower dark noise (only 2 counts) you'll have a much better performance. The superior Signal to Noise ratio (800:1) is important when you're dealing with small signals, which is typically the case in raman. Also when small process changes need to be monitored in time, the HERO is superior as the small change pro-

cess will lead to a small change in signal which can be clearly discriminated by the excellent SN ratio. The higher NA optical bench results in a better sensitivity (Twice as high as the ULS2048L). This will lead to more photons impinging on the detector. Temperature control is very important in raman measurements to create stable results in time. Cooling to -10 °C for lowest noise performance and very stable cooling control (+-0.1 °C accuracy) is delivering accurate and reproducible results. This all together provides you with a combination that is suitable for the more demanding applications (low light, better signal to noise, low noise ratio).

All AvaRaman systems are equipped with cooling systems. Cooling the detector down to -35°C cooling versus ambient, reduces the noise figures by a factor 2-3, enabling the usage of longer integration times to enhance the detection of small signals. All AvaRaman systems are delivered with special AvaSoft-Raman software. Complementary Panorama-Pro soft-



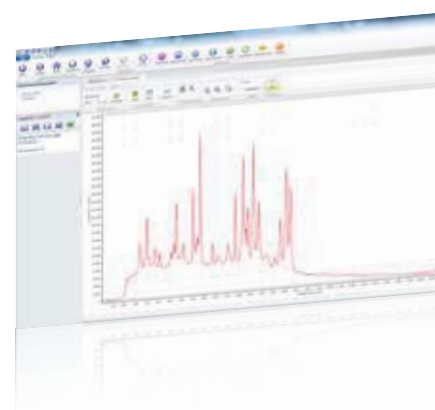
ware is available for Raman interpretation and functional group assignment.

A selection of different probes is available to select the right one for your application. For more information on our software solutions including AvaSoft-Raman and Panorama-Pro, please check the software pages on the website.

Technical Data

| | AvaRaman-532TEC | AvaRaman-532HERO-EVO | AvaRaman-785TEC |
|------------------------------|--|---|---|
| | Cooled | Cooled | Cooled |
| Signal to noise Ratio | 200:1 for Benzene | 800:1 for Benzene | 300:1 for Benzene |
| Resolution* | 6 cm ⁻¹ | 10 cm ⁻¹ | 6 cm ⁻¹ |
| Spectrometer | AvaSpec-ULS2048L-TEC with grating NC (535-752 nm), slit-25, DCL-UV/VIS TE-cooled | AvaSpec-HERO with HSC1200-0.75 (535-660nm), slit-25-FCPC, TE-cooled, Standard: replaceable slit | AvaSpec-ULS2048L-TEC with grating SI (785-1080 nm), slit-25, DCL-UV/VIS-200 TE-cooled |
| Raman Shift | 100-5400 cm ⁻¹ | 100-3650 cm ⁻¹ | 100-3500 cm ⁻¹ |
| Laser output | 532 nm, 50 mW | 532 nm, 50 mW | 785 nm, 500 mW, Class 3b |
| Laser Wavelength | 532 nm | 532 nm | 785 nm |
| Laser Bandwidth | < 0.1 nm | < 0.1 nm | < 0.2 nm |
| Dimensions housing | 240 (L) x 140 (W) x 250 (H) mm | | |

* typical resolution: higher resolution possible on request



Pre-configured spectrometers can be shipped within 24 hours

AvaRaman probes

AvaRaman-PRB-XXX

3/8" SS low-cost focusing probe with a 200 μm excitation fiber and 400 μm read fiber. Multiple focal lengths available (5 mm, 7.5 mm (standard), 10 mm). It can withstand 80°C. Manual shutter included, 1.5 m fibers. Specify XXX=excitation wavelength



AvaRaman-PRB-FP-XXX

1/2" SS focusing probe with a 200 μm excitation fiber and 400 μm read fiber. Multiple focal lengths available (5 mm (standard), 7.5 mm, 10 mm). It can withstand 80°C. Specify XXX=excitation wavelength



AvaRaman-PRB-FIP-XXX

5/8" SS immersible focusing probe for in-situ measurements with a 200 μm excitation fiber and 400 μm read fiber. It can withstand 200°C. Specify XXX=excitation wavelength



AvaRaman-PRB-FC-XXX

3/8" SS immersible process probe for in-situ measurements with a 200 μm excitation fiber and 400 μm read fiber. It can withstand 500°C and 3000psi, the probe optics provide complete background filtering. Specify XXX=excitation wavelength



Ordering Information

AvaRaman-532TEC-USB2

Consisting of following elements:

- Solid state 50 mW laser 532 nm, FWHM 0.2 nm
- TE-cooled AvaSpec-ULS2048L-TEC-USB2 Spectrometer with 1200 lines/mm grating set 535-752 nm, 25 μm slit, DCL-UV/VIS
- AvaSoft-Raman software for the AvaRaman system, AvaRaman-GL-532 laser safety goggles

AvaRaman-532HERO-EVO

Consisting of following elements:

- Solid state 50 mW laser 532 nm, FWHM 0.2 nm, FCPC Connector
- TE-cooled AvaSpec-HERO Spectrometer with 1200 lines/mm grating set for 535-660 nm, 25 μm slit (replaceable)
- AvaSoft-Raman software for the AvaRaman system, AvaRaman-GL-532 laser safety goggles

AvaRaman-785TEC-USB2

Consisting of following elements:

- Solid state 500 mW laser 785 nm, FWHM 0.2 nm
- TE-cooled AvaSpec-ULS2048L-TEC-USB2 Spectrometer with 830 lines/mm grating set 785-1080 nm, 25 μm slit, DCL-UV/VIS-200
- AvaSoft-Raman software for the AvaRaman system, AvaRaman-GL-785 laser safety goggles

Different Raman probes available, please see table above

Other accessories

AvaRaman-SH-3/8"

- Rugged sample holder for secure positioning of 3/8" Raman probes

AvaRaman-SH-1/2"

- Rugged sample holder for secure positioning of 1/2" Raman probes

AvaRaman-Calibrationtile

- PTFE White tile in holder for 3/8" Raman probe