

Analytical Instrumentation

Surf the New Wave in Portable Fiber Optic Spectrometry

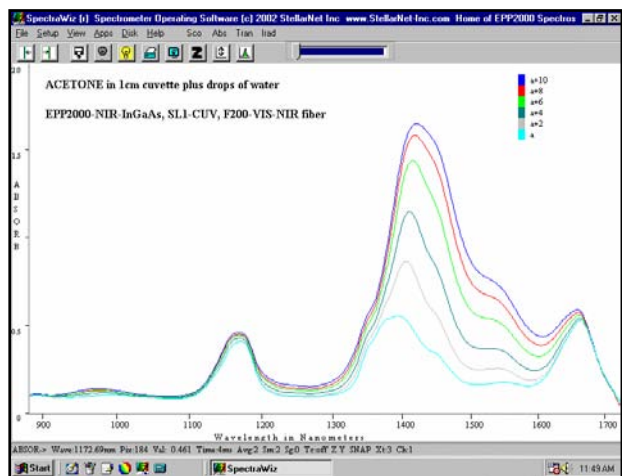
RED-Wave NIR Spectrometers with 512 or 1024 InGaAs detector arrays

The RED-Wave NIR spectrometers are equipped with high performance InGaAs PDAs to cover the NIR wavelength range from 0.9-2.3 μm . The units are exceptionally robust with no moving parts and are packaged in small rugged metal enclosures (2.75" x 4" x 6") for portable, process, and lab applications. The InGaAs detector is a Sensors Unlimited linear photo diode array with 512 pixels (**1024 optional**) 25 μm by 500 μm tall to provide maximum sensitivity. The detector has an integrated thermo electric cooler (TEC) maintained at $-10\text{ }^{\circ}\text{C}$, stabilized within $\pm 0.1\text{ }^{\circ}\text{C}$. The NIR spectrometers take a single strand SMA 905 terminated fiber optic cable with low OH as input. Several models provide a variety of operational ranges and resolutions suitable for both spectroscopy and optical spectrum analysis.



The units interface to a PC via USB-2 and can be operated simultaneously with StellarNet UV-VIS spectrometers to provide a Dual-Detector Super-Range (Dual-DSR) spectroscopy system. A list of NIR applications include chemical ID of solids and liquids, moisture analysis, SpectroRadiometry and optical power measurements including NIR laser characterization, *microsensor* applications, and multi-layer thin-film measurements.

The SpectraWiz software is included free and enables a variety of spectroscopy applications under every version of Windows including XP/Vista. Additional software is included for user customization via Excel with VBA or LabVIEW at no extra charge.



Drops of water in ACETONE

| Specifications | Zero defect 512 detector | RED-Wave-512 | NIR Spectrometer |
|--------------------------|--|--------------------------------|----------------------------------|
| Dynamic range: | 4000:1 with 5 decades | Dimensions: | 150 x 100 x 68.8 mm |
| Resolving resolution: | 3.1nm with 25 μm slit | TEC Power | 2 Amps @ 5 VDC |
| InGaAs Detector: | 512 pixel cooled PDA array | Interface: | USB-2 |
| Detector range: | 0.9-1.7 μm (900-1700nm) | Data transfer speed: | 40x faster than USB-1 |
| Pixel size: | 25 μm x 500 μm | Detector Integration: | 1 millisecond to 30 secs |
| Pixel well depth: | 130 x10 ⁸ electrons | Slit size options: | 25, 50,100, or 200 μm |
| Selectable well control: | 130 x10 ⁸ or 5 x10 ⁶ e1. | Operating systems: | Win98/NT/Me/00/XP |
| Signal to noise: | 4000:1 with TEC cooling | Software included: | SpectraWiz program & apps |
| Digitizer: | 14/16 bit @ 2.5 MHz rate | Also free programs for: | LabView,Excel+VBA,Delphi |



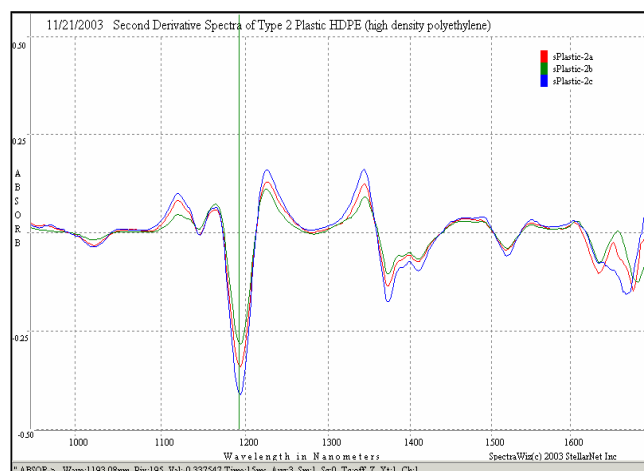
RED-Wave NIR Spectrometers with 512 or 1024 InGaAs detector arrays

The StellarNet RED-Wave fiber optic spectrometers are available in several models to provide optimal ranges and resolutions for various NIR applications in the standard 0.9-1.7 μ m and extended 1.5-2.2 μ m ranges. The standard detector is a 512 element photo diode array (PDA) with 25 x 500 μ m tall pixels and has zero defects. An optional 1024 element InGaAs PDA will double the resolution over the same range, however it can have <1% non-adjacent dropout pixels. The SpectraWiz software driver provides correction for any dropouts.

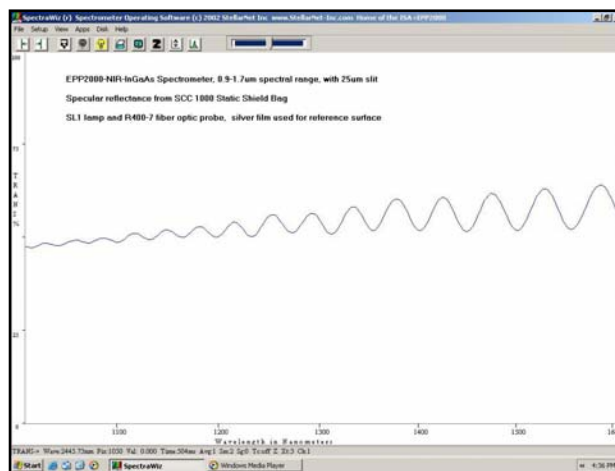
Extended range systems for 1.5-2.2 μ m are available in 512 or 1024 element InGaAs PDA's with 25 x 250 μ m tall pixels. Because of reduced sensitivity and higher dark noise, the extended range InGaAs spectrometers are primarily used for measuring tunable lasers, characterizing optics, or chemical absorption & transmission thru cuvettes, flow cells, and dip probes.

| InGaAs Model | Number of Elements | Spectrometer Range (nm) | Grating (g/mm) | Grating Range (nm) | Dispersion (nm/pixel) | Estimated Resolving Resolution |
|--------------|--------------------|-------------------------|----------------|--------------------|-----------------------|--------------------------------|
| NIR | 512 | 900-1700 | 250 | 800nm | 1.562 | 3.1nm |
| NIRb | 512 | 900-1600 | 300 | 650nm | 1.269 | 2.5nm |
| NIR2 | 512 | 1250-1575 | 600 | 325nm | 0.634 | 1.3nm |
| NIR2b | 512 | 1150-1475 | 600 | 325nm | 0.634 | 1.3nm |
| NIR | 1024 | 1000-1700 | 600 | 700nm | 0.683 | 1.4nm |
| NIR3-HR | 512 | 1530-1605 | 1200 | 70nm | 0.195 | 0.4nm |
| NIR3-HR | 1024 | 1500-1640 | 1200 | 140nm | 0.195 | 0.4nm |
| NIRX | 512 | 1500-2200 | 300 | 700nm | 1.367 | 2.8nm |
| NIRX | 1024 | 1500-2200 | 600 | 700nm | 0.683 | 1.4nm |
| NIRX-SR | 512 | 900-2300 | 300 | 1400nm | 5.3 | <13nm |
| NIRX-SR | 1024 | 900-2300 | 600 | 1400nm | 2.7 | <7nm |

The optical resolution is based on the grating range obtained by the StellarNet spectrograph and a 512 pixel detector to yield the dispersion. A 25 μ m slit will image onto one 25 μ m pitch pixel, and possibly 2, therefore our estimate of resolving resolution uses a factor of 2 times the dispersion. Actual resolutions may vary from the estimates shown. Multiply x2 for FWHM.



Spectrum from InGaAs-512 showing 2nd Derivative spectral reflectance of type-2 plastics (range 900-1700nm; 25 μ m slit)



Spectrum from InGaAs-1024 showing specular reflectance of silver coating (range 1000-1700nm; 25 μ m slit)

