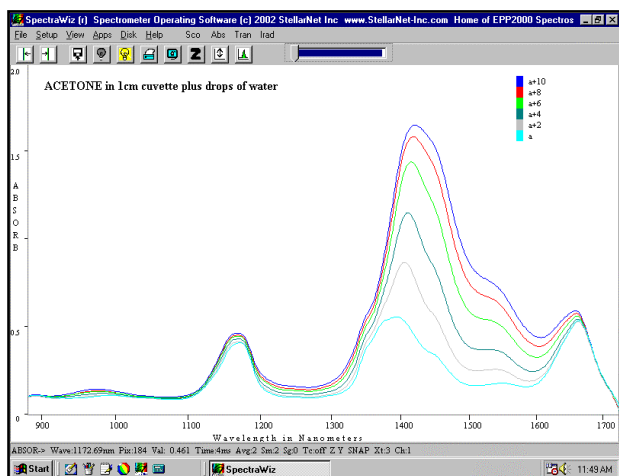




DWARF-STAR NIR Spectrometers for Portable & OEM Applications

StellarNet's newest NIR spectrometer, the **DWARF-Star**, is small, robust, and equipped with high performance InGaAs detector array for the 900-1700nm wavelength range and can achieve resolving resolutions to 1.25nm. The DWARF-Star features no moving parts and is packaged in a small rugged metal enclosure (5"x3"x2") for portable, process, and OEM applications. Advancements in electronic and optical design have allowed for size reduction never before achieved in a NIR spectrometer. The InGaAs detector is a linear photo diode array with 512 pixels (1024 are optional) which are 25 x 500µm tall to provide maximum sensitivity. The detector has an integrated thermo electric cooler (TEC) set to maintain -10 °C within +/-0.1 °C. The NIR spectrometers accept a single strand SMA-905 terminated low OH fiber optic cable as input. Several models provide a variety of operational ranges and



resolutions suitable for both spectroscopy and optical spectrum analysis. Each DWARF-Star includes free SpectraWiz® Software and a developer's toolbox of source codes, customizable demo programs, and full spectroscopy applications in LabVIEW, Visual Basic, Delphi Pascal, and MS Visual C. High speed spectral data acquisition with advanced features, such as time series analysis, episodic data capture, and rapid sample logging are standard features. Post processing techniques such as baseline correction, data smoothing, and spectral derivatives are included. Additionally, add-on chemometrics packages are available for complete multivariate calibration, analysis, and run-time with the DWARF-Star.

Specifications	DWARF-Star NIR Spectrometer	\$13,125	OEM Pricing available
Dynamic Range:	4000:1 with 5 decades	Dimensions:	5 x 3 x 2 inches
Resolving Resolution:	2.5nm with 25µm slit	Power Consumption:	1.5 Amps @ 5 VDC
InGaAs Detector:	512 or 1024 pixels	Interface Options:	USB ² or WiFi ² , RS232 ³ , SPI ³ , 4-20mA ³ , Digital I/O ³ , or ethernet ³
Detector Range:	900-1700nm	Data Transfer Speed:	30Hz or 1000Hz ¹
Pixel Size:	25um x 500um	Detector Integration:	1ms to 8 minutes
Pixel Well Depth:	130 x 10 ⁸ electrons	Slit Size:	25µm
Selectable Well Control:	130 x 10 ⁸ or 5 x 10 ⁶ electrons	Fiber Optic Input:	SMA-905 0.22 na single fiber
Signal to Noise:	1000:1	Operating Systems:	Windows and Linux ² , Android ² , iOS ²
Digitizer:	16-bit	Software Included:	SpectraWiz Program, WinSDK (C,C#,VB, Delphi), Customizable LabVIEW, VBA for Excel (CRI & LED Report)

¹ zAP1 Electronics Upgrade ² zAP2 WiFi + Applications Processor Upgrade with SpectraWiz Mobile Software ³ SMART-Control Interface



DWARF-Star InGaAs NIR Spectrometers for Portable and OEM Applications

The StellarNet DWARF-Star fiber optic spectrometers are available in several models to provide optimal ranges and resolutions for various NIR applications in the 900-1700nm range. The standard detector is a 512 element photo diode array with 25 x 500µm tall pixels and has zero defects.

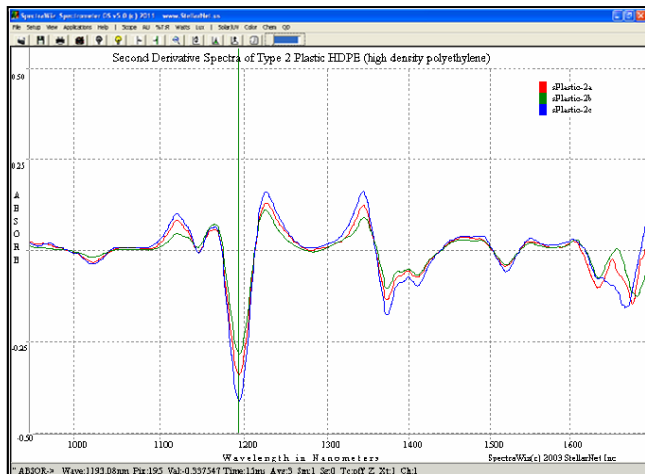
The instruments interface to a PC via USB-2 and can be operated simultaneously with StellarNet UV-VIS spectrometers to provide a Dual-Detector Super-Range (Dual-DSR) spectroscopy system. StellarNet also offers light sources, probes, and sampling accessories to facilitate virtually any NIR application. The miniature DWARF-Star NIR spectrometer is ideal for process analytical technology for industries such as food and drug, chemical, oil and gas, and plastics. The DWARF-Star's miniature size, low cost, and rugged design also make it ideal for the field, enabling on-site product analysis and quality control never before attainable.



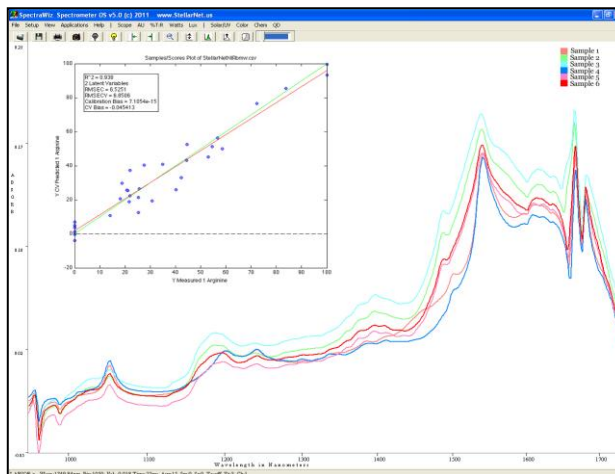
DWARF-STAR Standard Models

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	1.25	2.50nm
NIRb	512	1000-1700	300	650nm	1.00	2.00nm
NIR2	512	1250-1575	600	325nm	0.50	1.00nm
NIR2b	512	1150-1475	600	325nm	0.50	1.00nm
NIR	1024	1000-1700	600	700nm	0.62	1.25nm

The optical resolution is based on the grating range obtained by the StellarNet spectrograph and a 512 pixel detector to yield the dispersion. A 25µm slit will image onto one 25µm 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 DWARF-Star-512 showing 2nd Derivative spectral reflectance of type-2 plastics



SpectraWiz software interface displaying raw NIR reflectance spectra of dietary supplement powders with inset multivariate calibration model