STR series Laser Raman Spectrometer

STR Laser Raman Spectrometer is a highly compact, and flexible system with a high sensitivity to measure a weak Raman scattering from different materials. It consists of an imaging spectrometer and TE cooled CCD camera. We offer a remote probe head for remote sampling and an optical microscope with spatial resolution < 1μm.
The system comes with a combination of Visible and Near IR excitation laser sources, which allows to scan a wide variety of samples including organic compound. The included user friendly Windows based control and data processing software makes the operation of the spectrometer very easy.

Raman Spectroscopy

As the Raman scattering signal is a very small fraction of incident photons, large spectrographs were used in the past to reduce the Rayeligh Scattering. Such a large geometry is now replaced by recently developed laser line rejecting filter in STR Laser Raman spectrometer making it a highly compact and signal spectrograph. Using the optical fiber with Raman probe, it covers R&D application in laboratories, and also QC/QA in factory application.

Laser

HeCd	325/442nm	X:325nm 15,20,35,50mW, Y:442nm 40,50,70mW
DL532	532nm	Diode Green Laser 50 ,100mW
Ar-G/B	514.5(G)/ 488(B)/ 477(B)nm	Air coled Ar+ Laser 50, 100mW 10, 20mW
HeNe	633nm	He Ne Laser 15, 20, 30mW
DL785	785nm	Diode N-IR Laser 50, 100, 300mW

Standard items with the laser are 3m optical fiber and laser to fiber coupler. Please consult us for additional specification.

Imaging Spectrograph

STR300/500	300 / 500mm Focal Length
	flat field : 27mm(W) X 14mm(H)
	Resolution : 0.7 / 0.5 cm-1/pixel
STR750	750mm Focal Length
	flat field : 27mm(W) X 14mm(H)
	Resolution : 0.35cm-1/pixel

Common items to the above are aberration corrected Czemy-Turner single spectrograph, 3 gratings (max. 9 gratings) and a Windows based computer with a data collection/processing software.

Cooled CCD camera

Front/Back illuminated 1024 ~ 2048 X 100 ~ 512 pixels CCD, Minimum operating temperature of –80 °C with TE cooling. E and BR model is specialty designed for Near-IR application.

Optical Microscope

ST-BX51*	Confocal Raman optical microscope with < 1μm spatial resolution using x100 objective lens
	Raman probe with Raman filter set (1 wavelength including)
	Halogen light (ref/trans)
	Objective lens : x10, x20, x50, x100
	CCD color video camera
Options	Line illumination optics to reduce laser damage in sample. Motorized XY stage*, Z-axis auto focus motor, piezo xyz stage, and laser protection cover (Class 1)

*M option : motorized revolver and halogen illuminator

*P option (UV-PM, VIS-PM): Polarized Raman measurement, and observation

*step size: 0.1um, maximum travel 3"x2", or 4"X3" /w Joystick

Remote Raman Probe

RPM-xx	> 25mm working distance
	Spot size < 5μm

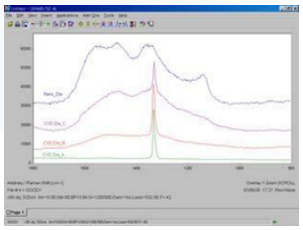
Raman filter set is common for both optical microscope and remote Raman probe and is easily exchangeable to other laser lines. Please consult for us other working distance.

Features

- Compact and flexible system configuration
- Confocal optics for microscope and remote probe
- Fully automated mapping data collection
- Up gradable to Micro FT-IR/Raman, AFM-Raman
- Grams32/AITM software for advanced data processing

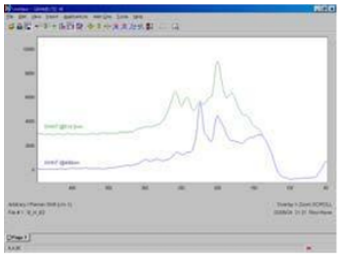
Application Example CVD Diamond and Nano-diamond

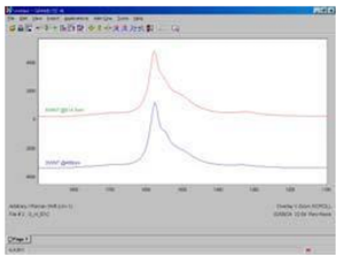
Raman spectra, shown in below, taken by STR300 at 532nm of three microcrystalline diamond samples and a nano-diamond sample, grown by Seki Microwave Plasma CVD Systems. The diamond quality appears to be deteriorating from the sample A to C. The nano-diamond spectrum shows a sharp feature near 1140cm-1 with significant amount of graphitic carbon (D and G-band).



Carbon Nanotubes

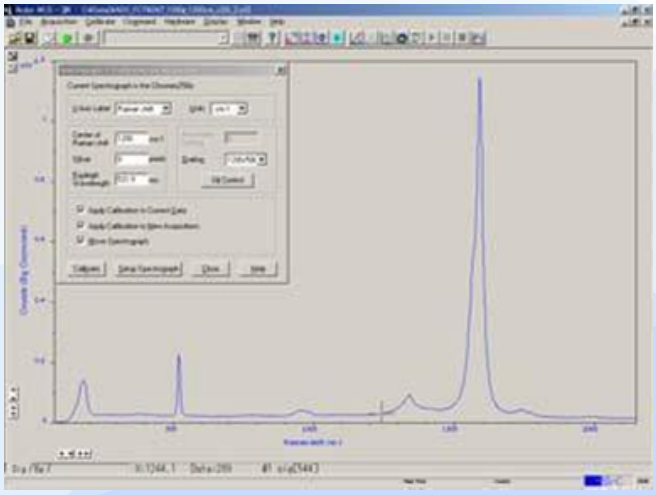
Raman spectra shown below, taken by STR300 at 488nm and 514nm, of high-purity single-walled Carbon Nanotubes from alcohol. Radial breathing modes and G-band with the zone holding spread can be clearly observed, respectively, in the left (low frequency) and right (high-frequency) figures (Courtesy of Maruyama, University of Tokyo).



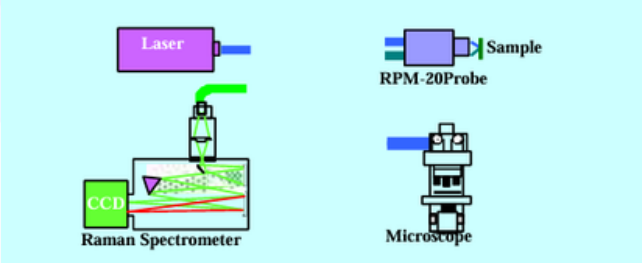


STR Data Collection Software

Windows based data collection software, which can control the grating angle, Raman shift and slit width for spectrograph. Further more can also control the exposure time and read out format for the cooled CCD camera. There parameter can be saved in a configuration file and can be loaded easily. Cosmic ray reduction and file conversion (text, Grams SPC format) functions are also included.



Laser Raman System



Data Processing Software Grams32/AI™

Windows based high performance data processing software. Differential, Integrate, Curve fit with automatic peak picking, Deconvolution Functions. Array Basic programming environment is supported.

Option

Spectral ID	Spectrum Search for popular commercial libraries including Aldrich and Sadthler. Also allows you to build your library.
Grams/3D	High quality 3D graphics for kinetic spectrum, and mapping data.
Ichem/SDBS	Raman Data library Orgamic 4715 spectra
RASMIN	Raman Data library Inorganic 1370 spectra

AutoMap Software

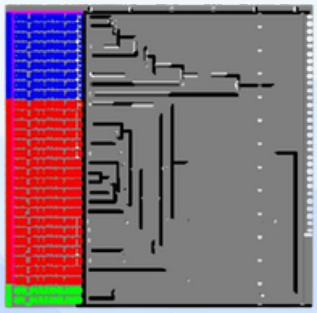
AutoMap software can control the motorized XY stage, Z auto focus motor, and can automatically collect the Raman mapping data.

AutoFind Software

AutoFind software can control the position of 96™ well plate or liquid cell and can automatically judges the crystal and the foreign material by the binarization processing.

Multivariate analysis software Pirouette

Pirouette executes the chemometrics (HCA, PCA, SIMCA, KNN, PLS).



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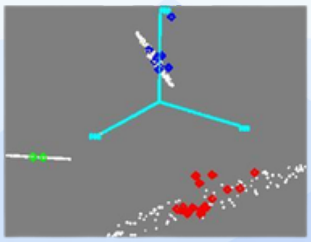

HCA

STR series Specification of Raman system

Laser

HeCd-X/Y	DL532-50,100	Ar-40,100G/B	HeNe-15,20, 30	DL785-50,100,300
He Cd Laser X:325nm, 15,20,35,50mW Y:442nm, 40,50,70mW	Diode Green Laser 532nm 50, 100mW	Air Coolde Ar+ Laser 488nm: B, 514nm: G 50, 100mW 477nm :B 10, 20mW	He-Ne Laser 633nm 15,20, 30mW	Diode Near-IR Laser 785nm 50,100,300mW

Standard items with the laser are 3m optical fiber and laser to fiber coupler. Please consult us for additional specification.

Imaging Spectrograph

	STR150-x	STR300-x*	STR500-x	STR750-x
	150mm Focal Length, f/4	300mm Focal Length, f/4	500mm Focal Length, f/6.5	750mm Focal Length, f/9.7
Flat field	25mm(W) X 10mm(H)	27mm(W) X 14mm(H)	27mm(W) X 14mm(H)	27mm(W) X 14mm(H)
Resolution	2cm-1 ** (1cm-1)	0.7cm-1 ** (0.36cm-1)	0.5cm-1 ** (0.26cm-1)	0.35cm-1 ** (0.18cm-1)

Cooled CCD camera

	100/400-F,B,B_eXcelon,BR	256E(/LN)	2KF,2KB,2KB eXcelon(/LN)	DU401/420A-UV,OE,BV,BR-DD
Format	1340 X 100 (400) pixels, 20x20µm	1024 X 256 pixels, 26x26µm	2048 X 512 pixels, 13.5x13.5µm	750mm Focal Length, f/9.7
QE	F: 45% B,B_eXcelon: 95% BR: 90%	E : 60%	2KF: 40% 2KB, 2KB eXcelon: 95%	27mm(W) X 14mm(H)
Dark noise (e-/pixel/sec)	0.0025 typ for 100B, B_eXcelon 0.02 typ for 100BR at -80°C	0.002 typ at -75°C 0.000083 typ at -120°C	0.001 typ at -75°C 0.000083 typ at -120°C	0.35cm-1 ** (0.18cm-1)
Read noise	3 e- RMS typ at 100KHz	3.5 e- RMS typ at 100KHz	3.5 e- RMS typ at 100KHz	
TE cooling	-75°C :400, -80°C: 100	-75°C (-120°C for LN)	-75°C (-120°C for LN)	DU:-70°C(-85°C), DU-BR-DD:-80°C (-100°C)

CCD type F/UV: front illuminated(FI) /w UV coat, B/BV:back illuminated(BI,BI_eXcelon), BR-DD:BI deep depletion(DD), E: open electrode ADC 16 bit, USB, wavelength range: 200-1050nm /w UV coat option, , TE cooling temperature: ( ) option

Raman Sampling accessories

Optical microscope ST-BX51*	Remote Raman Probe RPM-XX
Confocal Raman optical microscope with < 1µm spatial resolution using x100 objective lens Raman probe with Raman filter set (1 wavelength)*2 , halogen light (ref/trans), Objective lens : x10, x20LWD (WD=25mm), x40X(Near UV), x50, x100, CCD color video camera	>25mm working distance, spot size < 5um Raman filter set (1 wavelength)*2

Raman filter set is common for both optical microscope and remote Raman probe and is easily exchangeable to other laser lines.

*M option : motorized revolver and halogen illuminator *P option: Polarized Raman measurement, and observation *2 Please specify the excitation wavelength : 325nm ~150(30)cm-1, 488, 514.5, 532nm , ~50(10)cm-1, 633nm ~40(5)cm-1, 785nm ~30(5)cm-1 ( ) Option, Please consult us for additional specifications.

Options

Auto λ*	Cooling / Heating stage
Auto exchange unit for the Laser line and Raman optics unit Auto alignment function for max. 5 Laser lines and Raman optics.	THMS600 temperature range : -196°C ~ 600°C CCR4K temperature range : 4K ~ 400K

* Please specify the number of excitation laser. Laser power meter: UC-LPM up to 1W

* UNF-XXX: Ultra Notch Filter: 488nm, 514.5, or 532nm, 10cm-1 ,633nm,785nm, 5cm-1 (Select one wavelength) * TF Tunable Filter 325-633nm: up to 442nm, 30cm-1, up to 633nm 10cm-1 (Tunable Filter covers 325nm UV to 633nm lasers)

⚠ Attention	Please read the instruction manual carefully before operating for safe and correct use.

Features and specifications subject to change without notice.

Indian Representative

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