Multiplelabs™
Turnkey Laboratories Solutions

Analytical®
Technologies Limited

LASER RAMAN SPECTROSCOPY

LRS-3000 SERIES

EPC / PRODUCTS / APPLICATION / SOFTWARE / ACCESSORIES / CONSUMABLES / SERVICES

Analytical Technologies Limited

An ISO 9001 Certified Company

www.analyticalgroup.net

» Feature

- Compact & Flexible System Configuration
- High Resolution: < 0.3cm-1
- Measurement down to 10cm-1
- Confocal Optics for Microscope and Remote Probe
- Fully Automated 2D, 3D & 4D Raman Imaging
- Attachable to AFM, XRD, SEM and TEM
- Detect and measure deposits in liquid as it is
- Modular Approach and Customized solutions (near field, UV-VIS, etc.)

LRS series Laser Raman Spectrometer is a new generation high resolution Raman Spectrometer with a high sensitivity to measure even a very weak Raman scattering from materials

A basic system consists of a laser source, an imaging spectrometer, TE cooled CCD camera, an optical microscope with spatial resolution<1 m and/or a remote Raman probe. Based on the application, one can choose single/multiple appropriate UV, Visible and near IR excitation laser sources, which allows to scan a wide variety of samples including organic compound. User-friendly, Window based control and data processing software make the operation of the spectrometer very easy. Configuration of the spectrometer is based on modular approach that gives ample flexibility for integration with other analytical tools such as AFM, XRD, SEM, and TEM

» LRS-3000 Series-Selectable ModulesLRS

Laser			
LRS-3066	266nm	Deep U-V	10, 20, 50mW
He-Cd	325 / 442nm	X: 325nm Y: 422nm	15, 20, 35, 50mW 40, 50, 70mW
LRS-3532	532nm	Diode green	50mW, 100mW, 1.5W, 3 W
He-Ne	633nm	He Ne	17, 20, 35mW
LRS-3785	785nm	Diode N-IR	100, 300, 500mW
LRS-3830	830nm	Air cooled diode	150mW
LRS-3064	1064nm	Air cooled DPSS	500mW, 1W

» Imaging Spectrograph

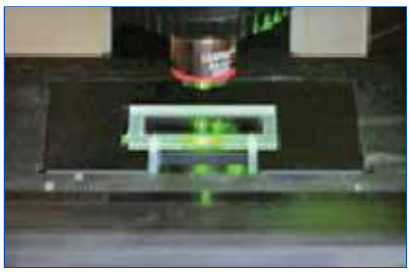
LRS-3150	150mm Focal Length flat field : 25 (27) mm (W) X 10 (14) mm (H) Resolution: 1.1cm-1/pixel
LRS 3200/3300/3500/3750	193 /300 / 500 / 750mm Focal Length flat field: 27mm (W) X 14mm (H) Resoluion: 0.6/0.4/0.3/0.2cm-1/pixel

» Cooled CCD camera

CCD	Front / Back illuminated type ultra sensitive TE cooled CCD
EMCCD	For fast data collection

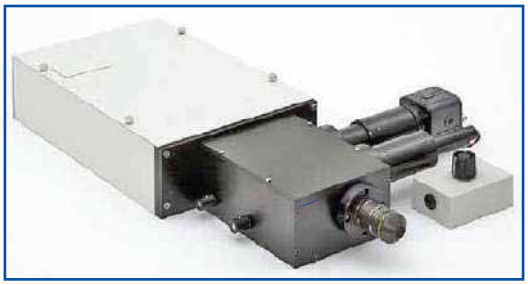
» Opatical Microscope

Confocal Raman optical microscope with 1 µm	
Spatial resolution,< 2 m axial using x100 objective lens	
Raman probe with Raman filter set	
Halogen Light (ref/trans/epifluorescence)	
Objective lens x5, x10, x20, x40(UV), x50, x100	
CCD color video camera,	
Software controlled power levels 1 - 100%	
Options	Line illumination optics to reduce laser damage in sample
	Motorized XY stage*, Z-axis auto focus motor, peizo 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: 0.1µ m, maximum travel 3”X2”, or 4”X3” /w



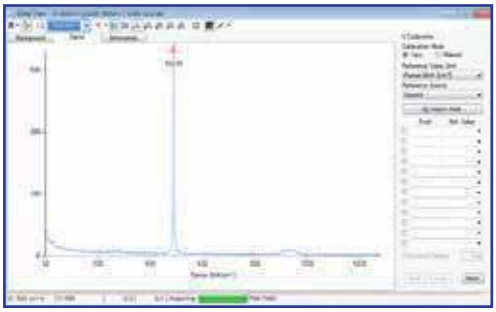
» Remote Raman Probe

RPM	> 25mm working distance, Spot size < 5 μ m
	Raman filter set is common for both optical microscope and remote Raman probe and is easily exchangeable to other laser lines. Please consult us for other working distance



» LRS Data Collecation Software

Windows based data collection software, which can control the grating angle, Raman shift and slit width for spectrograph. Furthermore, it can also control the exposure time and read out format for the cooled CCD camera. Measurement parameters 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 part of the software



» AutoMap Software for Auto XTZ Sacnning and 2D,3D,4D Raman Imaging

This software acquires Raman spectra of specified XYZ coordinates in various configurations, from scanning X and Y while keeping Z fixed (and vice versa) to scanning XYZ. The same software can plot peak strength or area of the specific Raman shift and display the Raman image in 2D, 3D and, in the most recently developed, 4D images.

» Applications:

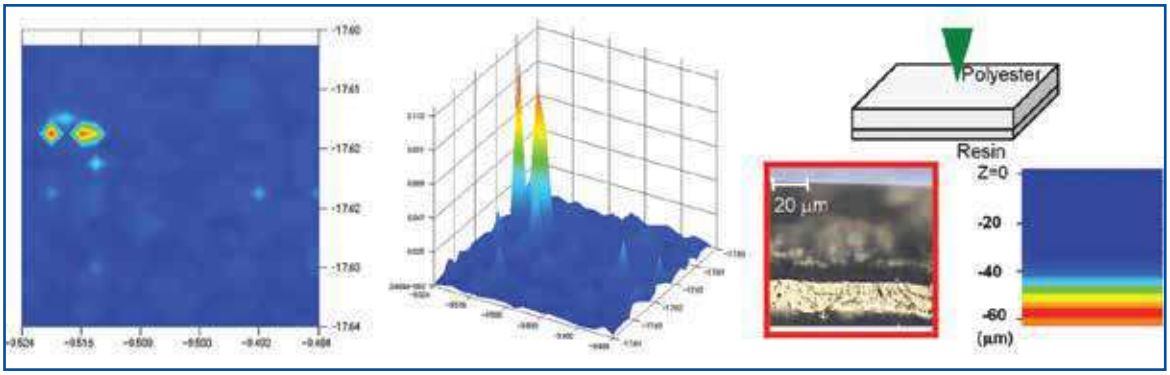
- Art & Archaeology
- Bioscience and Medical Diagnosis
- Polymers and Chemical Processes
- Semiconductor & Solar Industry
- Geology and Mineralogy
- Pharmaceutical Industry
- Environmental Science
- Raman Microscopy
- Forensic Analysis
- Gemology
- Teaching
- Quality Control
- General Research
- Chemical Warfare Agent Detection
- Polymer & Chemical Analysis
- Explosives Detection
- Petroleum Analysis
- Natural Product Testing
- Nano technology
- Carbon Nano material characterization

» XYZ-Scanning, Z-Fixed

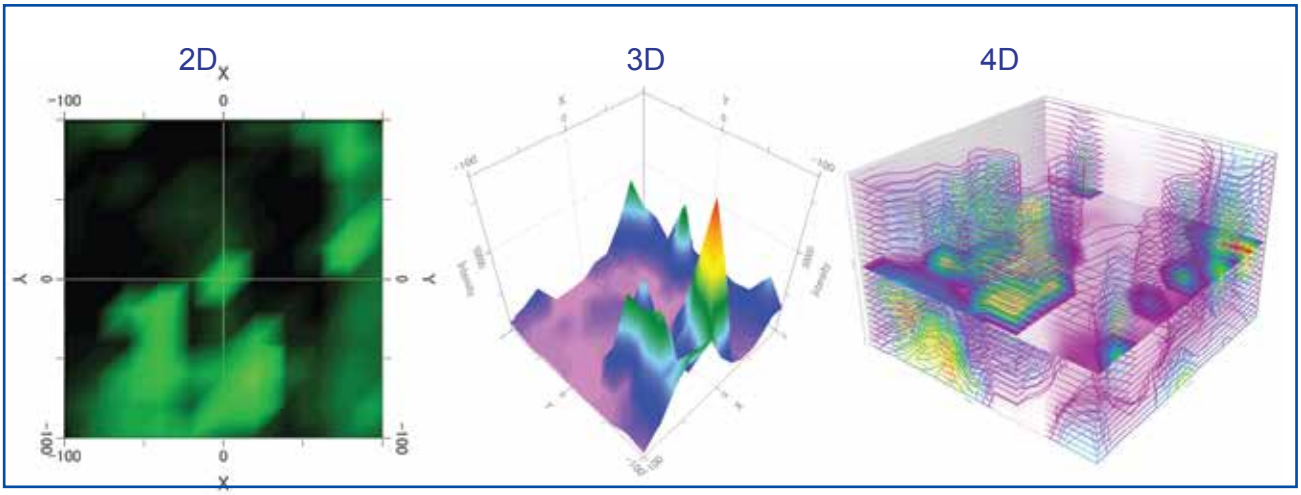
Example*: Measure Raman spectrum of the opal slice. Calculate the ratio of peak height (Peak height of quartz / Peak height of quartz + Peak height of cristobalite *1.89).

Plot coordinates of XY and ratio of the Peak height (Z)

Lower the focus point from the surface of the film intervals of 1mm



» XYZ-Scanning And Raman Imaging in 2D,3D and 4D



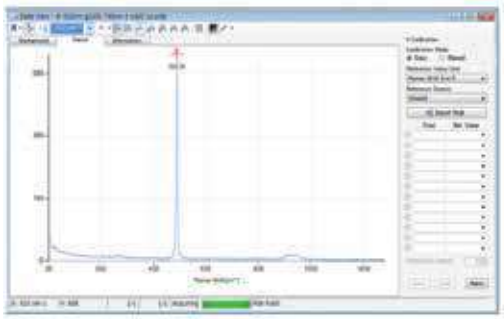
» Integration with Standard Raman Data Processing, Application Examples

Data Processing Software Grams32/AITM*

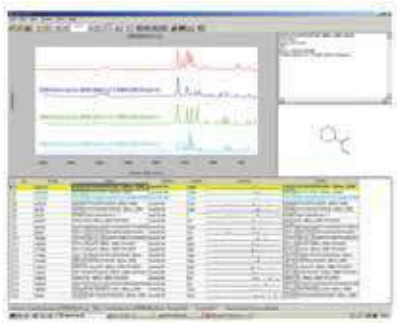
LRS Data Collection Software output can be smoothly processed with other standard software such as Grams32/AITM a premier solution for visualizing, processing and managing spectroscopy data and with functions of operation of the differentiation integration between spectra and curve fittings, de-convolution, etc. In addition, the following are also offered as optional software

Spectral ID™ Spectral ID provides rapid searching of multiple format Raman spectral libraries. Libraries can be centrally hosted, managed and searched

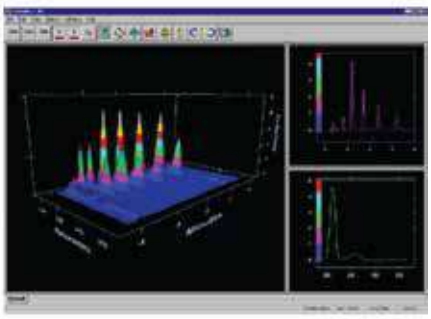
Grams/3D™ GRAMS/3D adds real-time, interactive 3D graphic visualization to the extensive list of capabilities already included in GRAMS/AI. We can manipulate large 3D data sets in real-time on their PCs and see the unseen information hidden in multidimensional data.



Data collection sotfware



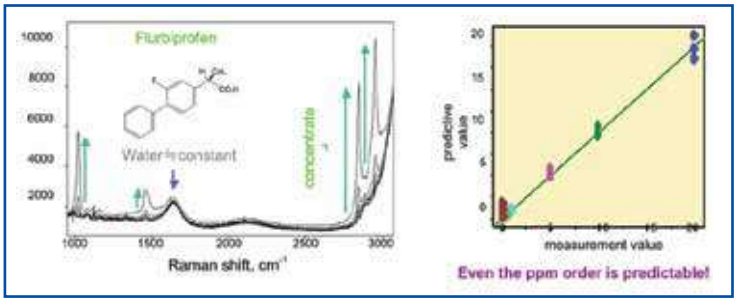
Identification of unknown material



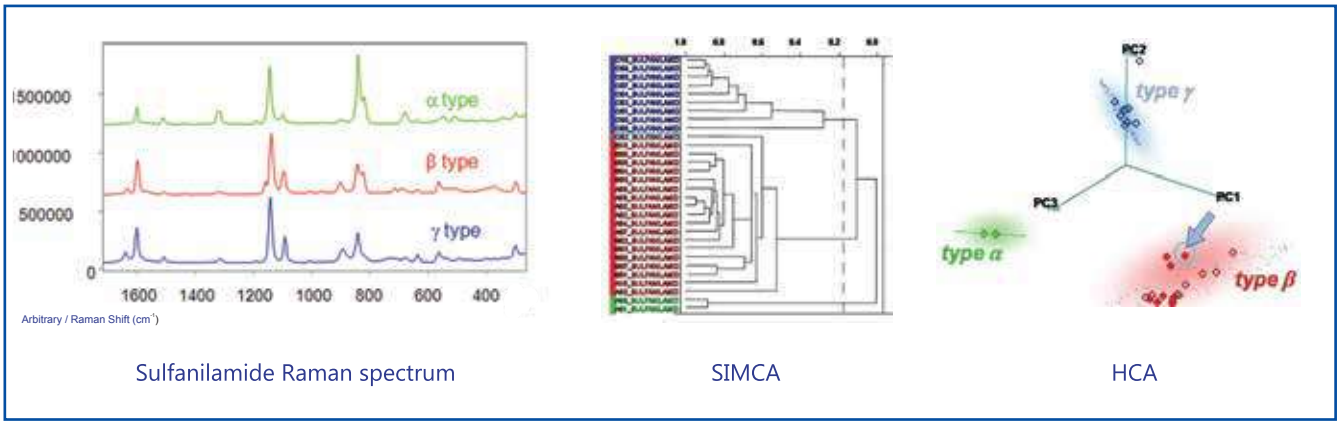
Displayed 3D image by Grams/3D

» Multivariate Analysis Software PLS/IQTM*, PirouettrTM*`

Quantitative analysis: This analysis is done by PLS method (Partial least squares regression). Construct the model with the solution concentration and relative intensity of Raman spectra. Physical properties of the sample are estimated from the calibration data set.



Polymorph Characterization (High Throughput Crystallization with 96 well plate): LRS Data Collection Software output is smoothly combined with other software to automate crystallization data collection from micro well plates to quickly analyze and present meaningful information. The result is new levels of efficiency in high throughput crystallization (HTC) studies.



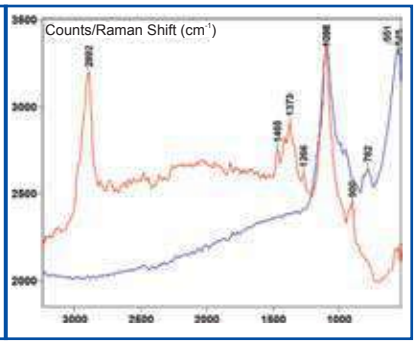
Sulfanilamide Raman spectrum SIMCA HCA

» Auto Detection of Foreign Materials in Injected Liquid

This software can automatically detect the foreign material in liquid micro cell using image analysis (i.e., binarization processing) under the optical microscope with color CCD camera image.

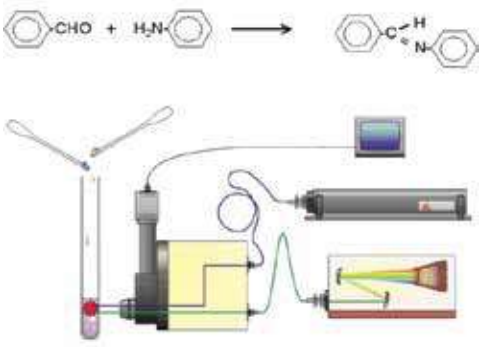
Automatic detection of solid foreign materials in liquid

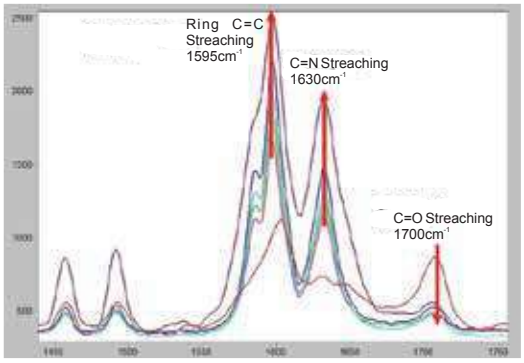
Photographic image and binarization image of foreign material



» Process Monitoring by Remote Raman Probe System

Real time monitoring of Aminouracil reaction by time dependent Raman Spectroscopy, which shows increasing intensity of C=C(1559cm-1) and C=N(1630cm-1) at the expense of decreasing intensity of C=O(1700cm-1)

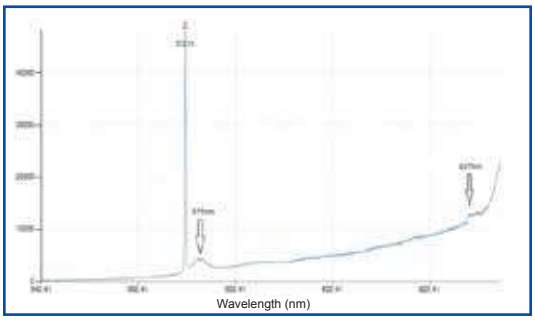




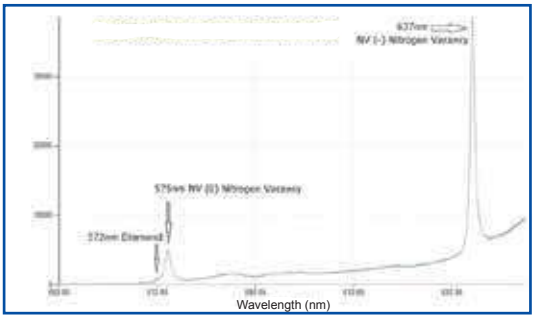
Time-dependent Raman spectra of Imine formation at intervals of every 2 minutes

» Photoluminescence and Optical Emission Spectroscopy

Our ATL series Raman Spectrometer, standalone equipment, is fully capable of carrying out Photoluminescence (PL) and Optical Emission Spectroscopy studies. The spectra in left and right, below, shows respectively the PL spectra of diamond taken at room temperature and at -100°C. The PL intensities of the nitrogen-vacancy points defects in diamond (i.e., NV(0) and NV(-)) increase drastically when diamond is cooled down to - 100°C.



PL Spectra of diamond @ Room Temperature



PL Spectra of diamond @ - 100°C

» ATL series- Specification of Raman System

Laser*

LRS-3266	LRS-3325	LRS-3488	LRS-3532	LRS-3633	LRS-3785	LRS-3830	LRS-3064
DPSS Deep UV Laser 266nm 10, 20, 50mW	He-Cd A: 325nm, 15, 20, 40, 50mW B: 442nm, 50, 70, 100mW	488nm 50mW, 1000mW	DPSS Green Laser 532nm 50, 100, 500mW 1.5W, 3W	He-Ne 633nm 17, 35mW	Diode Near-IR 785nm 100, 300, 500mW	Air cooled diode 830nm 150mW	DPSS 1064nm 500mW, 1W

Standard items with the laser are 2m optical fiber and laser to fiber coupler.

» Imaging Spectrograph

	LRS-3150	LRS-3200	LRS-3300	LRS-3500	LRS-3750
Focal Length	150mm, f/4	193mm, f/3.6	300mm, f/4	500mm, f/6.5	750mm, f/9.7
Resolution	1.1cm^{-1}/pixel*	0.6cm^{-1}/pixel**	0.4cm^{-1}/pixel**	0.3cm^{-1}/pixel**	0.2cm^{-1}/pixel**

Common items to the above are aberration corrected Czerny-Turner single spectrograph, 3 gratings (max. 9 gratings) for ATL 300/500/750, and 2 gratings (max. 6 gratings) for ATL 150/200, Window based computer with a data collection and processing software. Entrance slit: 10 µm - 3.0mm, RS232C/USB, optical fiber 2m. Scan repeatability <0.5cm^{-1}

Spectrum range: 200 - 2100nm, Raman shift: 5 - 5000cm^{-1}

*x: number of gratings, Resolution @532nm, 15µm CCD 1200g,*1800g, ** 2400g

» Cooled CCD camera

	iVAC-316	iVac-FI	DU416A	InGaAs
Format	2000x256 pixels, 15x15µm	1650 X 200 pixels, 16x16µm	2000 X 256 pixels, 15x15µm	1024 x 1 pixel, 25 x 500µm
Range	200-1050nm (UV-NIR)	380-1100nm (VIS-NIR)	200-1050nm (UV-NIR)	0.6µm to 1.7µm
QE	>95% @780nm	>55%	>95%	>85%
Dark noise	0.1 e-/pixel/sec (TYP)	0.0028 e-/pixel/sec (TYP)	0.0006 e-/pixel/sec (TYP) @ maximum cooling	10.1K e-/pix/sec
Read noise	< 4e-RMS (TYP)	< 5.8e- RMS (TYP)	< 4e- RMS (TYP)	< 580 e- RMS (TYP)
TE cooling	-60°C	-60°C	-80°C (air cooled) -95°C (coolant@10°C , 0.75L/min)	-70°C / -90°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, wavelength range: 200-1100nm/w UV coat option

» Raman Sampling accessories

Optical Microscope

Confocal Raman optical microscope with < 1 µm spatial resolution using x100 objective lens, Raman probe with Raman filter set, halogen light (ref/trans), Objective lens : x5, x10, x20, x40(UV), x50, x100, CCD color video camera

Remote Raman Probe

>25 mm Working distance , Spot size < 5 µm
Raman filter set**

Raman filter set is common for both optical microscope and remote Raman probe and is easily exchangeable.

*M option: motorized revolver and halogen illuminator, *P option: Polarized Raman measurement, and observation

** Please specify the excitation wavelength: 266, 325, 355, 442, 488, 514.5, 532, 633, 785nm

Please consult us for additional specifications.

» Opations

Auto λ*

Auto exchange unit for the Laser line and Raman optics unit
Auto alignment function for 5 and more Laser lines and Raman optics.

* Please specify the number of excitation laser sources, Laser power meter option: up to 1W
* Ultra Notch Filter: 488, 514.5, 532, 633, 785nm for measurement down to 10cm^{-1}
* TF Tunable Filter 325-633nm: 30cm^{-1} up to 442nm, 10cm^{-1} up to 633nm (Tunable Filter covers 325nm UV to 633nm Lasers)

Cooling / Heating Stage

TMHS600 temperature range: -196°C ~600°C
CCR4K temperature range: 4K~400K

Diamond Anvil Cell

High Pressure Raman Study

Polarized Raman Measurement

» HPLC Servicing, Validation, Trainings and Preventive Maintenance :

HPLC Servicing :HPLC Servicing : We have team of service engineers who can attend to any make of HPLC promptly @the most affordable cost.

Trainings :We also take up preventive Maintenace to reduce downtime of HPLC's Trainings.

AMC's/CMC :AMC's/CMC :We offer user training both in-House and at customer sites on PLC principles, operations, troubleshooting.

Validations :Validations :We have protocols for carrying out periodic Validations as per GLP/ GMP/U SFDA norms.

Instruments :Instruments :We offer instruments / Renting Services Modules like pumps, detector etc. on Rent.

» About Analytical Technologies

Analytical Technologies is synonymous for offering technologies for doing analysis and is the Fastest Growing Global Brand having presence in at least 96 countries across the globe. Analytical Technologies Limited is an ISO :9001 Certified Company engaged in Designing, Manufaturing, Marketing & providing Services for the Analytical, Chromatography, Spectroscopy, Bio Technology, Bio Medical, Clinical Diagnostics, Material Science & General Laboratory Instrumentation. Analytical Technologies, India has across the Country operations with at least 4 Regional Offices, 6 Branch Offices & Service Centers. Distributors & Channel partners worldwide.

» Our Products & Technologies

UV/VIS Spectro 2060+ Double Beam

FTIR

Gas Chromatograph 3000

Gas Chromatograph 2979 Plus

Flash Chromatograph

Atomic Absorption Spectrophotometer

Liquid Partical Counter

Optical Emission Spectrophotometer

DSC/TGA

NOVA 2020 plus Automated Bio Chemistry Analyzer

HEMA 2020 Hematology Analyzer

Micro Plate Reader/Washer

URINOVA 2800 Urine Analyzer

Total Organic Carbon

Fully Automated CLIA

NOVA Basic Semi -Auto Chemistry Analyzer

PCR/Gradient PCR/ RTPCR

Blood Gas Analyzer

Random access Analyzer for immunoassay Proteins & clinical chemistry

Semen Analyzer

Water purification system

» Regulatory compliances

» Corporate Social Responsibility

Analytical Foundation is a Nonprofit Organization (NGO) found for the purpose of:

1.Research & Innovation Scientist's awards / QC Professional Award : Quality life is possible by innovation only and the innovation is possible by research only, hence ANALYTICAL FOUNDATION is committed to identify such personallities for their contributions across various field of Science and Technology and awarding them yearly. To participate for award, send us your details of research / testing / publication at info@analyticalfoundation.org

2. Improving quality of life by offering YOGA Training courses, Work shops / Seminars etc.

3. ANALYTICAL FOUNDATION aims to DETOXIFY human minds, souls and body by means of Yoga, Meditation, Ayurveda, Health Care, Awards, Media, Events, Camps etc.

» Reach us @

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