Lightnovo

Research Grade Spectrometer

Extremely compact research-grade Raman Spectrometer

- High spectral resolution
- High sensitivity (very low limit of detection)
- Capability to carry out low-frequency Raman measurements
- Extremely stable laser
- Extended spectral range
- Range of customisation options

Miraspec

Software for PC (Windows 10, 11) and smartphone (Android)

Data acquisition	**Laser power control** **Exposure time control** **Sensor gain control** **Number of repetitions control** **Spectral range control**
Data preprocessing options	**Spike correction** (Whitaker-Hayes, moving window) **Spectral smoothing** (Whittaker, asymmetric least squares, Savitzky-Golay) **Baseline correction** (rolling circle, rubberband, least squares, asymmetrically reweighted penalized) **Spectrum normalization** (Z-score, mean, Mean centre, MinMax, Unit Norm L1, Unit Norm L2) **Intensity normalization*** **Laser mode-hop correction*** **Spectral super resolution***
Data Exploration	**Principal component analysis** **Non-negative matrix factorization** (SIMPLISMA-NNLS, MCR-ALS)
Qualitative analysis	**Material identification** (Pearson correlation, square Euclidean cosine, square first difference Euclidean cosine) **Compatible libraries** (>20,000 spectra)** **Creation of spectral libraries**
Quantitative analysis	Principal component regression Raman peak height/peak area calibration Partial Least Squares (PLS) calibration
Classification	Random Forest, Linear SVM, AdaBoost, Decision Tree, Hoefding Tree, Naïve Bayes, Perceptron, Softmax Regression

**patented feature*
***various library options available upon request*

System controlled by smartphone or PC via Bluetooth or USB-C cable.

Accessories

- Short/ Middle working distance probe, f=15 mm
- Long working distance probe, f=30 mm
- Contact probe
- Disposable silicone heads
- Sample/ Vial holders
- Axial focusing accessories
- Light protection sample cover
- Power bank

Applications

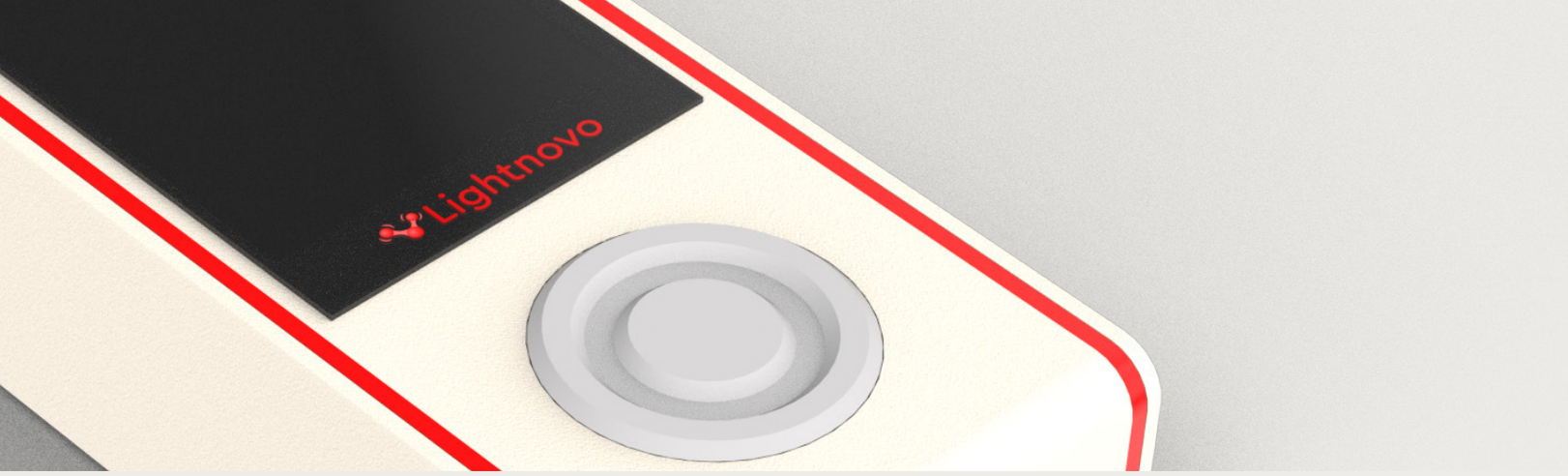
For researchers, industries, universities and general consumers

Life Sciences & Health: Biosciences, pharmaceuticals, skin diagnostics, cosmetics

Materials & Nanotechnology: Polymers, nano-materials, semiconductors, surface enhanced Raman scattering (SERS)

Industrial & Chemical Analysis: Chemicals, geology, forensics

Quality Control & Authentication: Alcohol quality, counterfeit product detection



Technology

RG Raman spectrometer perfectly suits for any kind of demanding Raman spectroscopy applications that require **high spectral resolution**, extremely **stable laser power**, **high sensitivity** and **broad spectral range** (from low frequency to high frequency Raman shift).
Technology is based on high throughput transmittance diffraction optics with up to 85% efficiency from sample to detector.

Specification

Feature versus model	RG Raman 405	RG Raman 532	RG Raman 638	RG Raman 785	RG Raman 830
Laser wavelength	405 nm	532 nm	638 nm	785 nm	830 nm
Power on sample*	10-80 mW 0.01-70 mW (LPR)	10-110 mW 0.01-100 mW (LPR)	10-75 mW 0.01-65 mW (LPR) 30-330 mW (Power) 0.05-280 mW (Power LPR)	10-95 mW 0.01-80 mW (LPR) 70-490 mW (Power) 0.1-490 mW (Power LPR)	5-70 mW 0.01-65 mW(LPR) 50-380 mW (Power) 0.1-330 mW (Power LPR)
Spectral Range	120-3700 cm^{-1}	80-3700 cm^{-1} 80-2040 cm^{-1} (HR)	70-3700 cm^{-1}	70-2500 cm^{-1}	70-2400 cm^{-1}
Spectral Resolution**	4 / 5 / 6 cm^{-1}	4 / 5 / 6 cm^{-1} 2.3 / 3 / 3.7 cm^{-1} (HR)	4 / 5 / 6 cm^{-1}	3 / 4 / 5 cm^{-1}	3 / 4 / 5 cm^{-1}
Signal-to-noise ratio at***	1000:1 800:1 (LPR)	1200:1 1000:1 (LPR) 800:1 (HR) 600:1 (HR LPR)	1000:1 800:1 (LPR) 2500:1 (Power) 2000:1 (Power LPR)	1000:1 800:1 (LPR) 3000:1 (Power) 2500:1 (Power LPR)	900:1 800:1 2500:1 (Power) 2000:1 (Power LPR)

* *Actual laser power range can differ ± 2 % per device. Please contact us if you need specific laser power range values*
** *Slit size dependent; slit size can be customized (20, 35, 50 um slits)*
*** *Determined as peak signal-to-noise ratio of polystyrene spectrum at maximal laser power, integration time 0.3s, number of repetitions 10.*

Extra Features

- Portable size (257 x 110 x 61 mm)
- Lightweight (1.5 kg)
- Five button operation
- Low power consumption (Up to 4 hr - compatible with power bank)
- Compatible with the Research Grade microscopy platform
- Bluetooth & USB connectivity

Customisation

The RG spectrometers have a multitude of customisation options:

- Low power range (LPR) - Filters that reduce laser power to analyse laser sensitive samples
- Power* - Increased laser power, to increase signal generated from weak Raman scatterers
- Low-cutoff Filter* (LF) - Extends the spectral range closer to the laser line
- High resolution* (HR) - Increases the resolution
- Line focus - Changes the analysis area from a spot to a line
- Operator body - IP67 and Drop resistant body design

** Only available with specific wavelengths, see specification table*

Contact Details

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About Lightnovo

A spin-off from the Technical University of Denmark, Lightnovo was founded in 2019 by an enthusiastic team united by the goal of revolutionizing the field of Raman spectroscopy through innovative, high-performance solutions. Our mission is to develop and commercialize **“Raman for all: democratize the power of high-end Raman spectroscopy for the benefit of mankind”.**

We aim to provide premium performance Raman spectrometers and microscopes with the world’s smallest form factors without compromising the performance. With this innovation, Lightnovo addresses the need for portable, reliable field instruments at an affordable price.

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