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Lightnovo

# miniRaman Spectrometer

## The world's smallest Raman Spectrometer

- Premium performance for quantitative analysis
- Excellent for material identification
- Accurate with high sensitivity
- Extended spectral range via dual laser
- Affordable

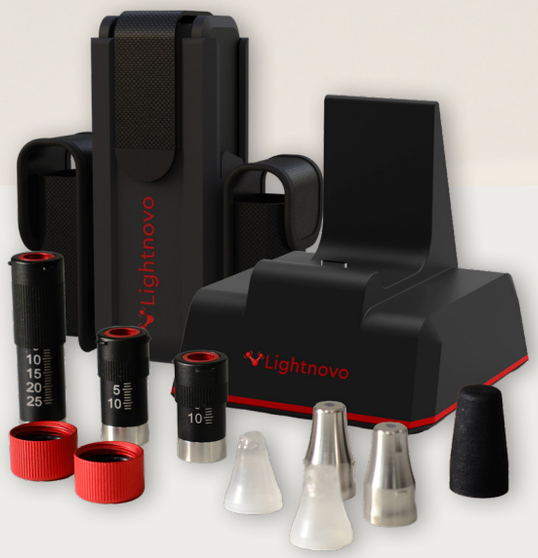
# Miraspec

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

| | |
|---|---|
| **Data acquisition** | **Laser power control**<br>**Exposure time control**<br>**Sensor gain control**<br>**Number of repetitions control**<br>**Spectral range control** |
| **Data preprocessing options** | **Spike correction** (Whitaker-Hayes, moving window)<br>**Spectral smoothing** (Whittaker, asymmetric least squares, Savitzky-Golay)<br>**Baseline correction** (rolling circle, rubberband, least squares, asymmetrically reweighted penalized)<br>**Spectrum normalization** (Z-score, mean, Mean centre, MinMax, Unit Norm L1, Unit Norm L2)<br>**Intensity normalization***<br>**Laser mode-hop correction***<br>**Spectral super resolution*** |
| **Data Exploration** | **Principal component analysis**<br>**Non-negative matrix factorization** (SIMPLISMA-NNLS, MCR-ALS) |
| **Qualitative analysis** | **Material identification** (Pearson correlation, square Euclidean cosine, square first difference Euclidean cosine)<br>**Compatible libraries** (>20,000 spectra)**<br>**Creation of spectral libraries** |
| **Quantitative analysis** | Principal component regression<br>Raman peak height/peak area calibration<br>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
- Belt Holder
- Docking station

## Applications

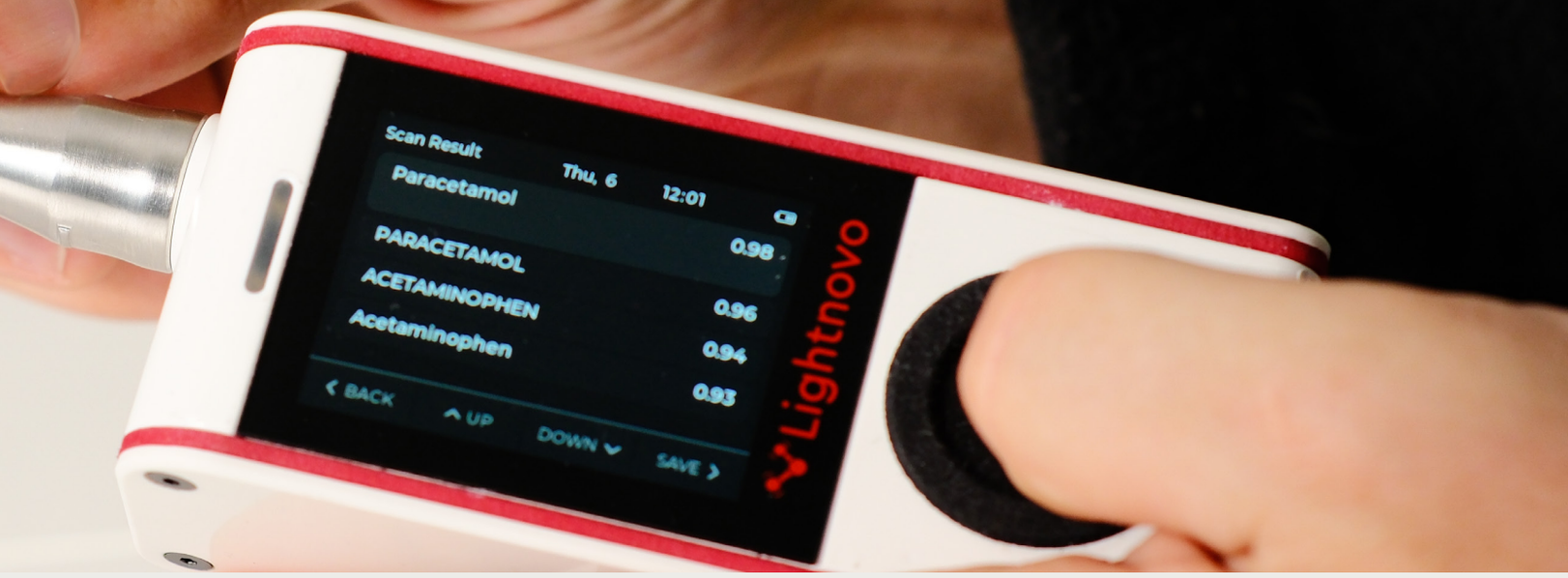
**For researchers, industries, universities and general consumers**

**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




## Unique Technology

The **miniRaman Spectrometer** is an innovative, miniaturized Raman spectrometer equipped with a patented, integrated **reference channel**. This innovative technology ensures **automatic calibration** by correcting for laser wavelength drift. The system continuously adjusts the Raman shift and intensity of the sample spectrum, delivering fast, accurate, and reliable results. These advanced features make the miniRaman spectrometer an ideal solution for **material identification** and precise quantitative measurements.

## Specification

| Feature versus model | miniRaman Standard | miniRaman SERS | miniRaman Dual | miniRaman Full Range |
|---|---|---|---|---|
| **Laser wavelength** | 785 nm | | 660 nm and 785 nm | 660 nm |
| **Power on Sample*** | 5-50 mW | 0.5-15 mW | 5-35 mW (660)<br>5-50 mW (785) | 10-80 mW |
| **Spectral Range** | 270-3000 $cm^{-1}$ | | 2700-3900 $cm^{-1}$ (660)<br>300-2700 $cm^{-1}$ (785) | 270-3900 $cm^{-1}$ |
| **Spectral Resolution**** | 8,10,14 $cm^{-1}$ | | 12,16,20 $cm^{-1}$ (660)<br>8,10,14 $cm^{-1}$ (785) | 12,16,20 $cm^{-1}$ |
| **Signal-to-noise ratio***** | 500:1 | 100:1 | 800:1 (660)<br>440:1 (785) | 800:1 |

* *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

- Small size (105 x 50 x 45 mm)
- Lightweight (360 g)
- One button operation
- Low power consumption (Up to 4 hr)
- Bluetooth & USB connectivity

## Customisation

- Operator body - IP67 and Drop resistant body design

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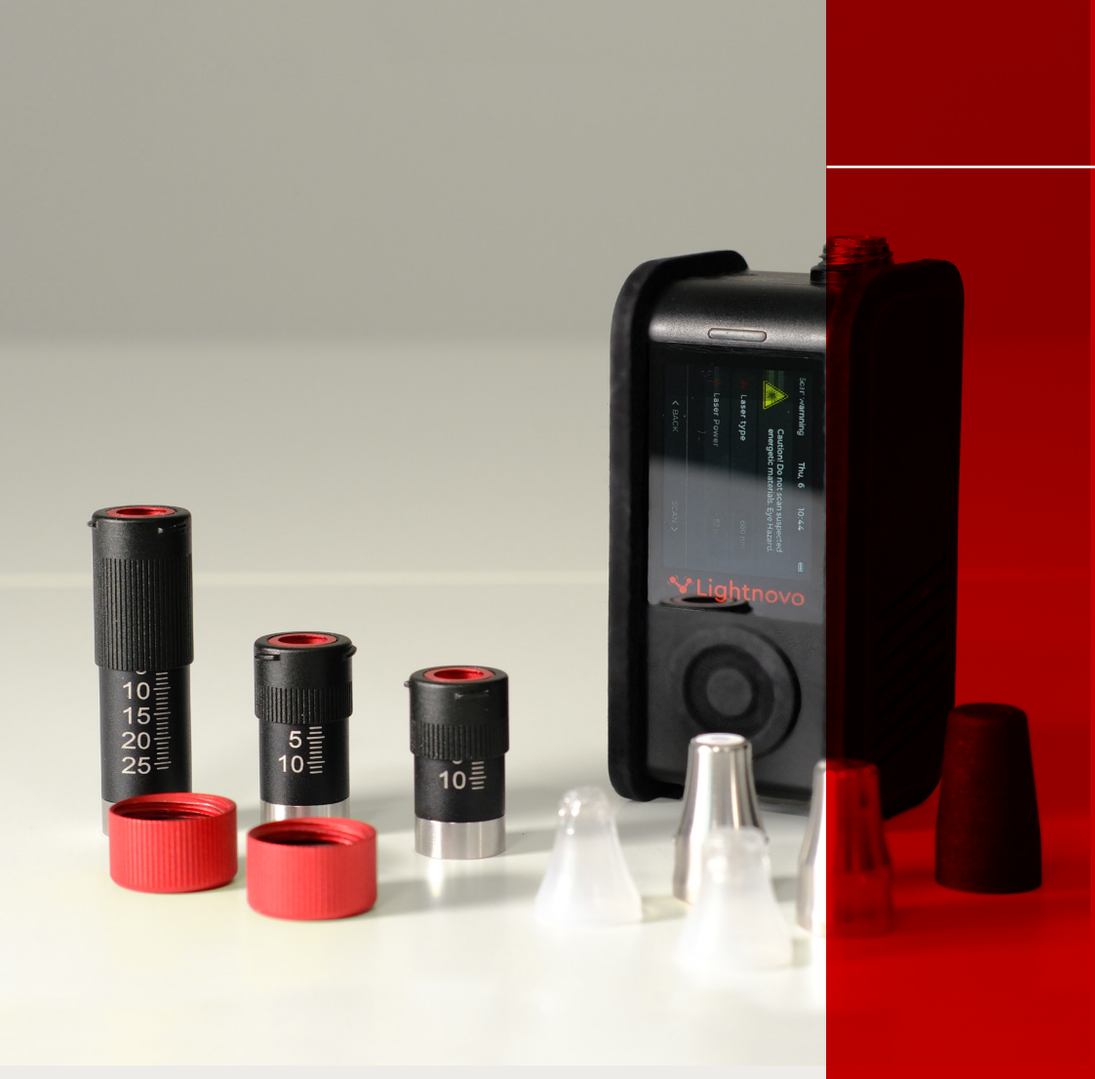


# Contact Details

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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.**