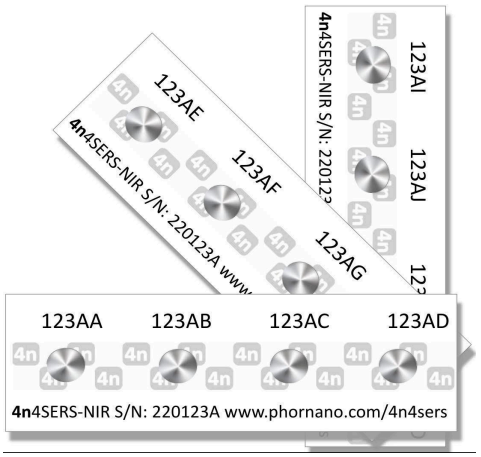
4n PHORNANO
SECURE | SENSITIVE | REPRODUCIBLE

SERS substrate
4n4SERS 4x4 NIR



Surface Enhanced Raman Scattering (SERS) is now an even more powerful sensing tool amplifying weak Raman signals from molecules to be detected.

HIGH PERFORMANCE 4n4SERS substrates feature a unique and patented **SIGNAL ENHANCING HEAT SINK** technology.

Four large active SERS chips based on **SIGNAL ENHANCING HEAT SINK technology** allowing for easy attachment of the analyte. The chips are embedded in a flexible adhesive SERS substrate.

HP-SERS substrate

01 | SECURE | 4n's **SIGNAL ENHANCING HEAT SINK** protects the analyte from overheating. Maximum signal is guaranteed at high power from your Raman laser

02 | SENSITIVE | The **SIGNAL ENHANCING HEAT SINK** compensates for low Raman signal in the NIR range, where autofluorescence is lowest

03 | REPRODUCIBLE | The **SIGNAL ENHANCING HEAT SINK** allows for long averaging and without degrading the analyte thermally.

Applications

SERS provides new perspectives in:

- Biomedicine
- Forensics
- Food safety
- Environmental applications
- Threat detection, and
- Medical diagnostics

Field based POC devices potentially outperform their expensive laboratory based counterparts in speed due to minimum sample preparation.

Technical information is current as of February 2025, Version 202503. It is noted that this is a disposable product and cannot be reused once the 4 active areas are used. PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION, DESIGN OR OTHERWISE.

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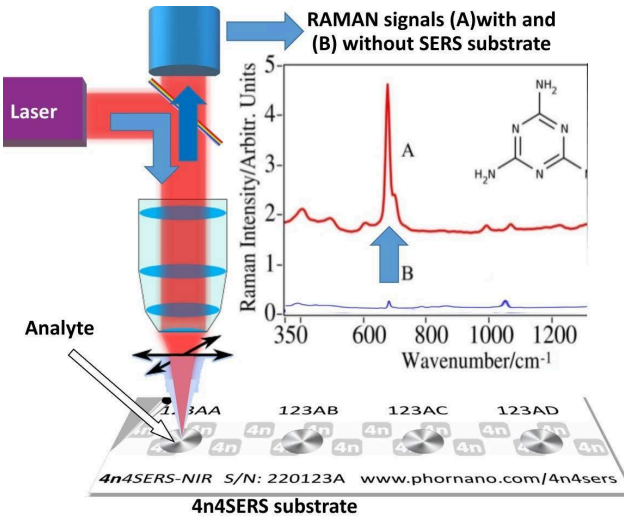
An amplification of the Raman signal is caused by the enhancement of the electric field provided by the SERS substrate. When the incident laser-light strikes the active spot of the SERS substrate, localized surface plasmons are excited. The specific nanoparticles employed are responsible for this resonant enhancement. The SERS effect is so pronounced because the field enhancement occurs twice: (i) The resonant field enhancement amplifies the intensity of incident laser light, which excites the Raman modes of the molecules of the analyte and (ii) the resulting enhanced Raman signal is then further amplified by the SERS substrate due to the same resonant effect.



SERS Specifications (typical values)

Parameter	Specification	Units
Substrate dimensions	75 x 24 x 0.2	mm
Active area (free chip size)	∅ 6	mm
Number of active areas (chips)	4	-
Analyte volume	5	µL
Substrate surface	Polyethylene flexible adhesive film	
Raman laser excitation wavelength range	671 / 785 /830/ 1064	nm
Maximum Raman laser fluence	5	kW/cm²
Shelf life for optimum performance:	8	months
Long term storage temperature	5 - 60 (40 - 140)	°C (°F)
Long term storage humidity	< 50, non condensing	% RH

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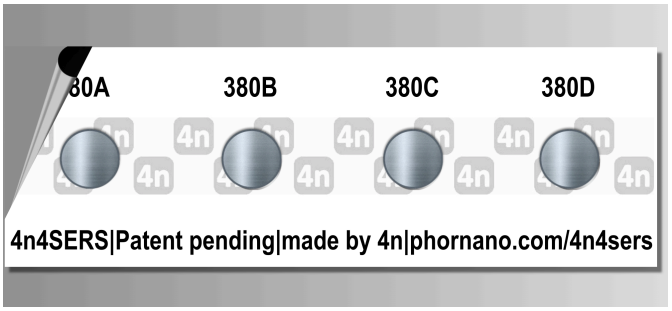
Dimensions: (mm)



Total dimension: 75 +0/-1 x 24 +0/-1;
Pitch: 18 +/- 0.25

A unique serial number system allows traceability of each SEHS-SERS active chip. The active chips are embedded in a flexible, adhesive substrate, compatible with a standard microscope slide.

Each **individual SERS ship** is scanned prior to shipment. Its response is available in the form of an **individual performance indicator** for calibration of your Raman setup for **quantitative SERS.**

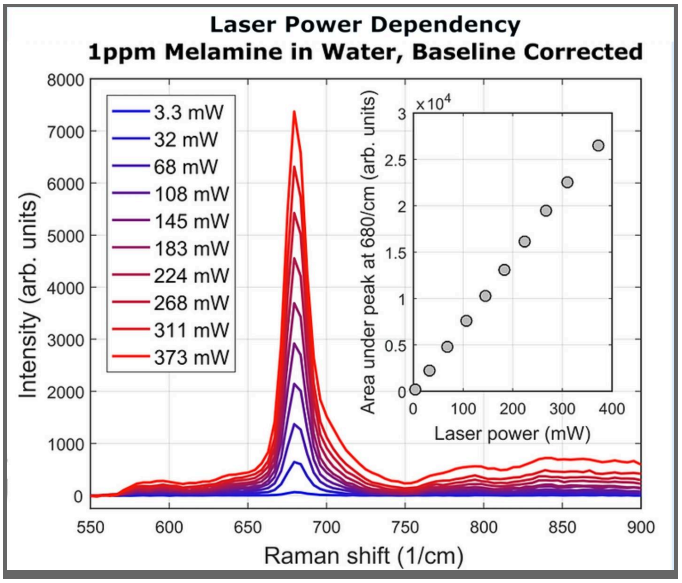
Examples of Raman spectra:

Robust and easy to use. With their **EXTREMELY HIGH DAMAGE THRESHOLD of > 5kW/cm²**, 4n4SERS substrates won't let you down, even when full power of your 500 mW Raman laser is utilized for best results. Distinct strong **LOCALIZED SURFACE PLASMON RESONANCE (LSPR)** effect of HighQuant nanoparticles unlocks many orders of magnitude improvement in the limit of detection.

Figure: linear enhancement of the Raman signal with increasing power.

Analyte: 1 ppm Melamine

Parameters: ca. 5kW/cm², 10 seconds



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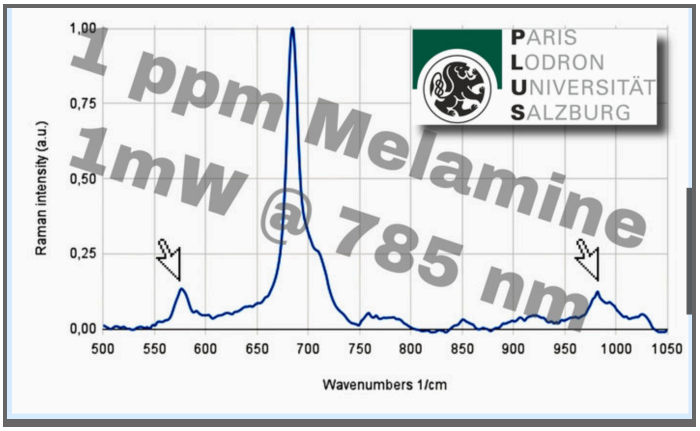
Enhancement factor of the Raman signal of >10^6 has been determined. At a record low Raman laser power of only **1 mW** a set of characteristic Raman peaks of **1 ppm Melamine** in water has been recorded using the new **4n4SERS 4x4** substrates.



Parameters:
Raman laser fluence: ca. 5 kW/cm²
Exposure time: 20 s

Supported by the Austrian research promotion agency, in collaboration with:

RECENDT RESEARCH CENTER NON DESTRUCTIVE TESTING
JKU JOHANNES KEPLER UNIVERSITÄT LINZ
PARIS LODRON UNIVERSITÄT SALZBURG
FFG Austrian Research Promotion Agency

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