SERSTECH SERS KIT

Serstech SERS kit allows for identification down to 200ppm

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Quick identification of difficult substances

Heroin • Fentanyl • Meth Amphetamine • Ketamine • Cocaine • Amphetamine • Low concentration and colored samples

The Serstech SERS kit is used together with Serstech Arx or Serstech 100 Indicator to enhance the capability to identify dark coloured substances or mixtures with very low concentrations. The device is capable of detecting very low amounts of "street quality" narcotics samples, including heroin and many fentanyl variants. The Serstech SERS kit is based on patented technology used together with disposable SERS surfaces.

In short, the signal from a substance is amplified while fluorescence is being reduced. The disposable surfaces are available in packs of 20 or 100 and are delivered together with sample preparation bottles pre-filled with solvent.

DESIGNED ★ DEVELOPED ★ IN SWEDEN ★ MANUFACTURED

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SERSTECH SERS KIT BENEFITS

Analysis using Raman spectroscopy gives rise to very information-rich spectra that allow identification of the analysed substance. Raman spectroscopy has some shortcomings in that it is a relatively insensitive technique where only a minute fraction of the light energy the sample which will give rise to Raman scattering. This shortcoming is further emphasised when using a laser with longer wavelength, e.g. 1064 nm lasers, since the Raman scattering is proportional to the laser wavelength used to induce the Raman effect. The Raman scattering relates to the wavelength as λ^{-4}, i.e. the longer the wavelength the lower the Raman scattering and thus the sensitivity. This limits the use of Raman in analysis of samples with low concentrations. In addition, the Raman information can be obscured by fluorescence, if this occurs simultaneously. By enhancing the Raman signal any fluorescence may be overcome as well as an increase in sensitivity is achieved.

Surface enhances Raman spectroscopy (SERS) is a technique that utilises surface plasmon effects on surfaces of noble metals, e.g. silver or gold. With the use of SERS the Raman signal can be enhanced above 1 million times, leading to that fluorescence issues are overcome and opening up for measurements in the ppb range. In the SERS analysis, the analyte is dissolved and placed on a metal surface (e.g. silver) with high surface roughness. The solvent used to dissolve the analyte is evaporated away and the remaining analyte is analysed by exposing the surface to the analysing laser beam. The intense surface plasmons are only active very close to the surface and by using a very high surface roughness we increase the likeliness for the analyte to achieve the enhanced signal. Combining a 785 nm Raman system with SERS, fluorescence problems are overcome with the added value the higher sensitivity and thus allowing higher performance than instruments based on lasers with longer wavelengths (e.g. 1064 nm).

Analysis of "dirty" amphetamine

Amphetamine give rise to a strong Raman spectrum with well defined peaks. However, this dirty amphetamine give rise to fluorescence that obscure many of the Raman bands and thus make the identification harder. The Serstech´s Raman instrument uses mathematical algorithms and firmware features to handle the fluorescence. In some cases, the fluorescence intensity is too high to allow identification and thus for the 785 nm Raman system, SERS is the solution.

As an example, "dirty" amphetamine was analysed using Serstech 100 indicator. Amphetamine is in its pure form a white powder, often in the form of a sulphate salt. Here the sample is grey brown of amphetamine that has a strong fluorescence. A standard "quick" analysis of the amphetamine sample gives rise to fluorescence that obscure the Raman signal. With the use of the firmware tools fluorescence is effectively reduced so that amphetamine can be identified, with a relatively low correlation. Note that the fluorescence is still present in the graph of the instrument although it is algorithmically removed prior to matching. The reason for this is to make the user aware of the presence of fluorescence if further improvement of the signal is desired.

When turning to the SERS improvement of the sample a small fraction of the sample (<1mg) is dissolved in methanol and subsequently placed on as SERS target based on silver. The analysis of this surface gives rise to nice strong spectrum completely void of fluorescence.

In addition to allow handling of fluorescent substances SERS gives Raman added sensitivity that allow analysis of more dilute system or smaller amounts.

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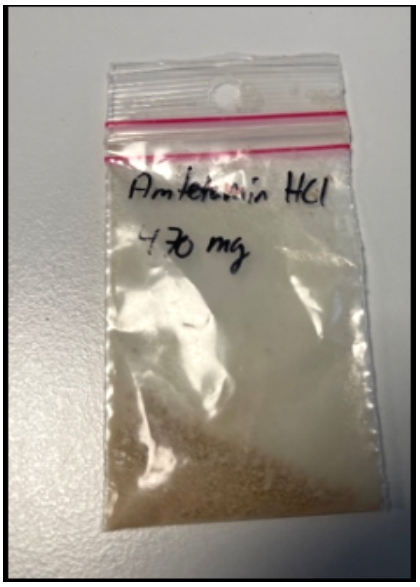

Figure 1. A zip bag with brown grey dirty" amphetamine

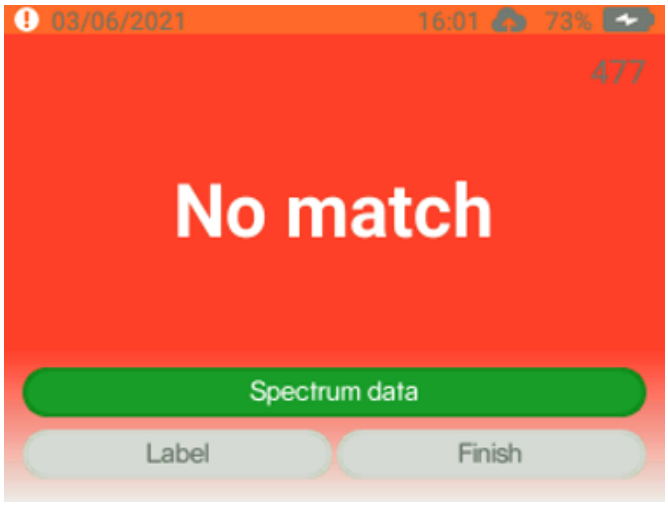

Figure 2. A quick analysis of the sample reveals a spectrum with very little information. The curvature of the spectrum indicates fluorescence.

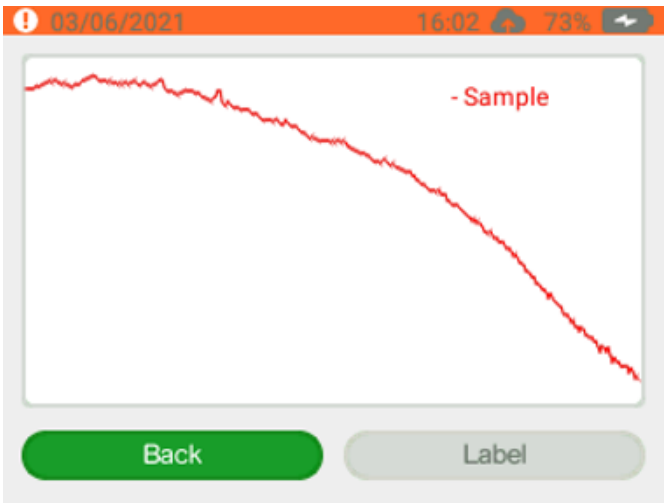

Figure 3. The lack of information in the Raman spectrum prevents identification.

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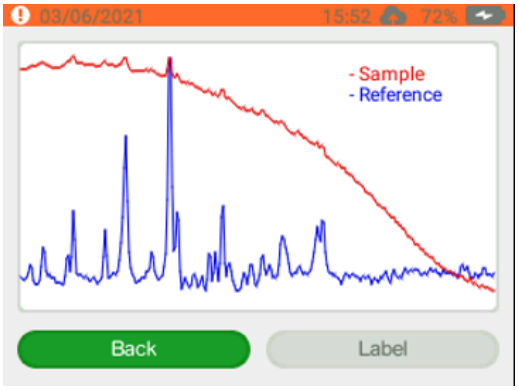

Figure 4. Using firmware tools the spectrum is improved to show some features. The slope from the fluorescence is not removed since it is information on the presence of fluorescence, if user decides to further improve spectrum.

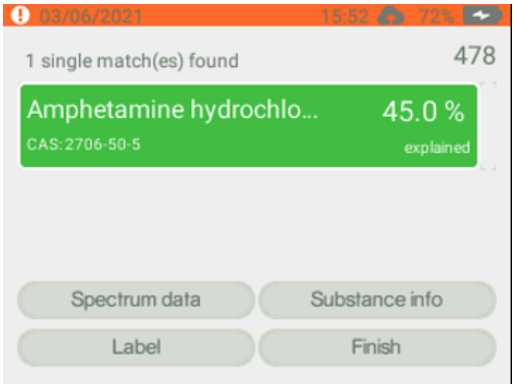

Figure 5. The information obtained from the analysis using firmware tools to reduce fluorescence allow identification of amphetamine. However, with a low mathematical correlation (45%).

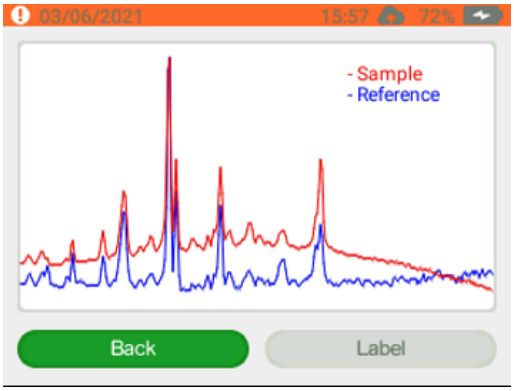

Figure 6. Using SERS the obtained spectrum is fluorescence free and well defined Raman spectrum is presented.

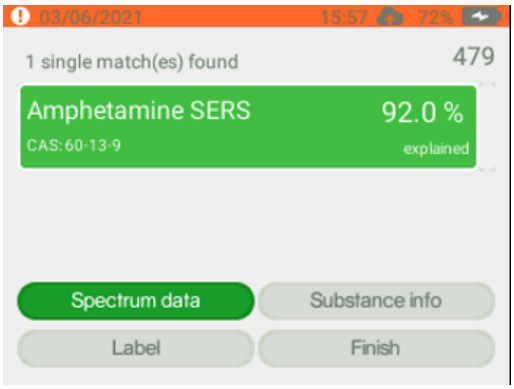

Figure 7. The SERS spectrum allow identification of amphetamine with a high correlation.

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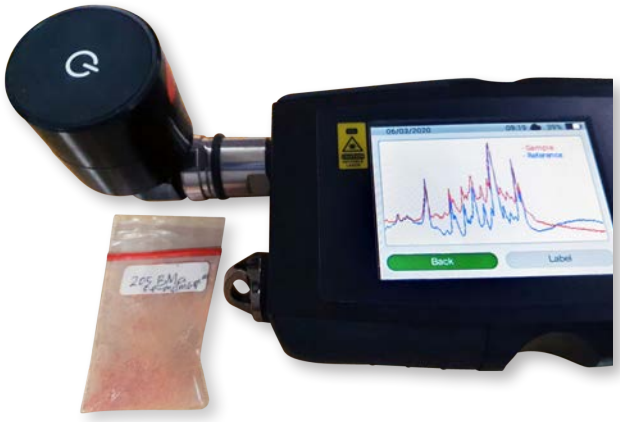
Size	39 x 44 mm / 1.53 x 1.73 inch
Detection level	Down to 200 ppm
Weight	67g / 2.36 oz.
Weight, including case and accessories	905g / 32 oz
Included in the package	Adaptor, 5 x sample preparation bottles containing solvent fluid, 5 disposable SERS plates, Allen key for battery exchange, quick-start guide
Solvent	Methanol, 3ml / 0.1 fl. oz. (CAS 67-56-1). Note: Due to local regulations methanol can not be shipped to all countries.
Battery type	Primary lithium battery, LS 14250, 3.6 V Primary lithium-thionyl chloride (LiSOCl2), High energy density, 1⁄2 AA-size bobbin cell
Battery use	Approximately 300 measurements



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