SERS Substrates

Surface Enhanced Raman Spectroscopy

Salvo Technologies SERS substrates amplify very weak Raman signals by many orders of magnitude for high-sensitivity measurements.

High-sensitivity gold and silver SERS substrates let you make fast, repeatable measurements for the identification and quantification of SERS-active analytes. Typical applications include trace level detection of pesticides and narcotics and precision screening of food ingredients for controlled additives such as melamine. SERS substrates also can be used for authentication and anti-counterfeiting applications using SERS-active taggants.

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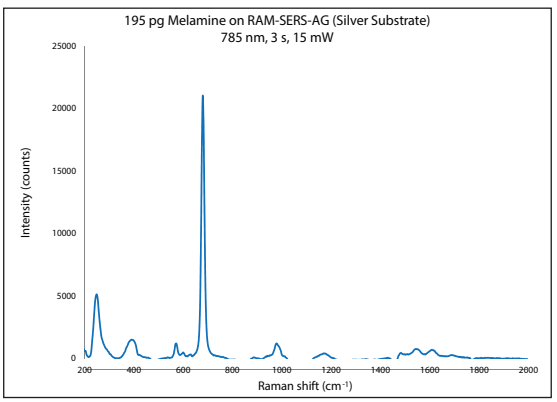
Key Applications

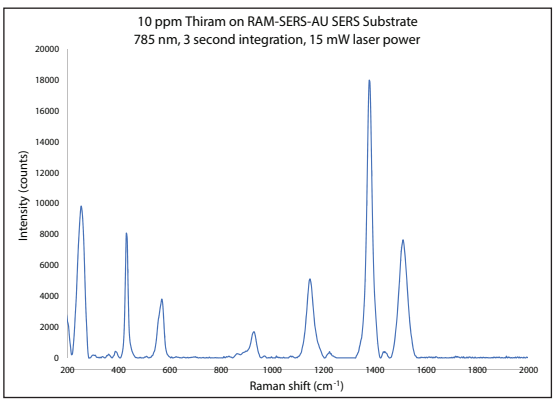
Detection of narcotics - Fast identification of drugs in the field is a real boon for those combating drug-related crime. Often only small residues of a sample can be collected from a crime scene. SERS also opens up a potential route for fast roadside drug screening of drivers using saliva samples.

Food safety - Certain additives such as melamine found in milk powder can be extremely harmful even at very low concentrations. Using SERS, we can qualify and quantify the level of contaminants, pesticides and dangerous trace elements in our food supply chain.

Anti-counterfeit tagging - High value products that are subject to duties and taxes - petrol is one example - are often the target of piracy and fraud. By adding a small amount of a SERS-active taggant to the unadulterated-product, detecting the presence of the taggant become an instant indicator of authenticity.

Biological research - SERS can be used to identify and characterize biological samples including proteins, DNA and bacteria.





Advantages of SERS Substrates

High sensitivity - Substrates deliver great results and have demonstrated superior sensitivity for a range of analytes when tested against competitor substrates.

Great stability - Highly stable substrates require no special handling and can be stored at room temperature.

Reliable reproducibility - Highly reproducible and easily scaled manufacturing methods enable sensitive measurements at an affordable price.

Customized form factors - Unique production techniques can be tailored to impact specificity to particular analytes (on demand) and custom form factors such as swabs and coatings.

Easy to uses - For great flexibility, substrates work reliably with the complete range of Salvo Technologies instruments.

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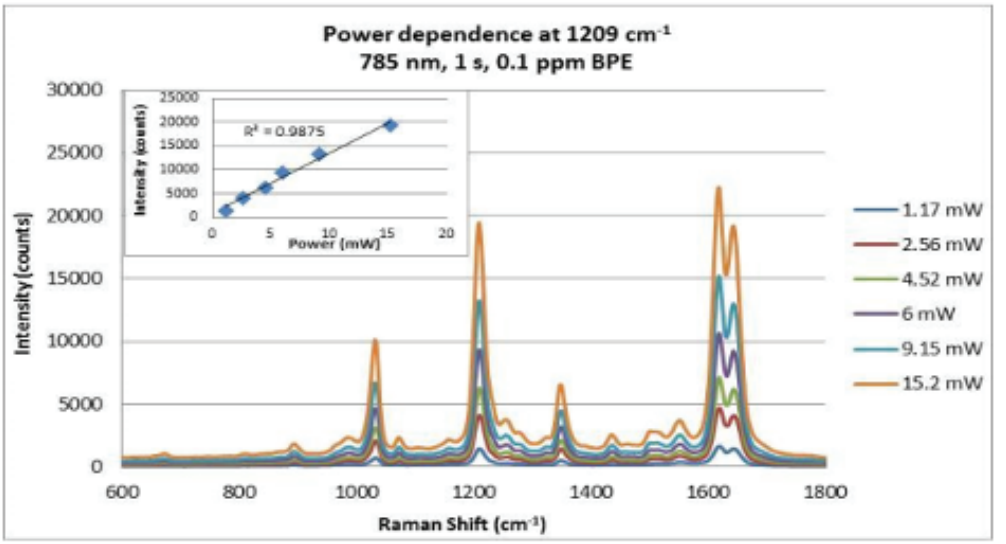
Laser Power Dependence

The intensity of the Raman signal should scale linearly with laser power. Hence, a laser power study was conducted on both substrates using BPE for RAM-SERS-AU and crystal violet for RAM-SERS-AP.



Concentration Dependance

The Raman peak intensity should also be concentration dependent. Various concentrations of BPE ranging from 10^{-9}M to 10^{-4}M (0.002 to 18 ppm) were used for the RAM-SERS-AU substrate. Crystal violet having concentratuons of 0.01 to 10 ppm were used for RAM-SERS-SP.

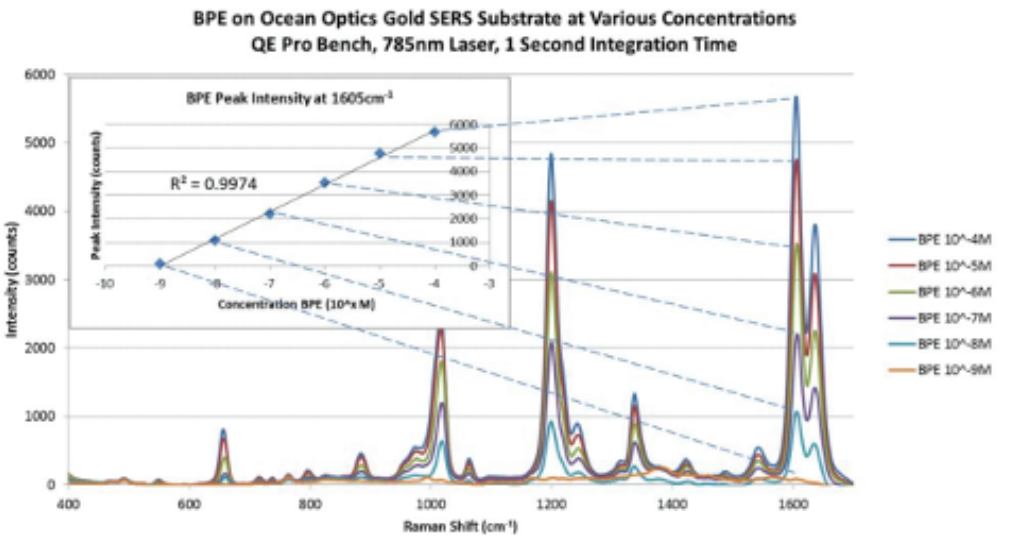


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Table 1: SERS Substrate Product Details

Specification	RAM-SERS-AU	RAM-SERS-AG	RAM-SERS-SP
SERS Slide Dimensions	25.4 x 76.2 x 1 mm	25.4 x 76.2 x 1 mm	25.4 x 76.2 x 1 mm
SERS Active Area	5.5 mm diameter circle	5.5 mm diameter circle	4 x 4 mm square
SERS Active Chemistry	Gold (Au) Nanoparticles	Silver (Ag) Nanoparticles	Gold/Silver Film
Slide Material	Borosilicate Glass	Borosilicate Glass	Borosilicate Glass
Raman Excitation Wavelength	785 nm	532 nm	638 nm
Storage Lifetime	1.5 months	1 month	6 months
Reusable	No	No	Yes
Laser power	≤20 mW	≤20 mW	≤100 mW
Volume of analyte	15 µL	15 µL	10 µL

Table 2: Limit of Detection (LOD) for Some Commonly Used Analytes

Material	Why Do I Want to Detect Trace Levels?	LOD with QE-*Pro**	
		RAM-SERS-AU	RAM-SERS-SP
BPE	BPE can be used as a taggant in fuel as well as in biological samples.	0.1 fg	30 fg
TNT	The threat of terrorism means the need for quick screening for trace levels of explosions is greater than ever.	5 ng	30 pg
Melamine	Poisonous to humans, especially babies and children at very low levels (<1 ppm).	5 pg	0.1 pg

*Please note that the LOD will depend on the sample and spectrometer used and that these are provided as guidelines only.

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