

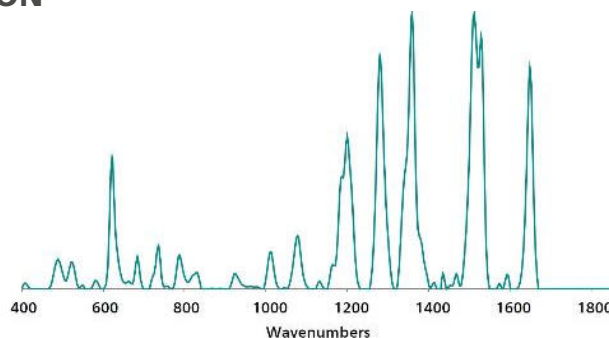


Ground cayenne pepper bought commercially was doped with Rhodamine B (RhB) and tested with Misa

to simulate a realistic food screening scenario.

## REFERENCE MATERIAL AND LIBRARY CREATION

To establish a reference spectrum, a pure RhB standard (50 µg/g in ultrapure water) was analyzed using gold nanoparticles (Au NPs). The unique SERS spectrum shown in **Figure 1** can be used to create a library entry for RhB.



**Figure 1.** Gold NP SERS standard reference spectrum of Rhodamine B.

## EXPERIMENT

A stock solution of RhB in methanol was prepared. Purchased cayenne powder was treated with serial dilutions of the stock (3 mL stock to 1 g cayenne) to yield samples with 1000, 500, 100, 50, 10, 5, and 1 µg/g of RhB. Samples were thoroughly mixed and air-dried. To prepare extracts, 0.1 g of each spiked sample was added to a vial with 400 µL of methanol, shaken to mix, and left to settle for 10 minutes. To prepare test samples, 50 µL of the methanol extract was pipetted into a vial with 400 µL of Au NP solution and 50 µL of 0.5 mol/L salt solution. The vial was shaken to mix, and then placed into the vial attachment on Misa for testing.



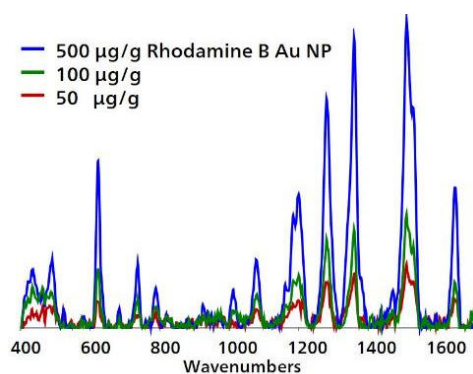
**Table 1.** Experimental Parameters

Instrument		Acquisition	
Firmware	0.9.33	Laser Power	5
Software	Misa Cal V1.0.15	Int. Time	10 s
Misa Vial Attachment	6.07505.040	Averages	10
ID Kit - Au NP	6.07506.440	Raster	ON

## RESULTS

In **Figure 2**, overlaid spectra of RhB indicate detection down to 50  $\mu\text{g/g}$ . For each concentration tested, the baseline spectrum from unadulterated cayenne was

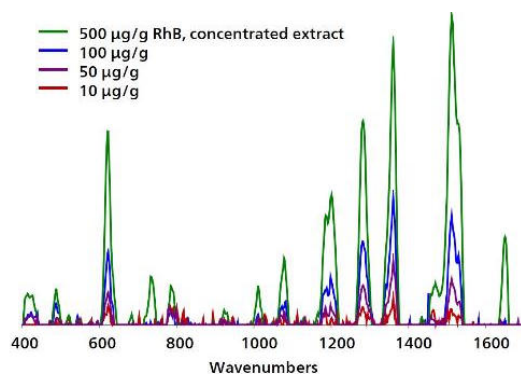
subtracted from the average of baseline-corrected, replicate measurements.



**Figure 2.** Gold NP SERS concentration profile of RhB extracted from adulterated cayenne powder. Spectra are baselined, with Au NP and control subtracted.

To improve trace detection and spectral signal-to-noise, a very simple concentration method was applied to each extract. All extracts were fully air-

dried, then resuspended in methanol to yield a 5x increase in concentration. The spectra in **Figure 3** demonstrate detection of RhB down to 10  $\mu\text{g/g}$ .



**Figure 3.** RhB profile after 5x concentration.

## FIELD TEST PROTOCOL

### Detection of Rhodamine B in the field

Using the large end of the scoop, add 3–4 scoops of sample to a 2 mL vial. Add methanol to the vial until ~1/3 full. Cap and shake the vial gently to mix, then let sample rest for 2 minutes. Fill a clean vial halfway

full with Au NPs. Using pipettes, add 1 drop each of sample solution and NaCl solution to the Au NPs, then cap and shake the vial gently to mix. Insert into vial attachment on Misa for measurement.

**Table 2.** Requirements for Field Test Protocol

ID Kit - Au NP	6.07506.440
includes:	Gold nanoparticles (Au NP)
	Scoop
	Disposable pipettes
	2 mL glass vials
Reagents	
Methanol	
NaCl solution	3 g NaCl in 100 mL water
Test settings	Use ID Kit OP on MISA

## CONCLUSION

Trace levels of detection, ease of sample preparation, and rapid assay times collectively recommend Misa as

a reliable, cost-effective solution for high-throughput, on-site identification of adulterated food products.

## CONTACT

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## CONFIGURATION



### MISA Advanced

Metrohm Instant SERS Analyzer (MISA) / MISA Metrohm (Orbital Raster Scan Technologie, ORS)

MISA 1BluetoothUSB

MISA Advanced MetrohmP-SERSSERS

MISA Advanced MISAP-SERSASTMUSBUSBMISAMISA  
Cal



### ID - Au NP

ID - Au NPMira/MisaSERS