



Application Note AN-RS-019

# SERS 姜黄中的美他尼黄

## Misa

Metanil yellow (MY) is an azo dye used in the manufacture of external-use products such as textiles; however, it is prohibited from use as a food additive in many countries. Toxicology studies demonstrate that ingestion of MY results in significant neurological and multi-organ damage. Despite these hazards, MY is commonly used as an illicit colorant for enhancing the visual appeal of spices and legumes, most notably turmeric. Given

the rising popularity of turmeric as a dietary supplement promising significant health benefits, routine safety tests must be readily available to ensure the integrity of turmeric-containing products. Ideal tests feature methods that are selective and sensitive, yet portable and convenient.

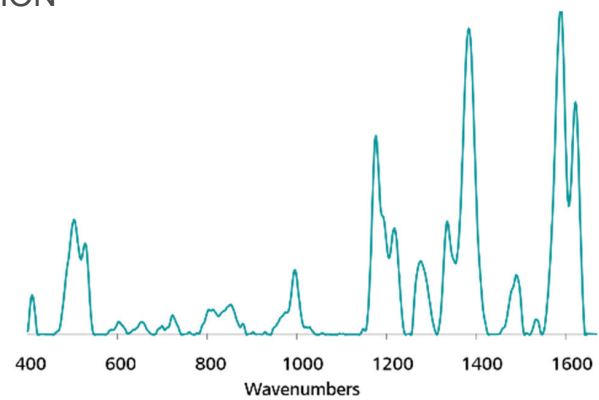
Misa (Metrohm Instant SERS Analyzer) achieves rapid and accurate detection of MY in a facile assay format.

Misa is a versatile analytical tool for detecting banned colorants in foods. This application note

details a simple, conservative extraction procedure for the detection of MY in turmeric.

## REFERENCE MATERIAL AND LIBRARY CREATION

To establish a reference spectrum for MY, a pure standard in 50 mmol/L HCl is analyzed using gold nanoparticles (Au NPs). The unique SERS spectrum presented in **Figure 1** can be used to create a library entry for MY.



**Figure 1.** Standard Au NP SERS spectrum of Metanil Yellow.

## EXPERIMENT

For simulated testing of MY in turmeric, solid MY was mixed thoroughly with commercially bought turmeric powder to yield a concentration range of spiked samples: 10 and 1 mg/g, 100 and 50 g/g. MY was extracted by the addition of 1 mL 0.5 mol/L HCl to 100 mg of each sample in a glass vial. This suspension was shaken and allowed to settle for 10 minutes. Test samples were prepared by pipetting 100 L of the HCl extract into vials containing 800 L of Au NPs and 100 L of 0.5 mol/L NaCl. Each vial was inverted to combine the components and then inserted into the vial attachment on Misa for analysis.



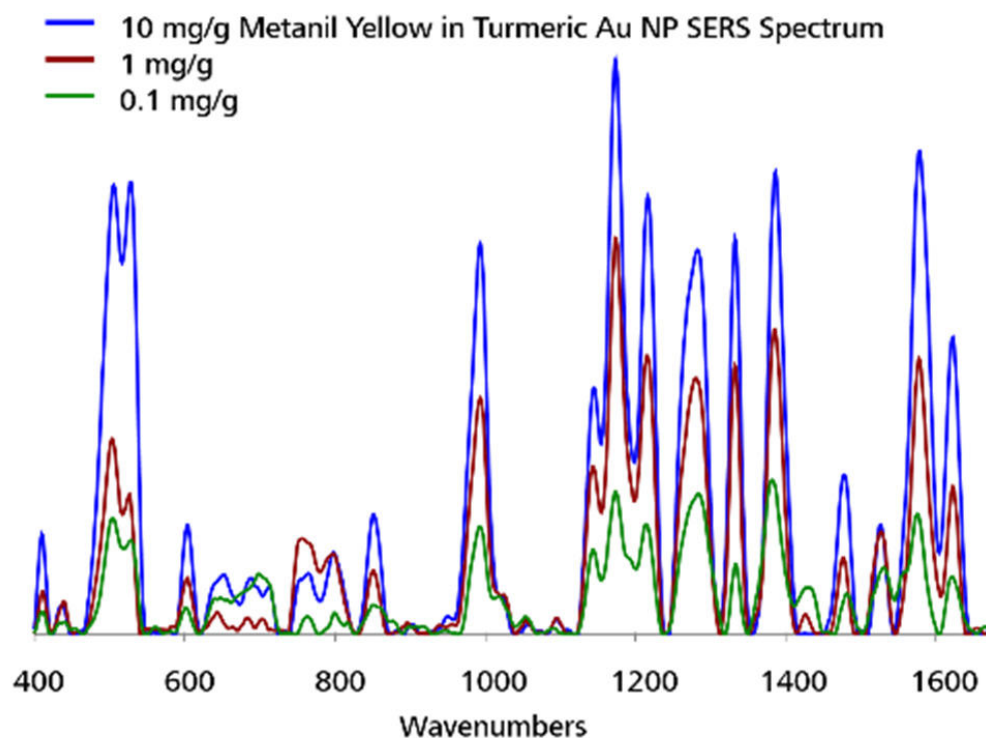
**Table 1.** Experimental parameters

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

Overlaid baseline-corrected spectra acquired for the spiked samples demonstrate detection of MY down to 0.1 mg/g (**Figure 2**). Reliable detection is based

on prominent peaks at 504, 1176, 1383, and 1588  $\text{cm}^{-1}$  in the spectrum.



**Figure 2.** Detection range of MY with Misa and Au NPs.

## FIELD TEST PROTOCOL

### Detection of Metanil Yellow in the field

Using the large end of the scoop, add 3–4 scoops of sample to a 2 mL vial. Add HCl solution to the vial until halfway full. Cap and shake the vial gently to mix, and let sample rest for 5 minutes. Fill a *clean* vial halfway full with Au NPs. Using pipettes, add 2

drops 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

<b>ID Kit - Au NP</b>	<b>6.07506.440</b>
includes:	Gold nanoparticles (Au NP)
	Scoop
	Disposable pipettes
	2 mL glass vials
<b>Reagents</b>	
HCl solution	4 mL HCl in 100 mL water
NaCl solution	3 g NaCl in 100 mL water
<b>Test settings</b>	Use <b>ID Kit OP</b> on MISA

The rapid detection of MY in adulterated turmeric is demonstrated using Misa and Au NPs. This assay requires minimal user training, making it ideal for cost-effective, on-site QC testing in large food processing facilities, as well as distribution and receiving centers. Recently, the sensitive detection

of MY in dal, a yellow split pea commonly used in Indian cuisine, with Metrohm Raman's portable Sierra spectrometer suggests potential for using Misa to screen a wide variety of foods prized for their intense yellow coloration.

## CONTACT

Metrohm AG  
Ionenstrasse  
9100 Herisau

[info@metrohm.com](mailto:info@metrohm.com)

## CONFIGURATION



### MISA Advanced

Metrohm Instant SERS Analyzer (MISA) ,/MISA  
Metrohm (ORS) ,MISA 1 , BlueTooth USB  
MISA Advanced , Metrohms P-SERS SERS  
MISA Advanced MISA P-SERS- ASTM USB USB  
MISA MISA Cal



### ID – Au NP

ID - Au NP Mira/Misa SERS