Fingerprinting food

Surveillant provides rapid and reliable screening methods to help food and beverage manufacturers monitor their products and raw materials. Using an Infinite® M1000 PRO, the company has developed a simple, low cost method of 'fingerprinting' products based on their intrinsic fluorescence, providing a rapid screening technique to help detect counterfeit or adulterated foodstuffs.

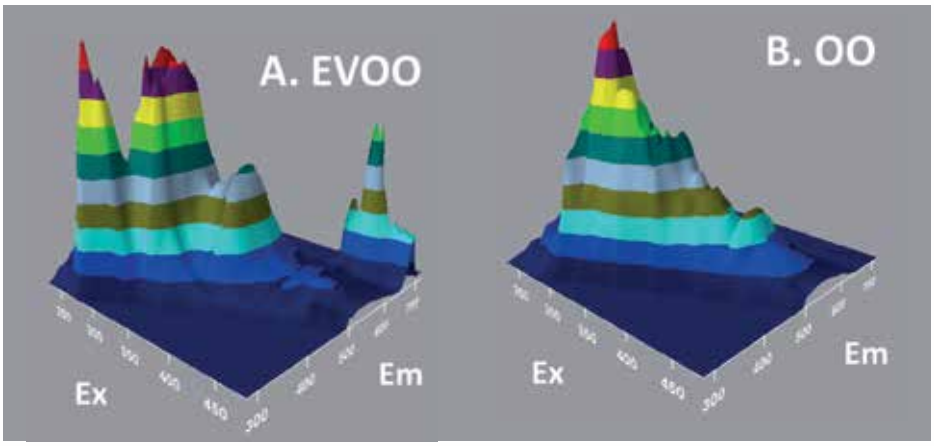
Fred Behringer, Surveillant founder

Brand recognition and reputation are important factors in the consumer goods market, particularly for foods and beverages. Ensuring the quality, authenticity and safety of foodstuffs is therefore a constant challenge for producers, with a majority of companies operating extremely stringent quality control and authentication programs to guarantee the quality and provenance of their raw materials and products. Recognizing that the cost and complexity of this testing can be a significant burden for large-scale QC programs, Connecticut-based Surveillant LLC has developed rapid and economical methods for 'fingerprinting' foods and beverages, identifying suspect products for further testing. Surveillant founder Fred Behringer explained: "There are a lot of very effective techniques for detecting the quality, purity or authenticity of materials, but these standard methods can be relatively expensive, limiting the number of samples that can be tested. Surveillant aims to offer complementary techniques to supplement existing QC workflows, providing methods that are rapid and inexpensive, allowing higher throughput and larger-scale sampling. By using our techniques for front-line testing, only samples that yield ambiguous or suspicious results need further analysis by more expensive and time-consuming techniques – such as GC-MS – reducing the overall cost."

"We have focused primarily on spectroscopic techniques, as these generally offer rapid, inexpensive measurements, with fluorescence measurements being the real workhorse. The idea is to keep things as simple as possible, avoiding the cost and variability associated with complicated chemistries, and so we use the intrinsic fluorescence present in most foods and beverages to create 3D spectral 'fingerprints' which can be compared to an in-house database."

The simplicity and potential economic benefits of this approach have recently been demonstrated, allowing extra virgin olive oil to be distinguished from olive oil and other edible oils[1]. Fred continued: "The authenticity of extra virgin olive oil is an ongoing concern, with strict production

Surveillant's label-free technique relies on the Infinite M1000 PRO's ability to create consistent fluorescence spectra



The method can be used to discriminate between closely related products, such as extra virgin olive oil (EVOO) and olive oil (OO)

requirements, high consumer demand and occasional poor harvests. The resulting combination of high prices and limited supply makes it a target for adulteration with less expensive oils, and so we have developed a rapid microplate-based method to help identify adulterated extra virgin olive oil. This method requires no sample preparation prior to analysis, and the results can be automatically processed, providing a low cost, effective technique which can be easily implemented at multiple sites."

"The sensitivity of the fluorescence reader is obviously crucial for this approach, as is the ability to freely select the most appropriate excitation and emission wavelengths for each target product. When I began developing the method in 2007, I compared monochromator-based microplate readers from different manufacturers head-to-head for several months, looking for the ability to create consistent spectra and discriminate between closely related products along with ease of use. The Tecan offering – at the time it was the Sapphire²™ – offered the best performance in my hands, and I have been very happy with my decision. In 2013 I upgraded to the Infinite M1000 PRO. Tecan's instruments have been reliable and robust – we have successfully shipped them to other countries for use in remote labs on several occasions, where they have performed well."

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"Tecan's software is another strong point. i-control™ is easy to use and allows you to export data directly to an Excel® spreadsheet. This is a particularly useful feature for our work, as the spectral reconstruction and multivariate analyses we perform are quite different from the standard techniques used in biochemical assays, so being able to access the raw data easily is a real bonus."

1) Behringer, F. Rapid Evaluation of Extra Virgin Olive Oil Using Fluorescence Spectra. *Spectroscopy: The Application Notebook*, Sept 2015.

To find out more about Tecan's Infinite M1000 PRO, visit **www.tecan.com/infinitem1000**

To learn more about Surveillant, go to **www.surveillanttech.com**