November 6, 2019 (13:30–14:15)

Waters

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VENDOR SEMINAR:

Real-Time Profiling of Food and Beverages Using Direct MS and Chemometrics

Real-Time profiling of food and beverages using direct MS and chemometrics

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Currently there is no globally harmonised definition for "food fraud" however, there are initiatives coordinating action against fraudulent practices in the food supply chain such as the EU Food Fraud Network [1]. Food and beverages of higher commercial value are frequently subject to fraudulent practice.

Mass spectrometry has traditionally been one of the 'last resorts' for food authenticity analysis. While gas chromatography-MS (GC-MS), GC isotope ratio-MS (GC IR-MS), and liquid chromatography-MS (LC-MS) are often used for authenticity testing, MS methods (including these) are generally considered to be slow, expensive and not amenable for routine application, mostly due to laborious sample preparation procedures. The advent of ambient ionization mass spectrometric methods remove most of the constraints associated with sample preparation and also opened new opportunities for direct-MS and point-of-control monitoring. Since direct MS methods require minimal or no sample preparation, the use of internal standards (or even external calibrators) is not always possible, resulting in the lack of quantitative information provided by these methods. Nevertheless, the spectral profiles are highly characteristic of the type, origin, age, etc. of the sample, which makes these approaches excellent for rapid profiling analysis. In these cases the MS spectral information is used as a 'fingerprint' for the identification of critical attributes associated with both the genetic origin and environmental exposure of the sample.

Proof-of-principle applications employing appropriate direct MS techniques including Direct Analysis in Real Time (DART), Rapid Evaporative Ionisation Mass Spectrometry (REIMS) and Atmospheric Solids Analysis Probe (ASAP) coupled with multivariant statistical analysis have been developed addressing various food authenticity, quality and composition testing requirements. For example, detection of undeclared ingredients in processed foods and establishing authenticity of various products, e.g. Protected Designation of Origin (PDO) status dairy products, quality indicators in meats, farming production methods, geographical origin of pistachio nuts and botanical origin of monofloral honey.

[1] https://ec.europa.eu/food/safety/food-fraud/ffn_en