Improving Food Safety through FT-IR

Food safety and food quality assurance are becoming increasingly important in the face of industrialized agriculture and food production.

Our food is often harvested, processed and packaged in a fully automated fashion. Foreign objects and materials such as glass, rubber or plastic may find their way into the production chain unnoticed.

In other cases, reckless producers do not shy away from food fraud to hide quality deficits. Moreover, storage and transport may have negative effects on food products.

To counter these problems Bruker provides a large suite of FTIR (and FT-NIR) instruments combining them with smart and intuitive analytical solutions.

ALPHA II - Macroscopic FT-IR and Foreign Object Analysis

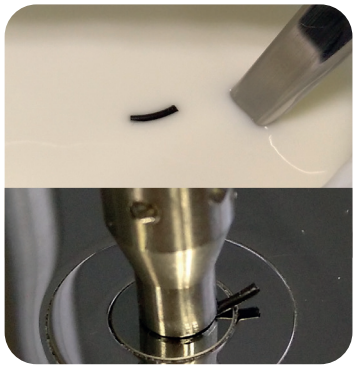
The ALPHA II is a routine benchtop FT-IR spectrometer. A sample is applied directly to the instrument and analyzed. No further preparation is needed. Whether liquids, fine powders or a chunk of unknown material, the shape of the sample is of no importance since the ALPHA II and its accessories are designed to adapt.

LUMOS II - Microscopic FT-IR and Mapping

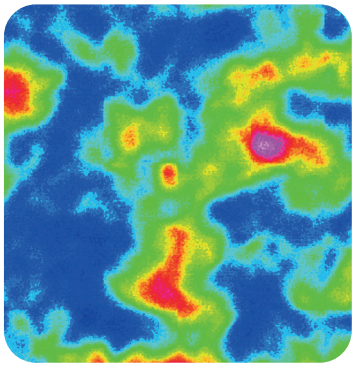
The LUMOS is a routine FT-IR microscope. FT-IR microscopy combines the advantages of a thorough visual inspection with a detailed chemical analysis. The LUMOS is simple and offers a high degree of automation to allow quick analytical success even for inexperienced users. Samples are inspected, areas of interests selected, analysis started and the LUMOS will do the rest.

HYPERION - Microscopic FT-IR and Imaging

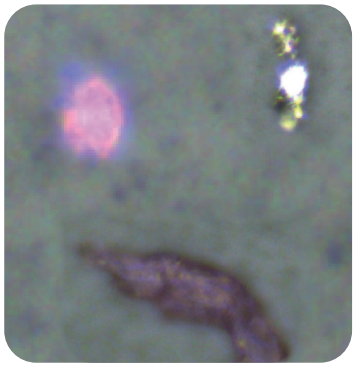
The HYPERION is a research grade FT-IR microscope. It offers a brilliant visual inspection and advanced FT-IR imaging. It has the ability to collect thousands of spectra in a matter of minutes.



A black foreign object found in yogurt (top) was cleaned and directly put onto a germanium ATR crystal (bottom).



Chemical Imaging clearly shows the addition of an inhomogeneous and possibly dangerous contaminant. (red)



Visual image of microplastic particles contained in a water sample. Pink polyester particle (top left) is 17 µm in diameter.

Applications of FTIR in Food Fraud and Adulteration

Example #1 – Foreign Object

A black, unknown, rubbery object was found in this yogurt. The foreign contaminant was separated and directly analyzed on the ALPHA II.

It was identified as a piece of an O-ring that broke during operation and thus entered the final product.

Example #2 – Food Powder

The HYPERION was used to assess the quality of powdered food and beverage samples. Fraud by illegal additives was suspected and the powder was analyzed as received.

Imaging measurements clearly showed the addition of an inhomogeneous and possibly dangerous contaminant.

Example #3 – Drinking Water

The analysis of bottled drinking water grows more important in times of microplastic pollution. Here, bottled water was filtered through cellulose and the filter directly analyzed by the LUMOS.

Differently shaped particles of varying origin were found and unambiguously identified. Among them were polyester, polyethylene and other organic and inorganic contaminants.

ALPHA II
FTIR Spectrometer

HYPERION 3000
FTIR Imaging Microscope

LUMOS II
FTIR Microscope

Technologies used are protected by one or more of the following patents:
DE 102004025448; DE 19940981; DE 102012200851B3; US 8873140B2. Additional patents pending.

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