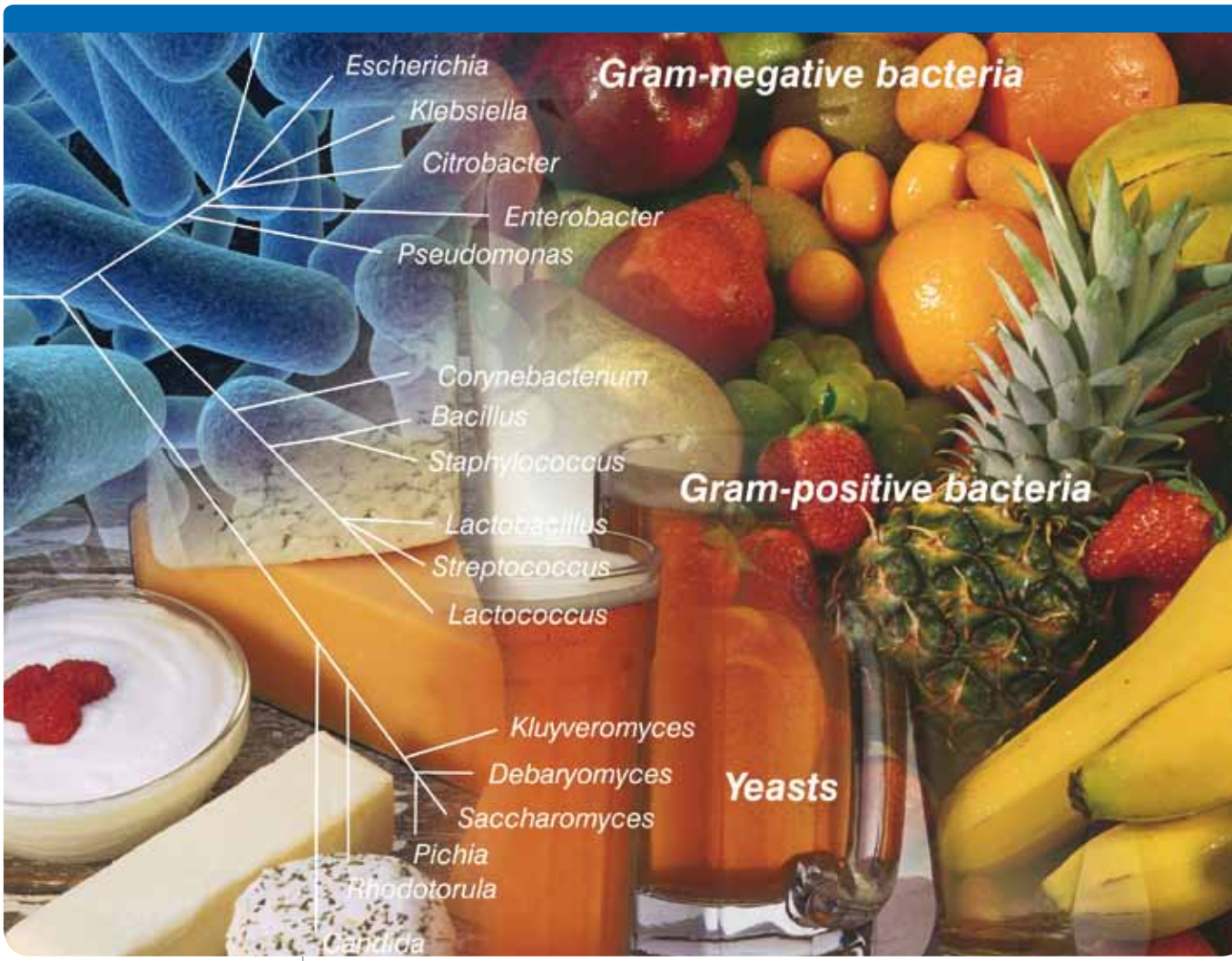


Microbial Identification

- Identification of Yeasts and Bacteria in Food

Innovation with Integrity

FT-IR

FT-IR Microbial Identification

Microbial Identification

Microorganisms are essential not only for the production of food such as dairy products, bread, beer and wine, but they also play a major role in fermentation processes and contribute to food digestibility and stability. However, as microorganisms can also cause spoilage or even poisoning during production processes, effective microbial quality management is essential for product safety. By a reliable microorganism identification production processes can be optimized and contamination sources be tracked down.

Fourier Transform Infrared (FT-IR) Spectroscopy is a fast and cost-efficient method for microbial identification in many areas of food analysis. Using this technique, qualitative control of raw materials and quantitative evaluation of complex compositions can be performed. In the field of microbiology, an FT-IR spectrum reveals a cell's "fingerprint" which reflects its biochemical composition (proteins, lipids, DNA/RNA and carbohydrates). The measurement's high sensitivity and accuracy enables to identify microorganisms even down to strain level.

Harvesting cells

Sample Preparation, Measurement and Evaluation

Pure microorganism cultures are typically grown for 24 hours under standardized conditions. Out of the confluent cell lawn, cell material is harvested from the agar plate and suspended in distilled water. This suspension is then loaded onto special reusable microplates in the 96- or 384-well format. After drying, the plate is inserted into Bruker Optics' microplate reader HTS-XT for measurement. The microplates can be easily cleaned and reused.

Unlike other methods, no additional, time-consuming cultivation step is necessary, and measurement and evaluation are performed without reagents or consumables. Data acquisition, evaluation and reporting are performed automatically, and samples are measured and identified in about a minute.

Identification results are summarized in table format showing the identified strain or species. Additionally, each sample has a detailed hit list. The application software also allows you to create dendrograms which graphically depict spectral similarities of different microorganisms.

Databases

The quality of the databases has a fundamental importance for the reliability of the identification. After all, each spectrum of an unknown microorganism is compared against all spectra from a certain library. A database library has to contain all relevant species, as well as all spectral variances of different strains from a single species. Food-relevant microorganisms from reference stocks are not the only strains in the library, but the data of isolates from different production sites are also included. Prior to building up libraries, all microorganisms in the database were identified through reliable reference techniques.

FT-IR for Microbial Identification

For the effective quality management of any food product, it is essential to reliably identify microorganisms. Bruker Optics' FT-IR spectroscopy based method identifies any microorganism by its specific infrared spectrum, which primarily reflects the complex mixture of biomolecules within the cells. No consumables are required for this method, making it more cost-effective than others. Since it requires only one cultivation step, FT-IR spectroscopy is also faster than other methods. Moreover, it is universally applicable and has extensive, customizable libraries.

Sample Preparation

Suspending cells in water

Loading samples on special reusable plates and drying

FT-IR Measurement

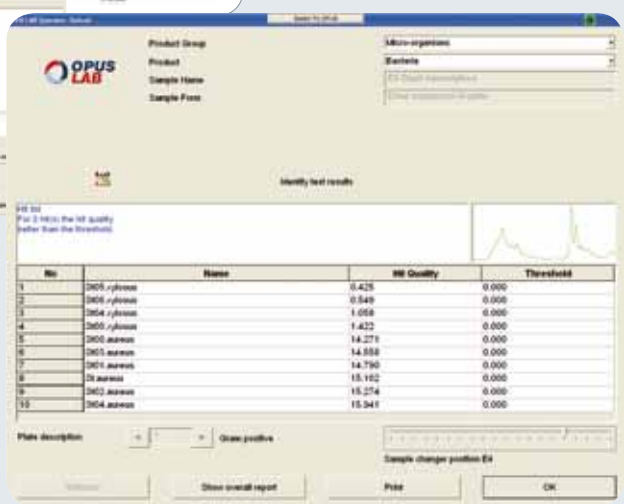
- No consumables or reagents required
- Identification down to strain level
- Extensive libraries of food-relevant microorganisms
- Universally applicable
- Libraries can be built up, modified and customized
- Fast identification methods (involves only one cultivation step)

Detailed result reports are available for each sample.

Identification results can also be shown through a dendrogram.

Software interface provides permanent measurement monitoring.

Results



Identification results are listed in a table format.

Additional Applications

The analysis and characterization of microbial populations are an important part of the quality management for the companies in the food industry. Ease of use and cost efficiency combined with quick, reliable results are FT-IR spectroscopy's strengths in microorganism identification. Due to its ability to differentiate down to strain level, this method is also suitable for monitoring a production plant's house flora. A specific house flora library is useful for:

- Tracking down microbial contamination routes
- Controlling specific cultures
- Recognizing early changes in flora
- Troubleshooting (source detection/ contamination responsibilities)
- Improving hygiene monitoring

Dedicated Training Courses

Held by microbiological experts at ZIEL, Technical University Munich, Germany (Prof. Dr. Siegfried Scherer/Dr. Mareike Wenning), our customer training courses will help you to learn how to prepare samples, operate the instruments, and evaluate measurement data.

The databases were built up and validated by the following organization:

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