

Strain typing by FTIR spectroscopy as a tool in food microbiology

Mareike Wenning

Abteilung Mikrobiologie, Zentralinstitut für Ernährungs- und Lebensmittelforschung
(Z I E L) Weihenstephan, Technische Universität München, Weihenstephaner Berg 3,
85350 Freising, Germany

Use of FTIR spectroscopy in microbiology has largely been focused on microbial identification which is the most extensively studied application. However, the information content of FTIR spectra offers a lot more perspectives than species identification. The spectra are in many cases strain-specific and allow the differentiation and subtyping of microorganisms below the species level [1, 2], which is particularly useful for different applications in food microbiology.

If the biodiversity of particular floras is analysed, hierarchical cluster analysis of FTIR spectra can reveal whether only one or more strains of a species are present in a sample or whether the same strains occur in different samples. The possibility to type organisms down to the strain level is furthermore helpful in the analysis of contamination routes in the food industry, where contaminants have to be matched with isolates of potential contamination sources. This is particularly important for elucidating whether a case of contamination lies in the responsibility of the producer or a supplier. If contamination with particular species occurs frequently and no responsibility of suppliers can be found, typing of FTIR spectra can reveal whether it is always the same strain which would lead to the assumption of a persistent contamination source. Stepwise analysis of the production process is then needed in order to find the source of contamination.

FTIR spectroscopy is an exceedingly interesting technique for such purposes as it offers the possibility to identify and subtype bacteria simultaneously using the same technology. In addition, it is easy to use and can therefore be carried out by lab personnel without special training, as all alternative techniques are based on molecular biology.

References

- [1] N.R. Büchl, M. Wenning, M. Hutzler, H. Mietke-Hofmann and S. Scherer, Differentiation of probiotic and environmental *Saccharomyces cerevisiae* strains in animal feed. *J Appl. Microbiol.* **109**, 783-91 (2010).
- [2] M. Wenning, N.R. Büchl and S. Scherer, Species and strain identification of lactic acid bacteria using FTIR spectroscopy and artificial neural networks. *J Biophoton* **3**, 493-505 (2010).