Semi-automated Identification and Tracing of Food Related Microorganisms by FTIR Spectroscopy

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Fourier Transform infrared spectroscopy is an alternative method for rapid and reliable identification and differentiation of microorganisms. In order to adapt the method to industrial use, we have previously developed high-throughput miniaturized protocols for FTIR spectroscopic characterization and tracing of food related microorganisms. The developed protocols are based on micro-cultivation in liquid broth and allow the characterization of a high number of microbial isolates in one analytical run of FTIR analysis. The high-throughput protocols for moulds and yeast characterization are adapted for use in food industry and analytical laboratories (1, 2).

In order to eliminate manual steps in the high-throughput protocol and in order to automate the separation of the microbial biomass from the liquid media after micro-cultivation in microtiter plates and subsequent spotting on FTIR plates, a prototype of an automated system was developed in the EU project FUST (R4SME, Fp7). The developed prototype is an automated and high-throughput liquid handling system that can process up to 96 samples at once. Cultivation protocols and sample preparation for FTIR spectroscopy were developed, in order to minimize the time of the total analysis and in order to increase the efficiency and identification power and automation of all possible manual steps (washing, sonication and spotting samples on IR plate) of the high-throughput protocol. The developed prototype allows the preparation and analysis of 96 samples per hour.
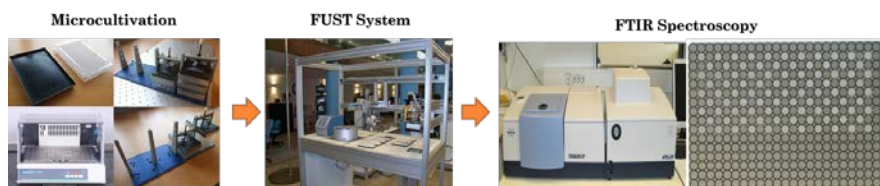

Fig. 1. High-throughput identification and tracing system 'Fust'

References

[1] V. Shapaval, J. Schmitt., T. Møretrø, H.P. Suso, I. Skaar., A.W. Åsl, D. Lilehaug, and A. Kohler, Characerization of food spoilage fungi by FTIR. *Journal of Applied Microbiology* 114 (3), 788-796 (2013).