

## ***Bioprocess control by FT-IR spectroscopy***

**Piry, Alexander and Boese, Matthias**

Bruker Optik GmbH, Rudolf-Plank-Straße 27, D-76275 Ettlingen

An effective control of bioprocesses requires the acquisition of comprehensive information during fermentation. Fourier Transform Infrared (FT-IR) spectroscopy allows to determine the product, nutrients and metabolites in parallel in the fermentation broth. The advantage of this new non-invasive method in comparison with conventional chromatographic analysis is the ease of its use and its cost effectiveness since no consumables are required. Almost without sample preparation, the analytic results of many samples are available within few minutes. This allows the control of several bioprocesses in parallel.

For analysis a sample of fermentation broth (3-10 µl) is loaded on reusable IR-transparent 96 or 384 well plates and dried. The measurements with an FT-IR microplate reader take typically 3-10 seconds for each sample. Directly after measurement the sample spectra are evaluated automatically using a multivariate statistical method (Partial Least Square).

FT-IR spectroscopy can be used for different types of cells (microbial, mammalian...). It is possible to monitor small (antibiotics, amino acids) and also big biomolecules (antibodies, poly hydroxy butyric acid) during fermentations. The method is applicable for the quantification of products, which were released by the cells and also for intracellular stored products. Moreover, it is also capable to analyze the product quality.

In this paper results will be shown which indicate that FT-IR spectroscopy seems to be a very promising analytical tool for the control of various types of bioprocesses.