T12. In-line monitoring of yeast fermentation with 2D-fluorescence probe

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Yeast fermentation is the basis of various biotechnological food and beverage productions. Traditional sensor-based monitoring cannot provide necessary level of process control and do not fulfill today's quality requirements. To meet them, new in situ methods of process analysis are actively developed [1].

2D-fluorescence spectroscopy has a great potential as an in-/ on-line analytical technique for biotechnological process monitoring. Due to its high sensitivity and selectivity it enables identification and quantification of (co-)enzymes, both extra- and intra-cellular, which typically fluoresce. The latter may act as markers indicating the concentration and metabolic state of the culture [2]. At the same time, fluorescence spectra, obtained during the running fermentation, are prone to multiple interferences, including excitation light intensity drift, scattering and absorbance effects, overlapped fluorophor signals, cascade fluorescence etc. Therefore, the analysis of two-dimensional excitation-emission process spectra may be challenging and require advanced chemometrics [3].

Lighthouse ProbeTM (LHP) [4] was adapted to acquire 2D-fluorecsence spectra and tested in the Saccharomyces cerevisiae yeast fermentation. Data collection, analysis and interpretation issues are discussed. Some new approaches are suggested to separate useful signal from the background. Taking additional information into the model, i.e. NIR-spectrometric scattering sensor data, may significantly improve the method performance.

References:

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