Bioethanol produced by fermentation is considered a good alternative for replacing fossil fuels. However, due to competition with food production the bioethanol produced today, which mainly come from sugar crops, only has a limited capacity. There is currently a huge demand to find alternative raw materials, such as other types of inedible starch based plants or lignocellulosic based alternatives. In order to evaluate and optimise the utilisation of these alternative resources, a large number of tests biomass screening and feeding strategy are necessary and the automated batch fermentation system Gas Endeavour is an excellent analytical tool for this purpose. Labour intensive sampling for off-line analysis can be replaced by continuous online monitoring of generated carbon dioxide which well corresponds to ethanol production in the fermentation phase with high quality of kinetic process data for further process optimisation.

Example 1
Determination of the optimal conditions for biomass hydrolysis

The break down of the raw material into simple sugars that can be fermented by the ethanol producing biomass is a key step in finding alternative raw materials for 2nd generation of bioethanol production. However, for this process to be economically viable several aspects of this conversion need to be optimised, e.g. type of enzyme used in the hydrolysis process, incubation temperature, processing time period, etc.

The automated batch fermentation system Gas Endeavour is an ideal experimental platform to perform the tests for optimisation of the parameters discussed above, as the simple operation of the instrument allows the user to screen many test conditions simultaneously (Moshi et al., 2014a, 2015a).

Generation of carbon dioxide and bioethanol as well as correlation between ethanol concentrations measured with Gas Endeavour and HPLC (Moshi et al., 2014a).
Example 2

Evaluation of yeast and bacteria strains for ethanol production

A key for a successful bioethanol production is represented by the microorganisms responsible for the conversion of the sugars to ethanol. Baker’s yeast (*Saccharomyces cerevisiae*) suffers from sensitivity to high glucose and toxic by-products and is restricted to glucose as a substrate. In order to make the ethanol fermentation more efficient and versatile, alternative microorganisms or genetically modified versions of *Saccharomyces cerevisiae* may represent a solution.

The Gas Endeavour is an excellent platform for simultaneous evaluation of different yeast and bacteria strains for optimisation of ethanol production, with minimal labour and time requirement (Moshi et al., 2014b, 2015b).

References


