Invitation

The **1st VH Online Yeast Conference** 2020 provides you with lectures and presentations on current topics in the fields of markets & quality, applied yeast research and process innovations in yeast production. Rising customer market demands on sustainable products and climate friendly production evoke new challenges to the feed/food industry, even to well adjusted yeast productions.

This year's focus is on **"yeast production challenges"** and solutions to apply. While we usually appreciate our face-to-face conferences with the lively exchange of our members, clients and partners from industry as well as science, this year everything is changed. We look forward to share our lecturers' and presenters' insights with you in the different format of an online conference this year!

M. Eng. Sc. Antoine Chagnon, President of VH Berlin
Dr.-Ing. Michael Quantz, General manager of VH Berlin

Yeast production challenges

Online "BlueJeans ®" conference day I, all times in CEST = UTC +2h

Monday, September 14th 2020

Markets

03:00 p.m. Conference opening and welcome

President A. Chagnon

Lallemand Inc. (CAN)

03:15 p.m. Bread: yeast & enzymes, a strong successful relationship

Lutz Popper, Alexander Rohde

SternEnzym (GER)

Enzymes: Classes and application (Lutz Popper)

In the beginning it was not clear that biologically loosened bread would become the great love of many people: Pliny the Elder, a novel historian, was the first to describe the spontaneous fermentation of sourdough (around the beginning of our calendar): "The Egyptians leave their bread dough to stand, so that it goes bad ...".

Although sourdough bread is found in many cultures, it is only the isolation and development of baker's yeast that has enabled bakers to produce well-raised bread with reproducible quality and taste.

However, cereal breeding and the development of milling technology have also played a large part in this. While breeding has reduced the influence of the weather on the baking properties of the grain by making it less prone to form its own enzymes in the grains during humid years, the separation of the bakeable flour fractions from those that interfere negatively with baking has been further refined. This also changed the flour treatment required for standardising the flour.

In the past, millers had to deal mainly with large fluctuations in grain quality, which they tried to compensate for with flour treatment agents such as enzymes and ascorbic acid. Today, raw materials with a low enzyme content predominate, which first have to be "revived" by adding amylases and other enzymes so that the doughs provide the yeast with sufficient nutrition and reach a consistency which allows good gas retention and processability.

Yeast brings its own enzymes into the dough, above all invertase for splitting sucrose – if present – into fermentable glucose and the fructose less loved by yeast or for splitting fructose from fructose polymers (innulin-like structures). The yeast can also split maltose using maltase. However, once the simple sugars have been used up, fermentation is slow. With exogenous enzymes, especially amylases, the fermentation can be restarted in a starch-rich environment.

Other exogenous enzymes such as xylanases or lipases, on the other hand, adjust the dough consistency so that the gas produced by the yeast is able to expand the dough, but does not escape, giving the baked goods an attractive and, above all, reproducible appearance and volume.

This shows that there has always been an interaction between enzymes and yeast, but due to changes in external conditions and the mechanisation of flour processing, this is more important today than ever before.

Enzymes: Legal status and declaration in EU (Alexander Rohde)

Currently, enzymes in the EU may be applied as either food additives or processing aids. Whether an enzyme is categorized as food additive or processing aid is determined by its activity in the finished food. If they are actively affecting the final food, they are considered as food additives and thus have to undergo the same assessments like all other food additives.
Only few enzymes received their authorization and with this their E-number. The vast majority are considered as processing aids, meaning that they are only active during the food processing, but not in the final food. As processing aids, they are generally permitted if they follow certain purity criteria.
In some European countries however, national regulatory regimes apply. The European Union expressed the demand to increase the level of safety for enzymes used as processing aids and at the same time harmonize the regulatory regime for enzymes throughout the EU.
In 2008 the new regulatory framework was published as Regulation (EC) No. 1332/2008. Now, in 2020 the application deadline is long gone and we will take a look at the current legal status of enzymes and their declaration.

Production

03:45 p.m. Sustainable concepts in industrial baker's yeast production

Josipa Lisičar Vukušić, Stéphan Barbe

TH Köln (GER)

The present contribution demonstrates how industrial baker's yeast manufacturing can be turned into a multipurpose bioprocess by applying innovative sustainable concepts.
The mass balance during the fed-batch fermentation of baker's yeast was performed in order to emphasize the complexity of the molasses medium i.e. the less complex medium vinasse. Analyses of raw material molasses and corresponding vinasse indicates the suitability of vinasse for the recovery of betaine, invertase, amino acids and food grade proteins. Furthermore, a membrane based process for the efficient and simultaneous recovery of biomolecules from fermentation broth of baker's yeast was developed. Additional roles given to this manufacture, besides producing yeast, as waste discharger and as supplier of valuable biomolecules and energy were presented which allow industrial production of baker's yeast to be employed within a sustainable industrial environment and provide a competitive stance in the market.

Markets

04:15 p.m. World sugar market in turmoil: Consequences for the molasses supplies to the yeast industry

Michael Kühnel

Pfeifer & Langen (GER)

The world climate change is a fact and will have its impact also on the molasses supplies.
In Central Europe we are facing a drought the third year in a row, and at the same time we see the evidence of increasing sugar beet diseases. So, the expectation for European molasses output for the next campaign is -7.5 % due to drought and diseases. (The beet yields in France are seen falling at least 40% in the most affected yellow virus areas; this will lead to an average national yield of 14% less than the five-year average.)
Besides drought and diseases there are a couple of factors that will have an impact on molasses supplies. These factors will be highlighted in this presentation:

Decline in acreage for sugar beets in Europe
German sugar beet cultivation has been reduced by 5 percent compared to the level of the previous year.
Decline in sugar production also in e.g. Thailand and other countries
In the 2019/20 season that ended in April, Thailand had the lowest harvest volume in a decade. Low forecast is due to ongoing drought.
Closure of sugar factories in Europe
The latest one will be probably a factory in Austria.
Prohibition of neonicotinoids in EU with exemptions in 12 out of 19 beet growing countries in the EU
Responsible for the yellow virus outbreak and competition differences
Coupled payments for sugar beet growers in 11 EU countries
Leads to production costs savings compared to sugar made in Germany
Corona impacts
Slump in worldwide sugar consumption in restaurants, hotels, tourism
Reduced demand in industrial applications
Cane molasses prices development

Poster

05:00 p.m. Decreasing operational costs with innovative Filtration and Packaging Machinery

Martin Dannenberg

Van Mourik Yeast & Packaging (NED)

Analytics / Quality

05:15 p.m. AquaSpark™ – A novel chemiluminescent detection method for on-site detection of foodborne pathogens

Mario Hupfeld

Nemis Technologies AG (SUI)

Foodborne pathogens and spoilage organisms are a major challenge for food producers. Every year an estimated 400 million people fall sick because of food contamination. To prevent disease and product recalls, hygiene controls and the HACCP concept have been established for all major food companies. However, controls are often processed in external laboratories losing valuable time before products can be released.

AquaSpark™ is a chemiluminescent platform technology which is based on measuring specific metabolic triggers from bacteria to detect foodborne pathogens such as *Listeria, Salmonella* or *E. coli*. It can be used without sample preparation, safely on site making it a perfect tool for hygiene control screenings. The technology is flexible to allow concepts such as dynamic monitoring or antibiotic resistance profiling. It can also be combined with complementary detection technologies such as bioluminescent ATP assays.

Here we present the recent advances of the technology, the first prototypes for market entry and its future possibilities.

05:45 p.m. NTP Screening Workstation – applying fully-automated microfluidic strain optimization for better yeast performance

Martin Mitchell

Efficient Robotics (USA)

Efficient Robotics (headquartered in Kornwestheim, Germany) has commercialized a microfluidic high throughput screening technology, called the NTP Screening Workstation for Microbial Strains, Mammalian Cells, Enzymes, Antibodies, Proteins, Peptides and Small Molecules.
Specifically, the screening can be setup for yeast optimization in many R&D applications such as yeast identification, metabolic engineering or synthetic biology but also in classical applications such as bakery, brewery and other life-science applications. With the modular screening setup of the NTP Screening Workstation, the system can process up to 10 million samples per day and allows for a broad assay development to screen and optimize growth, resistance and production of yeast products.
Additionally, Efficient Robotics has recently developed a peptide synthesis module, which allows our technology to synthesis and screening of up to 100,000 peptides per day with AI algorithm for peptide optimization by several synthesis rounds and offers a customized NCE platform for screening small molecule libraries of 250,000 to 1 million compounds a day with multiple assays for each compound.
The NTP Workstation works fully automated from start to finish and can significantly accelerate yeast optimization at a fraction of the capex and opex of traditional screening technology.

Applied research

06:30 p.m. Data-Driven Cell Factory design

Nicolaus Sonnenschein

Technical Uiversity of Denmark (DEN)

With ultra-precise genome editing tools at our disposal, we are shifting from experiments manipulating one factor at a time towards simultaneous changes at multiple loci. The success of these increasingly complex designs crucially depends on our ability to accurately predict system's level behavior, and often requires non-intuitive designs. Constraint-based modeling provides the means to achieve this, through rational target selection and a plethora of methods for integrating omics data. However, many tools in the field are not readily available to rapidly analyze public and private data, and/or require extensive prior computational experience.

With Caffeine, we aim to bring constraint-based modeling closer to everyone, and allow performing strain/community designs and interpreting generated data from the lab, without extensive programming labour.
The platform allows simulating with several flux-balance analysis methods, visualizing the results immediately in metabolic maps, and provides strain design tools for assessing e.g. knockouts and gene additions. Our latest additions to the platform include integration of proteomics with enzyme-constrained modeling and visualization of interactions between microbial communities .
Caffeine makes a broad spectrum of simulation tools and omics data useful for biotechnology and life science research by integrating systems biology with design in a one-stop resource. All research efforts are integrated in an open source, interactive, intuitive web-based platform available to both industrial and academic research.

Caffeine is freely available at https://caffeine.dd-decaf.eu.

Poster

07:00 p.m. Evaluation and optimization of effluent treatment from a Baker's yeast production unit

Mohsen Parhizkar, Jafar Gholi Jafari, Mohammad Sadegh Morvarid, Susan Khosroyar*

Razavi yeast Co., Islamic Azad University Quchan* (IRI)

The effluent from yeast production units is one of the major environmental pollutions, due to high COD and BOD as well as the presence of toxic substances such as phenolic compounds and a low pH. The direct and continuous disposal of this wastewater to the soil leads to a decrease in soil quality and the loss of agricultural and environmental products. Direct discharge of this type of wastewater into the river or sea threatens the life of the aquatic animals.
Due to the great environmental problems of this type of wastewater, this study attempts to reduce the high COD, BOD and other biodegradable parameters in order to reduce environmental hazards.
In this research, the effluent of the yeast production company was purified using anaerobic, aerobic and floating. Aerobic and anaerobic biological methods in comparison with the more affordable and more developed in recent years. Using anaerobic ponds with sufficient retention time, the BOD was reduced by 60-70%. In this case, the remaining BOD can be eliminated through aerobic methods. In this study, the amount of nitrogen and dye was removed using a coagulation method in a floatation pool.
In this study, reductions of 87% COD, 96% of BOD and 70% of TDS were achieved.

Poster

07:15 p.m. Bioengineering studies of Δ9-tetrahydrocannabinolic acid production in yeast

Christina Schmidt, Saskia Spitzer, Fabian Thomas, Marco Aras, Oliver Kayser

TU Dortmund (GER)

The interest in Δ9-tetrahydrocannabinolic acid (THCA), the carboxylated form of the psychoactive tetrahydrocannabinol (THC) for pharmaceutical purposes, as well as other cannabinoids derived from the plant *Cannabis sativa l.*, is growing in recent years.
Biotechnological approaches using yeasts or other microorganisms for the production of cannabinoids are suggested to be a promising alternative for common production methods. Functional implementation of the complete cannabinoid biosynthesis in *S. cerevisiae* was first reported in 2019. However, the resulting production titer is too low to set up an efficient bioprocess. This outlines the need to develop strategies to improve the heterologous biosynthesis using pathway, protein and process engineering.

Using a kinetic in silico model of our modified yeast including the cannabinoid biosynthesis we analyzed the metabolic pathway and identified critical conversions which limit an efficient flux towards THCA production. Based on this analysis we are iteratively working on optimization strategies for the single enzymatic steps and for the precursor supply, always in combination with process engineering approaches, to increase THCA production in *S. cerevisiae.*

[1] Luo et al. (2019). Complete biosynthesis of cannabinoids and their unnatural analogues in yeast. Nature 567, 123-126

Online "BlueJeans ®" conference day II, all times in CEST = UTC +2h

Tuesday, September 15th 2020

Applied research

03:00 p.m. Challenges and opportunities of yeast as a major protein source in meat alternatives

Leonardo Marcovitz, Florian Wild

More Foods (ISR)

The meat alternative market has developed from ancestors such as Tofu, Seitan and textured soya protein granules. The last ten years have seen significant growth in this market and the forecasts indicate that the market continues to expand at an accelerated rate, with estimates that it will become a $140 Billion market by 2029 (Barclays Equity Research).
The main protein sources utilized in this market are purified soy and wheat proteins while pea protein is becoming increasingly popular. All of the main three plant protein sources have specific properties that need to be considered. Soy and wheat protein are declarable by law as potential allergenic components, wheat and pea have distinctive flavor components and in particular soya protein has a somewhat negative perception due to connotations with genetic modification and cultivation in the rainforest area. All three proteins are typically used as purified, strongly processed components.
Because of the considerations previously mentioned, the food industry is searching for more alternative protein sources. Of highest interest are sources that meet the requirements of being natural, clean label and that are price accessible.
Yeast is a good candidate to meet these requirements as it is not on the list of 14 ingredients that need to be declared as allergens, it is high in protein content (more than 50%), contains no anti-nutrients, has a complete essential amino acid profile, has a favorable umami profile and can be produced economically.

More Foods is focused on understanding how to use yeast as a significant protein source in order to make final textured meat alternative products. In our presentation we will give an overview of meat alternative processing and discuss some of the requirements of a protein source. We give some insight on how we use yeast to create fibrous structures with a meat like bite and how we face challenges to enable yeast to become a major ingredient in the meat alternative industry.

03:30 p.m. EFRE project: Model-predictive control (MPC) application in industrial scale fermentations

Sven Wegerhoff

Technical University of Dortmund (GER)

Yeast is cultivated in a fed batch reactor which is fed with process air and molasses solution. One problem during the cultivation process is that the cell culture can switch to the undesired production of ethanol not only at anaerobic conditions but also can switch to the production of ethanol depending on the available sugar concentration in the reactor (overfeeding molasses).

The molasses feed rate in an industrial production process is usually controlled by a simple PI controller which follows a given trajectory. This strategy can usually cause an underfeeding of the process such that the growth of the cells is not exhausted which leads to an increased production time, or leads to repeated ethanol production in case of overfeeding.

In this work a novel control strategy was developed which avoids the switch to the production of ethanol or keeps the ethanol concentration in a desired range by determining the optimal operating point at which the growth of the cells is optimized even under changing environmental conditions. The control strategy uses a model-based control which is connected to a state estimator to determine the unmeasured concentrations. The model, which is used for the model-based control, was derived from the biochemistry of one cell to describe the primary metabolism of the yeast cells.

In order to drive the process always to the optimal operating point, the model-based control was coupled with a self-adapting optimizing controller which can determine the optimal operating point solely from the measurements of ethanol and information about the molasses feed rate.

The control strategy was tested before in experiments in lab scale at the "Versuchsanstalt der Hefeindustrie (VH Berlin)" where it could be shown that the process time can be reduced by more than 20% which leads to a decreased energy supply of more than 10%.

The control strategy is currently tested in an industrial environment to show that the control can be transferred from lab to industry where first applications show that the control strategy can optimize the process significantly compared to the PI controller which is currently used in the industry.

Analytics/Quality

04:00 p.m. Challenges in the assessment of yeast viability during the preparation of dried starter cultures

Martin Senz, Sarah Köhler, Maximilian Schmacht, Stefanie Malchow

Research and Teaching Institute for Brewing in Berlin (VLB Berlin) (GER)

Dry yeast preparations are highly relevant in various food and beverage applications. The viability of the yeast used is of the utmost importance as this parameter has a strong influence on the later manufacturing process and the subsequent product.

However, there are a variety of possible methods that can be used. In this article the progress of the viability of different dried yeast preparations was assessed by various techniques, i.e. colony-forming units in relation to total cell concentration, flow cytometry, Oculyze system and NucleoCounter. Therefore, freeze-dried and vacuum-dried preparations have been made and stored under refrigerated and challenging conditions to achieve a wide range of survival rates.

It was found that Oculyze and NucleoCounter measurements were clustered at relatively high viability levels for the entire time studied, while flow cytometry and classical microbiology gave much lower values for the respective samples. The detailed tracking of the processing history showed that this gap became larger with the advanced processing and storage.

The different results are discussed with reference to the different methods used and their measurement mechanisms. However, it can generally be concluded that the plate count method and flow cytometry have been better suited to demonstrating a wide range of viability. The study data will help users of viability detection methods make an evidence-based decision that represents a good compromise between cost-benefit considerations and the level of information required.

Applied research

04:45 p.m. Recent results of the DFG/AiF Cluster “Physically based management of disruptive foams in production plants: Prevention, inhibition and destruction”

Christopher McHardy

Technical University of Berlin (GER)

In the technical production of fine chemicals as well as food and beverages undesirable foam formation often occurs. This sometimes leads to significant changes of mass, impulse and energy transport effects as well as (bio-) chemical reactions up to the complete obstruction of the processing.

The effects range from higher pressure losses over increased energy demand to reduced throughput or separation performance. Foaming affects predominantly (amplifier) columns, scrubbers, mash tuns, fermentation tanks, stirrers, evaporators and stills. Nevertheless, foam management usually stands not at the center of the process and apparatus design. The very high time and cost pressure on the one hand and the missing forecasting and diagnostic tools on the other hand make it difficult to identify foam during operation and to implement solutions. Current foam inhibition methods are usually limited to the reduction of the throughput, as anti-foaming agents are difficult or even impossible to remove at a later process stage.

The DFG/AiF Cluster “Physically based management of disruptive foams in production plants: Prevention, inhibition and destruction” aims at investigating the reasons and mechanisms of undesired foaming in production plants and at developing physically based methods for the inhibition and destruction of foams.
The cluster involves 6 research groups and more than 40 companies and industry associations, working together over a time period of 3 years in 7 research projects with a total funding of more than 2 million Euro.

The present contribution provides an overview of the ongoing work and recent results obtained in the different projects, ranging from numerical simulations of foam development and evolution to approaches for active foam control.

05:15 p.m. Impact of stress conditions on age related population dynamics

Marco Eigenfeld, Roland Kerpes, Thomas Becker

Technical University of Munich (GER)

In industrial processes like brewing processes, wine production and bakeries, yeasts are exposed to multiple simultaneous stressors (high sugar concentrations, inhomogeneity, salt, pH value, O2 content, ethanol, metabolites), influencing the physiological state of the yeast culture. As a result, the yeast population adapt to their environment resulting in altered fermentation performance, aggregation behavior and aroma profile. Therefore, the fermentation process essentially depends on the sum of the physiological states of the individual cell.

Nevertheless, the singular yeast cells differ in their phenotype; an important factor is the individual cell age. To ensure a constant quality of the product, knowledge about the age distribution in heterogeneous yeast cultures is essential. During cell division of mother and daughter cell, a scar remains on the mother cell, so the number of scars is directly proportional to the replicative cell age. Bud scars are characterized by significant amounts of chitin in the ring, so that statements about the replicative cell age can be made indirectly via the chitin content.

In order to use this connection for the determination of replicative yeast ageing, in a first step a protein linker for binding to bud scars had been synthesized. In the next step, the linker is attached to heterogeneous yeast cultures. The binding strength of the protein linker to yeast resulted in Kd-values between 200 and 500 nM, which is in the range of antibodies with high affinity. An included fluorescent part of the protein linker enables the at-line measurement of bud scar fluorescence of yeast cells by flow cytometry. Single cell fluorescence detection shows that the binding of the protein linker results in an additional fluorescence per cell and is independent of the cultivation media.

This immobilization procedure can be applied to different yeast species and enables the basis for a detailed analysis of the cellular age distribution in yeast culture. For the industry, this direct measurement of bud scar fluorescence enables the investigation on the impact of cell age distribution on fermentation performance and product quality.

Poster

05:45 p.m. About a new process for encapsulating flavours in yeast cells and testing the stability of the capsules

Cornelia Errenst, Marcus Petermann, Andreas Kilzer

Ruhr-University Bochum (GER)

Spent yeast cells occur in beer and bioethanol production and are used for the production of yeast extract. This results in emptied yeast cells, so-called "ghost cells", which are currently sold as animal feed. Due to their valuable ingredients, 25-30% beta-glucans and 45-50% proteins, the yeast cell walls could also be used for human consumption. Thanks to their still intact, robust cell wall, yeast is suitable as encapsulation material for flavours, for example, to protect them from environmental influences such as oxygen or UV light and thus from degradation. Furthermore, volatile substances encapsulated inside the yeast cells are protected from evaporation and are only released at temperatures above 200°C.

Within the scope of this work, a new process for encapsulating flavours in yeast cells was developed and the produced flavour-filled yeast capsules were tested with regard to their stability. A high-pressure spray process was used as the first step of the three-stage process. The process enables the production of free-flowing powder with a liquid content of up to 80 wt.% under particularly gentle process conditions, such as low temperatures and an inert gas atmosphere.

As a first step the spraying process is used to load yeast cells with an emulsion of water and flavour. The water allows the biopolymer network of the yeast cell wall to swell and thus enables the permeation of molecules into the interior of the cells. The second step is the storage of the loaded powder to give the molecules time to diffuse into the interior of the yeast cells. In the third step, the flavour-filled yeast cells are dried to close the polymer network and stop the mass transport. The flavour content of the capsules was determined by GC-MS. Thermogravimetric analyses provided information about their thermal stability.

Process

06:15 p.m. MTP – Communication 4.0

Michael Heising

GEA Westfalia Separator Group GmbH (GER)

Producing companies are facing faster than ever moving industrial markets with shortened product life cycles and increasing diversities of product variants.
At the same time, the digital era is affecting the daily life of us all and now forms the basis of industry 4.0. The needs of big data, time-to-market and flexibility in production are core drivers to satisfy newly upcoming customer requirements.

Modularization of process lines is therefore the key concept to ensure modular and high flexible production. This requires modular automation as well and that is where MTP (Module Type Package) comes into the picture.
MTP is a new common standard in automation and analogue to printers, on an even higher industrial level. Today's printers can be connected to every computer due to printer drivers, which standardize the communication between printers and varied systems.
Following the MTP standards, machines and modules can be intergrated into process lines much easier and faster. These standards define process control, visualization, alarming, security and diagnosis. Programmers from all involved parties ensure a standardized, digital, functional description of each single process module independent of vendors. Thus, defined interfaces enhance the software quality and take the pressure off process control programmers.

GEA Westfalia Separator is working on this together with international committees as NAMUR and VDMA from scratch. We do master MTP, our operating panel can speak MTP, and first GEA centrifuges do follow this state-of-the-art approach.
Realize the benefits, automate production processes with cutting-edge technology, plug-and-produce as well in yeast applications, … with MTP technology.

06:45 p.m. Ash2®Phos: Phosphorus recycling and products from incinerated sewage sludge

Christian Kabbe, Yariv Cohen

EasyMining Germany GmbH (GER), EasyMining Sweden AB (SWE)

EasyMining, a daughter company of the Ragn-Sells Group, has developed a process for the recovery of clean phosphate from sewage sludge ash patented and registered under the brand Ash®2Phos. This process is based on the wet chemical treatment of sewage sludge ash from mono-incineration or similar wastes.
Phosphorus is initially recovered in the form of the clean calcium phosphate called PCP already fulfilling the quality requirements set for feed phosphate. Given it`s high quality, the PCP provides highly versatile applications and can be upgraded into any other form of phosphate, depending on local or regional market needs.

Phosphorus recovery from sewage sludge (ash) will be mandatory in Switzerland beginning in 2026, and in 2029 in Germany with other European countries will follow with similar obligations. This will lead to relevant volumes of recovered phosphates within this decade and will have an impact on the domestic, if not European market for phosphates. Besides that, the increasing recovery of detoxified phosphates and their recycling back into the food cycle will contribute to make food production more sustainable in the near future.
Besides the phosphorus itself, Ash2®Phos allows also the recycling of other key components in sewage sludge. Fe and Al salts as well as the sand are recovered and decontaminated. This allows an actual waste reduction of about 97%, with 3% of the input ash remaining as waste in form of the efficiently extracted heavy metals.

Poster

07:15 p.m. YeastForce – Raising Power & gas retention measurement

Holger Müller

BlueSens gas sensor GmbH (GER)

The raising power provides information about the yeast performance in baking. It is of essential importance, in both incoming and outgoing goods inspection. In recent years, BlueSens has therefore developed and improved the „YeastForce“ device (formerly known as RPP) in cooperation with the VH Berlin and now presents it in its mature version.

The device uses the proven infrared measurement technology for the determination of CO_2 concentrations. With its compact design and easy handling, „YeastForce“ is not limited to the determination of raising power, but can be used in various applications.

In the poster presentation we show the new features of the „YeastForce“ device for the measurement of raising power, dough volume and gas holding capacity. „YeastForce“ is a compact and cost-effective device. In addition to the low acquisition costs, it is characterized by the fact that it is optimally adapted to the needs of the laboratory (inexpensive, reusable sample containers, fast set-up times, little manual interaction). The associated software „YeastForce Monitor“ is intuitive to use and provides complete reports after the measurement time. Manual recordings or recalculations are not necessary.