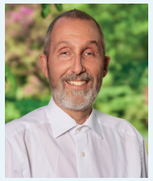
PROCESS ANALYTICS AND CEREAL SCIENCE



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This Department investigates and develops methods of process monitoring and automation for food and biotechnological processes with the focus on cereal technology. In this context knowledge about the condition of these complex processes (interaction between physical, chemical and microbiological parameters) is used to automate the control of these processes on the basis of process analysis. The Department's Technical Center offers the ideal conditions for combining basic with application-oriented research in order to develop and establish innovative products.

BIOPROCESS ENGINEERING

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The goal of the Department of Bioprocess Engineering is to develop new biotechnological processes for industrial use in technical processes. Bioprocess engineering generally comprises all process stages that are needed for the industrial manufacture of a biotechnological product. This includes the preparatory steps (upstream processing), and the actual bioproduction and the conditioning of the products (downstream processing). The current focus of research is on process development for the fermentative production and conditioning of microbial surfactants.

RESEARCH FOCI:

- Investigating the interactions of microorganisms and enzymes with the food matrix and ingredients
- Examining the interactions of bioactive components and changes to physiological efficacy caused by technological, enzymatic processes
- Developing food-specific analytical methods and measurement procedures for safe and high-quality food
- Developing innovative technologies and processes for food constituents with special technofunctional properties
- Studying the relationship between food structure, sensory perception and the availability of value-added ingredients
- Investigating and developing quality improvement processes
- Developing processes to obtain, enrich, fractionate and modify biofunctional components
- Implementing new biotechnological processes and methods in food treatment and processing using exogenous and endogenous enzymes

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UNIVERSITY OF HOHENHEIM

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FOOD INFORMATICS

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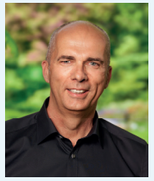
The Department of Food Informatics operates interdisciplinary at the interface of food science, biotechnology, and computer science. The research focuses the digitalization of food production in a holistic approach that also includes the food supply chain, traders/distributors, and consumers. In cooperation with partners from industry and research, we transfer and optimize approaches, methods, and technology from the fields of artificial intelligence, predictive data analysis, Industry 4.0, adaptive software systems, and the Internet of Things to the domain of food processing.

FOOD MICROBIOLOGY AND HYGIENE



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The research foci of the Department of Food Microbiology and Hygiene are the microbiol fermentation of foods and the analysis of toxins, and the virulence and survival strategies of enterohemorrhagic *Escherichia coli* (EHEC). In addition, bacterial starter cultures are characterized and, in collaboration with colleagues, used for food fermentation. This is mainly done in the areas of dairy products, meat products and plant-based foods.
Both foci draw on state-of-the-art methods including next generation sequencing technologies.

PROCESS ENGINEERING AND FOOD POWDER

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In the Department of Process Engineering and Food Powders processes and methods for food production are designed, customized and optimized. Research focuses on quality- and cost-optimized production processes for dry food and food raw materials.
Particular interest is paid to the targeted design of plant and equipment, and modern control concepts in the areas of drying, in particular spray and vacuum drying, agglomeration, mixing, encapsulation, dispersion or rehydration, and the hygienic design of plants.

SOFT MATER SCIENCE AND DAIRY TECHNOLOGY

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Our research focuses on milk and dairy products with the emphasis on (1) innovative technologies and measurement technology, (2) soft matter science and (3) process and food safety. Together with national and international research bodies and innovative companies, fundamental questions that arise from complex, colloidal matrix and transformation processes are examined in greater depth and researched using physical, chemical and microbiological analytical methods.
Our motto is: From simple lab experiments to pilot plant.

FOOD MATERIAL SCIENCE

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With its facilities and pilot plants, this Department offers the opportunity to produce complex structures in all foods, in particular meat and sausage products. It has expertise in the areas of the material sciences, structural analysis and meat technology. In addition to chemical methods, the Department boasts the very latest equipment to produce dispersed systems and to analyze physico-chemical properties, like particle sizes, surface tensions, zeta potential, etc. One focus of its research is the use of new raw materials, e.g. microbial and plant proteins.

BIOTECHNOLOGY AND ENZYME SCIENCE

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The Department's research focus is on the application, the analytical detection and the production of enzymes (enzyme technology). Here, the emphasis is on enzymatic and fermentative processes for the modification of proteins, carbohydrates and fats. In this way, functional peptides, amino acids/derivatives, oligosaccharides, unsaturated fatty acids, emulsifiers and generally functional food constituents are generated *in situ* (clean labeling). Enzyme production is studied and carried out using both wild strains and recombinant food-grade microorganisms.

PLANT-BASED FOODS

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The Department of Plant-based Foods investigates the extraction and functionalization of ingredients from plants. Fractionation and isolation processes of plant-based raw materials in pilot plant are followed by functionalization and structurization approaches by established and emerging processes. Supported by our comprehensive analytical methodologies, we are developing knowledge and expertise to specifically design safe and clean-label foods. This means we can simply combine specific plant-based material with engineering approaches to design foods. To achieve this aim, we develop innovative processes such as additive manufacturing.

YEAST GENETICS AND FERMENTATION TECHNOLOGY

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In the Department of Yeast Genetics and Fermentation Technology the focus is on the production of spirits. Our activities are very wide-ranging from the production of award-winning fruit brandies over the generation of bioethanol as a fuel to research on basic life processes in yeast cells. A large share of our research activities is dedicated to the sustainable production of second-generation biofuels, with special emphasis on the genetic optimization of yeast strains. In addition, we also use yeast as a model system to study membrane processes.

FLAVOR CHEMISTRY

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The main research foci of the Department of Flavor Chemistry are flavor analysis, flavor characterization, masking of off-flavors, elucidation of aroma enhancers and the production of natural flavoring agents. It uses innovative technologies (e.g. SAFE, SPME, SBSE in combination with GC-MS-O) to identify the main flavoring agents in foods and examine the changes they undergo during processing and storage. The objective is to optimize the sensory properties of food and beverages in further studies using fermentation with edible basidiomycetes or enzymatic activities.