QUALITY AND SENSORY ANALYSIS OF FOOD

In Brazil agricultural products such as coffee and cocoa have enormous potential for the development of innovative, high-quality foods. Post-harvest processes such as customized fermentation and roasting are the key for generating specific flavor components.

Services:

- Fermentation processes to improve flavour and eliminate or reduce off-flavour
- Reduction of salt
- Development of gluten-free bakery products
- Development of sugar-free products
- Identification and quantification of flavour substances
- Accelerated shelf life tests and evaluation of off-flavours
- Anayses of flavour substances in food and raw material
- Technology for chocolate products

Examples of projects:

- Development of beverages from plant raw materials by combining mashing and fermentation technologies
- Low Allergen – Effective measurement and lowering of the allergenic potential of foods using the example of soy protein
- TASTE – Edible seaweed-salt reduction in foods without taste loss
- Instant meals – new manufacturing process for ready-to-eat meals containing minced meat
- ProFerment – Fermentation of plant proteins for the development of new foods having high consumer acceptance
- Plant-based cheese-like products – Plant-based protein gels as alternatives to dairy products
- LikeMeat – High quality meat-like products based on plant raw materials
- GlutenFree – Healthy and tasty gluten-free bakery products and pasta
- Fat crystallization on chocolate technologies
- Enrichment of food with Omega 3 Fat Acids

Fraunhofer Project Center for Innovations in Food and Bioresources at ITAL

GOVERNMENT OF STATE OF SÃO PAULO

Secretariat of Agriculture and Food Supply - SAA
São Paulo State Agency for Agribusiness Technology - APTA
Institute of Food Technology - ITAL

Fraunhofer IVV

Fraunhofer IVV
Fraunhofer Institute for Process Engineering and Packaging

Further information:
www.ivv.fraunhofer.de/en/kooperation-brasilien.html

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iTAL INSTITUTE OF FOOD TECHNOLOGY | apta São Paulo State Agency for Agribusiness Technology | GOVERNMENT OF STATE SÃO PAULO Secretariat of Agriculture and Food Supply

Fraunhofer Project Center for Innovations in Food and Bioresources at ITAL

2013 - 2016

iTAL | Fraunhofer IVV

Fraunhofer Project Center for Innovations in Food and Bioresources at ITAL

The production of food and agricultural products is one of the most important sectors of the Brazilian economy accounting for over 18% of the countrie's Gross Domestic Product. Innovations in process technologies as well as the development of novel, functional and healthier food products is needed in order to increase the competitiveness of the Brazilian food and agricultural production. For this purpose the **Fraunhofer Project Center for Innovations in Food and Bioresourcesures at ITAL** was installed in Campinas (São Paulo) in 2013. The research center targets a strong integration and synergy between Brazil and German industries, diversifying business opportunities in both countries.

Models of projects:

- Private sector contracts and joint industrial projects Brazil/Germany
- Public calls for proposals: i.e. Bioeconomy 2030, European Community (EU), FINEP/CNPq/FAPs, etc.

Product development:

Both ITAL and Fraunhofer IVV have broad experience in executing projects for the industry. The products and processes developed in the frame of the Project Center are evaluated according to the following criteria:

- Technical feasability of the production (equipments and processes)
- Economical feasability
- Screening of applications with focus on development of products

In the framework of the Project Center a strategic interaction with the market is offered to partners and clients, opening new business opportunities in Brazil and Europe.

Networking:

The Project Center at ITAL allows the interaction with networks and alliances established with other Fraunhofer Institutes and also with institutes related to APTA - Paulista Agency for Agribusiness Technology (Agronomic Institute of Campinas, Biological Institute, Institute of Animal Science, Institute of Fisheries and Institute of agricultural economy). This synergy complements the skills offered by each institution thereby facilitating the execution of complex multidisciplinary projects.

Examples of networks and alliances of the Fraunhofer Society:
Food Chain Management Alliance (FCM); Polymer Surfaces Alliance (POLO); Nanotechnology Alliance (NANO) and Group for Life Sciences (VLS)

Facilities:

The infrastructure available at both, ITAL and Fraunhofer IVV, enables not only the testing of innovative processes and the production of samples at pilot scale, but furthermore the testing of several parameters, which contribute to the analysis of the economic feasibility of the process and the provision of data for industrial scale applications.

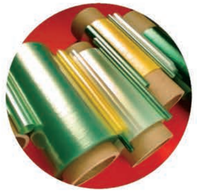
Pilot Plants:

- Manufacture, processing and modification of polymers
- Hygiene and sterilisation through UV-Systems and Plasma Reactor
- Fractionation of biogenic raw materials and manufacturing of food ingredients:
  - Milling technology and separators for dry solids
  - Extraction technology using CO_2
  - Mechanical separation of solids and liquids
- Heating Technology
- Evaporation Technology
- Drying Technology
- Extrusion equipments
- Meat and sausage products development
- Ice cream plant
- Pasteurizers
- Bakery products and pasta development
- Processing of fruit and vegetable products
- Chocolate pilot plant (pilot scale 5-10 kg)
- Packaging of products and samples
- Pilot plant for oil extraction, oil refining and biofuel production
- Plant for food applications

Skills and Expertise

BIOENERGY AND MATERIALS FROM RENEWABLE RAW MATERIALS

Projects are being undertaken in the area of bioenergy and materials from renewable raw materials. These projects concern the energetic and material recycling of raw materials and residual materials from the agricultural and food industries, i.e. the extraction of secondary plant metabolites, or the fractionation of raw materials in order to obtain and apply fat, fibers, proteins and carbohydrates.



Services:

- Characterization of the composition and techno-functional properties of residual materials, raw materials and their fractions
- Fractionation of by-products, purification, modification and optimization of fractions for technical applications
- Demonstration of functional properties, scale up, and manufacturing of samples on a pilot plant scale
- Development and testing of utilization strategies in close collaboration with potential users and industry
- Extraction of secondary plant metabolites
- Mass and energy balance

Examples of projects:

- Development of thermoplastic materials based on residual whey protein for packaging applications
- Production of diacylglycerol (DAG) enriched plant oil with integrated, enzymatic refining
- Mineral oil free lubricants based on polymers
- Novel biofuels via enzymatic partial transesterification of plant oils
- High-quality active components from plant raw materials for the cosmetics industry

INNOVATIVE PACKAGING SYSTEMS

Foods that spoil easily require innovative packaging systems to guarantee their quality and shelf-life. The development of modified packaging systems, for example with effective barrier properties and active functions, is one of the main areas of research of the Fraunhofer Project Center. This research area supports the **CETEA / IVV ME Group of Excellence on intelligent and active packaging (GEIA)**, composed of researchers from the Center for Packaging Technology at ITAL (CETEA) and the Department of Material Development at Fraunhofer IVV (IVV ME). This group also meets the research demand for meat packaging technologies through innovative and sustainable solutions.

Services:

- Development of multilayer systems to improve gas barrier properties
- Extrusion of films with up to 7 layers
- Development of functional films by incorporating active agents with antimicrobial properties, control of headspace moisture, scavenging of oxygen and ethylen and binding condensated water
- Coating of paper and different substrate films such as PP, PET, polyamide or PLA with metals (e.g. Al, Cr, Ti), semiconductors (e.g. Si) or oxides (e.g. Al_2O_3, MgO, SiO_x)
- Plasma treatment (e.g. using O_2, N_2, NH_3 as reactive gases)
- Sustainable solutions for meat packaging

Examples of projects:

- Transparent and high barrier biodegradable film and sheet for customized modified atmosphere food packaging
- Sustainable paper-based packaging materials with nano-scale barrier layers
- Ethylene absorbers for corrugated board systems (i.e. fruit packaging)
- Development of films with antimicrobial properties
- Application of quality indicators in packaging systems

FUNCTIONALITY, NUTRITIONAL VALUE AND HEALTH ASPECTS OF FOOD

Obesity and nutrition-related illnesses such as arteriosclerosis and diabetes are problematic in industrial nations and increasingly so in Brazil. Indeed, awareness of this and an interest in healthier foods is on the increase in Brazil. The Fraunhofer Project Center is developing new food ingredients and formulations to promote health, for example foods enriched with dietary fibers to reduce cholesterol levels and ingredients to promote gastrointestinal health.

Services:

- Fractionation of plant raw materials, purification, modification and optimization of fractions for food and feed applications.
- Chemical, physical and biochemical modification of fractions aiming to explore their functional properties for the development of products.
- Production of food ingredients in pilot scale
- Fermented products (i.e healthy drinks and desserts) based on plant raw materials
- Development and optimization of formulations with focus on salt, sugar and fat reduction and substitution in food products
- Development of gluten free and sugar free products
- Extrusion technologies for optimization and development of innovative textures
- Pilot scale production of samples for degustation and demonstration of process feasability
- Mild heating technologies for the conservation of products: microwave and radio frequency heating

Examples of projects:

- Fat substitutes – Manufacturing of fat substitutes based on native plant proteins
- Development of an alternative process for manufacturing fat-rich, high-quality extrudates using the example of pet foods
- Use of plant-based residues from oil recovery to manufacture high-quality fish feed for farming rainbow trout
- Development of a fraction process for manufacturing pea protein preparations with improved sensory properties
- Polyphenol-reduced sunflower proteins as food ingredients
- SunPro: Sustainable cultivation and novel processing of sunflower seeds for simultaneous production of sunflower oil, solid fuel and protein-rich food ingredients
- Lupin protein as a bioactive food ingredient – Mechanism of lipid reduction and effectiveness in people
- BioProFibre: Development of cholesterol-lowering foods through bioactive proteins and fibres
- Radio-frequency heating for mild heating of foods
- PlantsProFood: Recovery of biofunctional food ingredients from lupin seeds for the food industry:
  - LUPIROH – New varieties of Blue Lupin as raw materials for the food industry (two project partners)
  - LUPIING – Development of a plant for the processing and extraction of lupin seeds and for modification of protein isolates (six project partners)
  - LUPIWURST – Development of low-fat sausage products and plant-based sausage and meat surrogates (two project partners)
  - LUPIFEIN – Development of lupin protein based food emulsions (two project partners)
  - LUPIPASTA – Development of lupin protein based pastries (two project partners)
  - LUPIBACK – Development of lupin protein based baked goods and confectionery (two project partners)
  - LUPISENS – Development of methods for the sensory evaluation of lupin based foods (one project partner)