BIOENERGY, **AGRICULTURE** & FOOD TECHNOLOGY

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BIOENERGY, **AGRICULTURE** AND FOOD TECHNOLOGY

AUSTRIAN CENTRE OF INDUSTRIAL BIOTECHNOLOGY (acib)

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THEMATIC RESEARCH FOCUS

RESEARCH AREA
Biocatalytic Synthesis, Enzymes & Polymers, Cell Design & Engineering, Protein Design & Engineering, Bioprocess Engineering, Metabolic Modelling, Synthetic Biology

EXCELLENCE
Industrial Biotechnology

MISSION
acib employs and adapts the tools and concepts of nature for industrial production. Industrial bioprocesses will become more cost efficient by reducing trials and errors in research and process development. acib is the internationally visible centre of Austrian research acitivities in industrial biotechnology and the preferred research partner for companies active in industrial biotechnology. It stands for new production processes & products with improved ecological efficiency, new production processes with higher economic efficiency, products with higher quality and purity, innovative functional products for everyday use and for the health care industry.

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH

- 1) Biocatalytic synthesis deals with the use of natural catalysts (enzymes) instead of the chemical catalysts being used in conventional chemistry. Reactions become easier, cheaper, more energy-efficient and less harmful to the environment and dangerous waste can be avoided. These environmentally benign 'green' processes for the production of compounds are used in pharma-, agro-, refinement-additive-, food- & feed-, flavor- & fragrance-applications.
- 2) Functional polymers are gaining increasing importance in everyday life, from medical to electronics and automotive areas. However, despite their high potential for specific and covalent polymer functionalisation (without affecting bulk properties), enzymes so far are under-exploited bioresources for this purpose. acib-research deals with optimized surfaces for clothing industry, biodegradation & recycling of synthetic polymeres (plastics) or ecological paint.
- 3) Modern cell design and engineering has to become more rational and integrates aspects of bioprocessing. Predictable cellular performance and high yield production of proteins and biochemicals should become achievable using systems of biotechnological derived knowledge. Microorganisms and higher eukaryotic cells are used for biopharmaceutical and technical applications on a large scale. Quantitative analysis and modelling (systems biotechnology) of cellular performance and the synthesis, cellular trafficking, and excretion of recombinant proteins and other biomolecules is one of acib´s biggest challenges towards rational strain design and engineering.
- 4) In nature, proteins evolve to support organisms' survival and propagation. For utilization outside their original habitat proteins need to be re- or de novo designed and adapted to non-natural conditions and application-specific requirements using protein engineering. Our team has broad expertise in the fields of molecular enzymology, structural biology and biotechnology. Research activities increase the fundamental knowledge on structure-function relationships of proteins on the molecular level by investigating for example catalytic mechanisms, selectivity and specificity, stability or interactions with other (macro-)molecules.
- 5) An emerging focus for the biotech-industry is to implement "Quality by Design" criteria in their production processes to further optimize economics. According to this concept the quality of a certain product arises from the detailed knowledge about the product itself and of its production process and the risks contained therein. The analysis and improvement of such production processes is the main goal of the research field Bioprocess Engineering. Biotechnological production processes include the cultivation of the cells, recovery of the product, and process design

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and management for the production of chemicals, enzymes, microorganisms and biopharmaceuticals. Currently such processes are mostly conducted batch-wise. An important step towards process intensification is the implementation of continuous processes, also in the field of downstream processing.

MAIN CAPABILITIES

APPLICATION RESEARCH
Based on the fundamental understanding of enzyme-kinetics, -structure and -mechanism innovative bioprocesses will be provided in the Biocatalytic Synthesis research field which will lead to significantly reduced development times and enhanced predictability for biotransformations. Novel enzymes and the steadily increasing knowledge of the underlying biological principles will be used for new innovative biocatalytic reactions.

The Enzymes & Polymers research field aims to extend the existing strong cross-disciplinary expertise in biocatalysis to macromolecules and makes enzyme / polymer interactions predictable. This knowledge will consequently allow molecular adaptation of enzymes to non-natural polymeric substrates to increase their efficiency.

In the field of Cell Design & Engineering, biomolecule synthesis and secretion will be analysed using transcriptomics, proteomics, metabolomics and cytometric tools. Such data provide the basis for dynamic models (e.g. of protein translocation, trafficking, aggregation, degradation and excretion) which can be linked to existing metabolic models. An iterative process of data generation, modelling and cell engineering including new knock down strategies and synthetic biology will advance the efficient and predictable generation of future production strains and cell lines.

The expertise available in the Protein Design and Engineering research field is used to reach new milestones like the design of minimal enzymes or complex enzyme systems. A major challenge is the design and engineering of unprecedented functionalities, which will enable industrial biocatalysis to perform chemical reactions not yet accessible by the current portfolio of biocatalysts.

FIELDS OF RESEARCH RESULTS APPLICATION
Medical health related biotechnology, environment and safety, agriculture and food, consumer related, waste industry, material industry

ALUMNI PROFILE
Our graduates are top specialists in all fields of industrial biotechnology with a special focus on applied research. Typically acib alumni are familiar with academically driven basic research and industry derived applied research. Alumni are also trained in the field of stringent research project management.

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF
31,85/36

JUNIOR RESEARCH POSITIONS (INCL. PH.D. STUDENTS):
31,14/40

KEY RESEARCH EQUIPMENT

LIST OF DEVICES
High-Sensitivity PTR-QMS System (IONIMED), proton transfer reaction-mass spectrometry for online monitoring of volatile organic compounds in ambient air,

- Multifermenter System for parallel fermentations on 100 - 1000ml scale (DASGIP)
- Various HPLCs with DAD, MWD, VWD or PAD detectors for reversed and normal phase separations and chiral separations (Agilent (1100; 1200,), Dionex (ATC-HC, BioLC GS50, P680A LPG Pump, WPS-3000SLAnalyt; Foxy 1 Fraction Collector with Diverter), Shimadzu (TNM-1 TNb Analysator, 1300bar HPLC-System incl. LCMS Single Quad)
- FACS equipment and fluorescent-based screening procedures for identification and sorting of productive clones in heterogeneous cell populations
- GC/FID and GC/MS with normal stationary phases and chiral stationary phases (Agilent 7890 incl. PAL-H6890)
- High Throughput HPLC/MS with UV and ESI/APCI mass selective detectors
- HPLC MS/MS for small compound fingerprinting (Shimadzu)
- Maldi TDS for post-translational modification analysis (Agilent)
- CALIPER Lab chip GY (Caliper Life Sciences) capillary electrophoresis
- NMR AVANCE III 300 (300MHz) (Bruker) and INOVA 500 spectrometer (500MHz) (Varian) for characterization of known and unknown organic and anorganic compounds
- Biacore X1000 (GE Healthcare) for biomolecule interaction analysis

BUDGET

TOTAL: 59.300.000EUR

PART OF THE TOTAL BUDGET FROM PRIVATE RESOURCES (%): 42 %

MAIN PROJECTS

- **2006-2009:** Recombinant esterase for α-substituted aliphatic esters improving the yield , Kompetenzzentrum

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Angewandte Biokatalyse (Angewandte Biokatalyse Kompetenzzentrum GmbH), Kplus centre in the framework of the Kplus programme of the Austrian Federal Government.

- **2006-2009:** Cloning and engineering of new non-heme oxidoreductases, Kompetenzzentrum Angewandte Biokatalyse (Angewandte Biokatalyse Kompetenzzentrum GmbH), Kplus centre in the framework of the Kplus programme of the Austrian Federal Government.
- **2006-2009:** New lyases and nitrile hydrolysing enzymes, Kompetenzzentrum Angewandte Biokatalyse (Angewandte Biokatalyse Kompetenzzentrum GmbH), Kplus centre in the framework of the Kplus programme of the Austrian Federal Government..
- **2006-2009:** Autoprotease-Fusion protein Expression System, Austrian Centre of Biopharmaceutical Technology (acib), Kplus centre in the framework of of the Austrian Kind/Knet programme of the Austrian Federal Government.
- **2006-2009:** Evaluation and Implementation of PTR-MS Technology for Process Control in Biotechnology, Austrian Centre of Biopharmaceutical Technology (acib), Kplus centre in the framework of of the Austrian Kind/Knet programme of the Austrian Federal Government.
- The Angewandte Biokatalyse Kompetenzzentrum GmbH (AB) and the Austrian Centre of Biopharmaceutical Technology (acib) are both precurser centers of acib GmbH.

ACHIEVEMENTS

INTERNATIONAL PATENTS:

- WO 2006/113959 A3 Production of recombinant proteins by autoproteolytic claevage of a fusion protein
- WO 2007/073845 A2 Novel polypeptide having esterase activity and recombinant esterase and use thereof
- WO 2008/071695 A1 R-Hnl Random variants and their use for preparing optically pure, serically hindered cyanohydrins.

IMPORTANT PRICES:

- **2008:** Fast Forward Award & DSM Innovation Award: "APLE - Die Entwicklung eines hochwirksamen Biokatalysators" Pig liver extracts have been used in bio-transformations for decades. However, their porcine origin and the risk of viral and prion contaminations prohibited their application in pharmaceutical production. Furthermore, pig liver extracts contain several structurally similar esterases conferring surprisingly different activities. Our research team has identified the most interesting alternative pig liver esterase (APLE), found a way to produce large quantities thereof and has applied APLE in ton-scale production of an intermediate for a novel anti-hypertensive drug. APLE will be applicable in numerous biotransformations for high-value pharma products. For the research done in this field the Centre was awarded the Fast Forward Award 2008 of the Styrian Business Promotion Agency and Prof. Helmut Schwab and his team received the DSM Innovation Award.
- **2006:** Houska Preis "R-HNL – Ein pflanzliches Abwehrsystem rettet Menschenleben" In 2006 the Dr.-Wolfgang-Houska-Award of the B&C Privatstiftung was officially bestowed to Anton Glieder and his team for the contribution »A Plant-Based Immune System Saves Human Lives«. Anton Glieder applied for this prize on behalf of an interdisciplinarily cooperating research team from our working groups molecular biotechnology, organic chemistry and structural biology. Scientific results of the team members are regulary published in high parole scientific journals: Achmüller Clemens, Kaar Waltraud, Ahrer Karin, Wechner Philip, Hahn Rainer, Werther Florian, Schmidinger Hannes, Cserjan-Puschmann Monika, Clementschitsch Franz, Striedner Gerald, Bayer Karl, Jungbauer Alois, Auer Bernhard (2007): Npro fusion technology to produce proteins with authentic N termini in E.coli. Nature Methods, 4 (12), 1037-1043

ACIB SUCCESS STORIES 2010:

A toolbox of flavoproteins for the asymmetric bioreduction of activated alkenes was developed. These enzymes allow the production of flavor- and fragrance compounds, such as the citrus-flavor 'citral' and the olfactory principle of the 'lily-of-the-valley', both of which are widely used in perfumes.

Proteins are widely used as medicines, vaccines and enzymes for a series of technical processes. In the majority of the cases they are produced by microorganisms and yeast cells are among the most important cell factories. After the start of the acib research programme in January 2010 the researchers in Vienna and Graz bundled their expertise in Pichia technologies and established an efficient production platform for proteins which is presently being further optimized in a cooperation with six industrial partners.

Cofactors are highly conserved mediators of biological processes and the cofactor-dependence of enzymes is thus highly restricted. For the first time, chemically modified (artificial) cofactors could successfully be applied to biocatalysis.S-Adenosyl-L-methionine (SAM) dependent methyltransferases are used as catalysts for alkylation reactions with S-Adenosyl-L-

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methionine analogs. The modified cofactors are decorated with alkyl groups other than methyl and used for biocatalytic Friedel-Crafts alkylation. In contrast to the classical chemical reaction the biotransformation is very selective and environmentally compatible.

MAIN COLLABORATING PARTNERS

COLLABORATION WITH ACADEMIC PARTNERS

- University of Natural Ressources and Life Sciences, Vienna, AT
- Graz University of Technology, Styria, AT
- University of Graz, Styria, AT
- University of Innsbruck, Tyrol, AT
- Medical University of Graz, Styria, AT
- Vienna University of Technology, AT
- University of Applied Sciences, FH Campus Wien, Vienna, AT

COLLABORATION WITH COMPANIES

- AB Enzymes, Darmstadt, DE
- BASF, Ludwigshafen, DE
- Biotenzz Gesellschaft für Biotechnologie mbH, Graz, AT
- BIA Seperations, Ljubljana, Slowenia
- Biocrates Life Scienes, Innsbruck, AT
- Bio-ferm, Tulln, AT
- Biomerx, Linz, AT
- Biomin Holding, Herzogenburg, AT
- Boehringer Ingelheim RCV, Vienna, AT
- Chorus GmbH, Boeheimkirchen, AT
- Cytec Austria, Werndorf, AT
- DSM, Heerlen, NL
- F.Hoffmann-La Roche, Basel, CH
- Roche Diagnostics, Grenzach-Wyhlen, DE
- Ingenza, Midlothian, UK
- Ionimed, Innsbruck, AT
- Jungbunzlauer, Basel, CH
- KWS Saat, Einbeck, DE
- Lonza, Basel, CH
- Novartis, Basel, CH
- Organobalance, Berlin, DE
- Sandoz, Kundl, AT
- Siemens, Munich, DE
- Süd-Chemie, Munich, DE
- VTU Technoloy, Grambach, AT

The Competence Centre acib is funded in the framework of the COMET - Competence Centers for Excellent Technologies by BMVIT, BMWF, and the provinces of Vienna, Styria and Tyrol. The COMET programme is conducted by FFG.

EXPECTATIONS

OFFERS

acib offers joint research projects for industrial biotechnology. We are interested in applying biotechnology for industrial production or in companies which are planning to do so in near future and who want to support joint research projects.

REQUIREMENTS

- Partners for FP7 research projects in the field of industrial biotechnology, green chemistry and synthetic biology.
- Collaboration with industrial partners in common projects dedicated to industrial biotechnology.

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BIOENERGY 2020+ GMBH, LOCATION WIESELBURG

/ SMALL SCALE BIOMASS SYSTEMS & LIQUID BIOFUELS

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THEMATIC RESEARCH FOCUS

RESEARCH AREA

Research and development, engineering and consulting, and dissemination and national/international networking in the following bioenergy related fields

- resources and technical logistics
- solid biofuel assessment and characterization
- small-scale biomass combustion systems
- technical energy systems (system design and optimization)
- liquid biofuels

EXCELLENCE

- **Applied R&D in small-scale biomass combustion systems:** Coordinator of 2 related FP7 projects. These focus on lowest emission, highest efficiency small-scale biomass boilers and stoves (pellets and log wood).
- Resources and **technical logistics and solid biofuel assessment and characterization:** Coordinator of another 2 related FP7 projects. These are pre-normative research projects aiming to develop a proposal for a slag formation test and quality assurance measures along the pellet supply chain.

MISSION

Our overall mission is to become the world leader in bioenergy research and to support industry from fundamental R&D to market introduction. The specific purposes of our research group is to perform industry driven fundamental, pre-competitive, and applied research to develop sustainable biomass supply chains, tradable solid biomass fuels, zero emission / 100% efficiency combustion systems, small and micro CHP systems, and algae for biofuel conversion routes.

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH

Resources and technical logistics

The resources and technical logistics research area is concerned with the provision of biomass across the entire process chain, from agricultural and forestry production (cultivation, growing, harvesting) to transport; and from storage to processing. The most important tasks are thus:

- Evaluation of availability of biomass
- Assessment and development of harvesting and compacting technologies
- Development and optimization of appropriate transport logistics
- Assessment, development and optimization of storage systems
- Development and optimization of drying techniques
- Development and evaluation of processing technologies such as chipping, separating, conditioning and manufacturing of pellets and briquettes
- Development and evaluation of technologies for recycling of biomass ash in agriculture and forestry

Solid biofuels – assessment and characterization

The solid biofuels research area generally deals with the assessment and characterization of solid biomass fuels for combustion purposes. The most relevant contents of research therefore are:

- Method development (for testing and characterization)
- Determination of combustion characteristics
- Determination of off-gassing characteristics
- Determination of ash melting behaviour
- Development of fuel indexes and fuel classes

Small-scale biomass combustion systems

In general the small-scale biomass combustion systems research area focuses on the development of low emission, high efficiency combustion systems aiming at zero emission and 100% efficiency. We consider all relevant product categories from closed fireplaces, chimney inserts, chimney stoves, stoves, tiled stoves, to boilers of 500 kW and above and we deal with all biomass fuels (log wood, briquettes, pellets and chips from wood as well as from agricultural biomass). The research field covers activities in:

- Primary measures for emission reduction (grate design, combustion chamber design, air staging...)

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- Secondary measures for emission reduction (PM reduction: Filters and scrubbers, for CO reduction: catalysts...)
- Primary measures to increase efficiency (reduce air excess ratio, improve load control concepts...)
- Secondary measures to increase efficiency (improve heat exchanger designs, novel heat storage concepts, flue gas condensation...)
- Improve annual efficiency (method development, improve load control concepts...)

Technical energy systems

The technical energy systems research area spans a wide range of activities, topics concerned and methods applied:

- Dynamic modelling of heat supply systems
- Building integration
- Hybrid systems (biomass / solar, biomass / heat pumps)
- Small and micro-scale cogeneration technologies (steam engine, thermoelectrics...)

Liquid biofuels

The liquid biofuels research area mostly deals with the following topics:

- Second generation biofuels (collection of data from demoplants)
- Assessment and cultivation of Algae for biofuel production

MAIN CAPABILITIES

FUNDAMENTAL AND APPLIED R&D

- Desktop research and studies
- Experimental research and development
- Product / technology development and optimization
- Method development (ash melting, off-gassing, condensate, annual efficiency, direct efficiency from stoves...)
- Modelling and simulation

400 m^2 technical laboratory and 120 m^2 of chemical laboratory on-site equipped with modern gas analyzers, PM measuring and sampling equipment, chemical analyzers). Access to in-house chemical lab in Graz with the most advanced chemical methods for fuel and ash characterization.

FIELDS OF RESEARCH RESULTS APPLICATION

- Renewable energy
- Environmental engineering
- Air quality and environmental protection
- Heating and cooling
- Agricultural engineering and forestry
- Systems and plant engineering
- Measurement technology

ALUMNI PROFILE

M.Sc.s, Ph.D.s and post-docs in:

- Mechanical Engineering
- Technical Chemistry
- Chemical and Process Engineering
- Electrical Engineering
- Technical Physics
- Environmental Engineering
- Ecotechnology
- Biotechnology
- Agriculture
- Bioresource Management
- Regional Sciences

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF

10/12

JUNIOR RESEARCH POSITIONS (INCL. PH.D. STUDENTS):

25/18

KEY RESEARCH EQUIPMENT

LIST OF DEVICES

Pilot plants:

- Biomass boilers and stoves for wooden and non wood biomass from 1 kW to 220 kW
- Filters and scrubbers
- Combustion catalysts
- Various pellets storage facilities

Other equipment:

- Modern gas analyzers (CO, CO2, O2, NOx, SO2, HCl, dust, VOC
- Standard condensate sampler
- Climate box for direct determination of efficiency of stoves

Methods and software:

- HCl and SO2 determination in the lowest concentration range
- Annual efficiency determination
- Matlab for simulation purposes
- CAD

BUDGET

TOTAL: 3 mil. EUR

PART OF THE TOTAL BUDGET FROM PRIVATE RESOURCES (%): 35 %

PART OF THE TOTAL BUDGET FROM FOREIGN RESOURCES (%): 35 %

MAIN PROJECTS

Resources and technical logistics

- **Pellet Optimization I+II:** Analysis and optimization of pellet production on an industrial scale. Central to the project was the investigation of the influence of various binding agents / pressing aids on energy consumption and pellet quality.
- **Woodchip logistics:** A logistics system consisting of an auger wagon with high-performance removal capacity was developed for local biomass heating systems with nominal output ranges of 100-1,000 kW.
- **Pro Cinis II:** Assessment of different applications for biomass in agriculture and forestry. The approach was characterized by attention to aspects

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of closed loop systems, recirculation of nutrients and cost efficiency.

Solid biomass – assessment and characterization

- **Pellet Optimization I+II:** Analysis and optimization of pellet production on an industrial scale. Central to the project was the investigation of the influence of various binding agents / pressing aids on energy consumption and pellet quality.
- **"Energy grain" & energy crop monitoring:** Fuel and combustion properties of various agricultural resources and waste materials were tested in a long-term study of three years. In addition to technical and environmentally-relevant aspects, economic angles were also considered.
- **ProPellet II:** Within the framework of ProPellet II, data on production capacity, sales markets, raw materials and quality standards in the European pellet market was collected. Numerous analyses of samples yielded insights about the quality of available pellets; these were also investigated in actual combustion tests.
- **A-Safepellets:** The release of CO and VOC from wood pellets is a relatively new topic. Within this project, technical solutions were developed to control these substances and thus reduce the dangers posed to humans by their release. Derived solutions are implemented in national and international standards and technical guidelines.

Small-scale biomass combustion systems

- **New Stoves 2020:** In accordance with consumer and regulatory requirements, the compilation of fundamentals, policies and measures for the binding market launch of logwood stoves in the year 2020; development of concepts for technological implementation of such stoves by the industry.
- **Thermodual:** Development of a pellet/logwood combined boiler in cooperation with an Austrian industry partner. The geometry of the combustion chamber has been optimized by means of a computer simulation and a control system was developed for the automatic switch from pellets to logwood mode and vice-versa.
- **BioMaxEff:** BIOENERGY 2020+ is coordinating an FP7 project with 13 partners from eight countries. The aim of the project is the demonstration of state-of-the-art biomass combustion technologies. In a comprehensive monitoring program, the actual performance of the combustion systems shall be demonstrated for the boiler exchange, the refurbishment and for the new building markets. The results will be used for further development and optimization.

Systems engineering

- **Biotheg III:** The automatic start, operation and heat distribution of pellet-fired stoves requires electric energy. This is produced by the stove itself during heating phases through the use of a so-called thermo-electric generator, or TEG. This makes it possible for the equipment to function without being connected to the grid.
- **ActiveCond:** Water vapor is produced during the combustion of biomass; this causes the majority of energy loss in the operation of modern biomass boilers. By way of condensation of this water vapor at low temperatures and subsequent use of a heat pump, this energy can be transferred into the heating system from the exhaust.

Biofuels

- **Algae & Energy Austria:** The use of microalgae as raw material for bioenergy is a very hot research topic around the world. The aim of this project is to determine whether and how the production of biofuels, electricity and heat from algae can be integrated into the existing Austrian energy systems.
- **2nd Generation Biofuels Demoplants:** BIOENERGY 2020+ has compiled an overview of projects demonstrating the transformation from lignocellulosic raw materials into fuels for transport. The depiction of the current state of technology supports potential investors and political decision-makers in their decisions.

ACHIEVEMENTS

- Joint product developments with boiler and stove industry (product names: Thermodual, BioWin, Twist 6, Twist 12...)
- Software developments with industry (KMS Informer...)
- 4 successfully coordinated FP7 applications in the years 2010 and 2011: **BioMaxEff:** Cost efficient biomass boiler systems with maximum annual efficiency and lowest emissions, in FP7-ENERGY.2010.4.2-1: Demonstration of a new generation of boilers and stoves (started in April 2011); **BioCAT:** Clean Air Technology for Small-Scale Biomass Combustion Systems, in FP7-SME-2011 - Activity 2.1: Research for SMEs (to start in November 2011); **AshMelT:** Development of a practical and reliable ash melting test for biomass fuels, in particular for wood pellets, in FP7-SME-2011 - Activity 2.2: Research for SME AGs (to start in January 2012); **SafePellets:** Safety and quality assurance measures along the pellets supply chain, in FP7-SME-2011 - Activity 2.2: Research for SME AGs (to start in January 2012)
- 1 successful partner application in FP7 in 2011: **SECTOR:** Production of Solid Sustainable Energy Carriers from Biomass by Means of Torrefaction, in FP7-ENERGY.2011.3.7-1: Development of

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new or improved sustainable bio-energy carriers (to start in January 2012)

MAIN COLLABORATING PARTNERS

COLLABORATION WITH ACADEMIC PARTNERS

Competence-Centre K1 partners

- Vienna University of Technology (A)
- Graz University of Technology (A)
- HBLFA Fransciso Josephinum (A)
- IFA Tulln – University of University of Natural Resources and Life Sciences, Vienna (A
- Jonaneum Research Forschungsgesellschaft (A)
- Technical Research Centre of Finland VTT (FI)
- Lulea University of Technology (S)
- Technologie- und Förderzentrum im Kompetenzzentrum für Nachwachsende Rohstoffe TFZ (D)
- Teknologisk Institut DTI (Dk)

COLLABORATION WITH COMPANIES

About 100 companies from Central Europe (mostly Austria), another 10 from Scandinavia and South and South Eastern Europe.

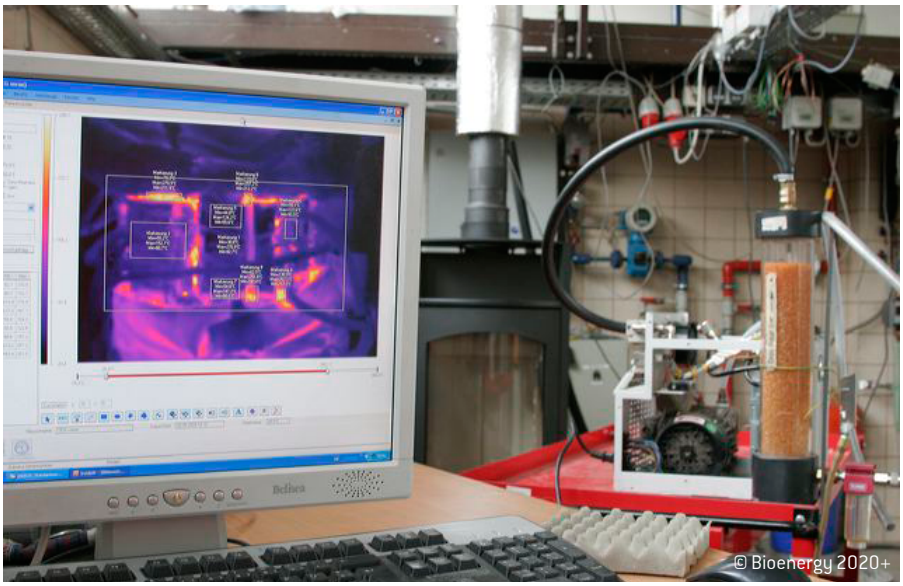
EXPECTATIONS

OFFERS

- For contract research with industrial partners
- For joint international research projects (FP7, CENTRAL)
- For joint non-RTD projects in IEE programmes

REQUIREMENTS

- Partners for FP7 research project in the field of creating sustainable and efficient energy systems based on renewable energy sources and for projects dedicated for SMEs and SME Associations
- Collaboration with industrial partners in common projects dedicated to applied R&D
- New complementary technologies (heat storage, cogeneration, cooling technologies, hybrid technologies...)
- New field of applications for our existing know-how (eg. application of thermoelectrics...)



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ERBER AG/BIOMIN/ROMER LABS/BIO-FERM

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THEMATIC RESEARCH FOCUS

RESEARCH AREA
- Innovative natural feed additives (probiotics, phytobiotics, mycotoxin deactivators, enzymes)
- Analysis of undesirable contaminants in food and feed (mycotoxins, allergens, GMO, drug residues)
- Biotechnological plant protection

EXCELLENCE
- Mycotoxin analysis and management (detoxification)

MISSION
- Making the world´s food safer.
- Naturally ahead in animal nutrition

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH
- Development of innovative natural feed additives (probiotics, phytobiotics, mycotoxin deactivators, enzymes) and characterisation of the mode of action and effects
- Analysis of undesirable contaminants in food and feed (mycotoxins, allergens, GMO, drug residues); development of rapid test kits, reference materials and reference methods in food and feed analysis
- Development and characterisation of biotechnological plant protectors

MAIN CAPABILITIES

- In vitro, ex vivo and in vivo testing and characterisation of natural feed additives (incl. Cell culture, FISH, PCR technologies)
- Fermentation technologies and down stream
- Analysis of food and feed contaminants (reference testing, rapid test kit development like LFD and ELISA)
- Production of certified reference standard materials

FIELDS OF RESEARCH RESULTS APPLICATION

Our developments and products are used by the animal feed and food industry

ALUMNI PROFILE
We have a multidisciplinary team from the fields of microbiology, molecular biology, biotechnology, chemistry, veterinary medicine, animal nutrition.

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF
24

JUNIOR RESEARCH POSITIONS (INCL. PH.D. STUDENTS):
38

KEY RESEARCH EQUIPMENT

LIST OF DEVICES
- Several HPLC- DAD, FLD, MS, MSMS
- Several PCR
- Fermentation technology (lab scale fermenters up to 20l, down stream equipment, lyophilisator)
- Cell culture laboratory
- FISH
- Electrophoresis
- Microscopes
- Laminar flows for aerobic and anaerobic working

MAIN PROJECTS

- Development of natural growth promoters for animal husbandry (probiotics, mycotoxin deactivators, phytobiotics, silage inoculants, yeast derivatives, feed enzymes)
- Development of rapid test kits for undesirable contaminants in food and feed; i.e. LFDs and ELISAs for mycotoxins, allergens, GMOs, veterinary drug residues, pesticides
- Development of reference materials for analysis
- Development of biotechnological plant protectants

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MAIN COLLABORATING PARTNERS

COLLABORATION WITH ACADEMIC PARTNERS

- BOKU Vienna, IFA Tulln
- Veterinary Medicine University Vienna


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ESM-YZAMER, ENERGY SERVICES AND MONITORING

RESEARCH GROUP CONTACT

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THEMATIC RESEARCH FOCUS

RESEARCH AREA
Innovative sources of energy, systems for measurement and control

EXCELLENCE
We apply new concepts and tools for heating, cooling and control systems

MISSION
We will practise an applied research in use of advanced energy sources, such as the heat pumps with gas-powered, microcogeneration devices and alternative energy sources.

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH
We will try to improve the possibilities of using a heat pump with a gas-powered and microcogeneration unit. We want to develop an energy unit that provides the necessary energy requirements of the building in case of emergency. We want to expand the use of alternative energy sources.

MAIN CAPABILITIES

With our research we want to improve the parameters of the equipment and promote innovative technologies of energy sources. Our results can be used in the design of the heating and cooling of buildings when using alternative energy sources. Our research also provides tested measurement and control algorithms for energy units.

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF
3

KEY RESEARCH EQUIPMENT

LIST OF DEVICES
We have the usual equipments for routine measurement and testing of energy units.

BUDGET

TOTAL: 0,1 mil.

PART OF THE TOTAL BUDGET COMING FROM PRIVATE RESOURCES (%): 100 %

PART OF THE TOTAL BUDGET COMING FROM FOREIGN RESOURCES (%): 0 %

MAIN COLLABORATING PARTNERS

COLLABORATION WITH ACADEMIC PARTNERS
- UCM Trnava
- FEI STU Bratislava
- Žilinská univerzita

COLLABORATION WITH COMPANIES
- AISIN SEIKY Co, Ltd - Japan
- TECHNOCASA CLIMATIZZAZIONE, S.r.l - Italy
- ELESTA Building Automation - Germany

EXPECTATIONS

REQUIREMENTS
We expect an expansion of our research group from potential partners. We would like to carry out those analyses and measurements with the co-operation of our potential partners for which we do not have the necessary equipments.

OFFERS
We offer for the partners our experience with the development of alternative energy resources, their control and monitoring.

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FOOD TECHNOLOGY CENTRE

/ FRANCISCO JOSEPHINUM SECONDARY COLLEGE AND RESEARCH INSTITUTE

RESEARCH GROUP CONTACT

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THEMATIC RESEARCH FOCUS

RESEARCH AREA
- Developing food and beverages

EXCELLENCE
Milk products, beverages, desserts, ice-cream, delicatessen, fruit processing,

MISSION
- Development of new food and beverages
- Assistance from concept to implementation

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH
- Finding and adapting fitting food processing technology
- Evaluation of food ingredients application

MAIN CAPABILITIES

APPLICATION RESEARCH
- Improvement of existing and development of new food and beverages
- Usage of food ingredients

FIELDS OF RESEARCH RESULTS APPLICATION
- Food processing
- Application of food ingredients

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF
2/8

JUNIOR RESEARCH POSITIONS (INCL. PH.D. STUDENTS):
6/8

KEY RESEARCH EQUIPMENT

LIST OF DEVICES
- Homogenizer
- Separator
- Cup filling and sealing machine
- Cheese vats
- 3 Stephan cutter (5l, 20l, 40l)
- Foaming machine
- Heat exchangers
- Rotation autoclave
- Tubular heat holder
- Spray drying tower
- Freeze dryer
- UHT-heat exchanger with evaporator
- Ultra filtration plant
- Multipurpose heater
- Can closing machine
- Colloid mill
- Cream ice freezer
- Soft ice machine
- Vinegar pilot plant
- Brewing pilot plant
- Carbonation plant

BUDGET

TOTAL: 0,5 MIL. EUR

PART OF THE TOTAL BUDGET FROM PRIVATE RESOURCES (%): 30 %

PART OF THE TOTAL BUDGET FROM FOREIGN RESOURCES (%): 5 %

MAIN PROJECTS

- Many development projects with European food enterprises (no details due to confidentiality agreements with clients)

ACHIEVEMENTS

- Many product launches in European food market (no details due to confidentiality agreements with clients)

MAIN COLLABORATING PARTNERS

COLLABORATION WITH ACADEMIC PARTNERS
- Department of Food Sciences and Technology, University of Natural Resources and Life Sciences, Vienna, AT

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- Austrian Marketing University, Wieselburg, AT

COLLABORATION WITH COMPANIES

- Food enterprises in Europe (even in Czech) and overseas

EXPECTATIONS

OFFERS

- development of new food and beverages
- finding matching technology and ingredients

REQUIREMENTS

- Collaboration with industrial partners in common projects

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DEGREE PROGRAMME BIOTECHNICAL PROCESSES, CAMPUS TULLN

RESEARCH GROUP CONTACT

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THEMATIC RESEARCH FOCUS

RESEARCH AREA

- Microbiology, Molecular Biology, DNA Analytics
- Analytical Chemistry, Spectroscopy, Biochemistry
- Gas Chromatography, Food Analysis, Ecotoxicology
- Renewable Energy, Soil Analysis
- Biotechnology, Fermentation

EXCELLENCE

Due to its numerous biotechnical companies and research institutions, Tulln has established itself as a Center for Biotechnology within Europe. The Degree-Programme is part of this network.

MISSION

Our basic mission is to provide our students with a solid biotechnical training. Furthermore we carry out research work in cooperation with companies and optimize analytical methods for industrial applications.

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH

Currently, we carry out research projects in analytical chemistry (e.g. mass spectrometry, IR spectroscopy), fermentation, biochips, and molecular biology.

MAIN CAPABILITIES

State-of-the-art laboratories in the fields of analytics, environmental technology, biogenic agents and fermentation and first-class researchers guarantee for hands-on training and profound knowledge.

FIELDS OF RESEARCH RESULTS APPLICATION

- Food and Feed Industries
- Pharmaceutical and Cosmetics Industries
- Environmental Engineering and Waste Disposal
- Test Laboratories
- Biotechnology

ALUMNI PROFILE

Our graduates have undergone solid biotechnical training and are familiar with handling sensitive, state-of-the-art equipment and have a sound knowledge of current quality management systems.

Postgraduate students have extended their knowledge in the fields of chemometrics, bio-analytics and process analytics. They have also gained additional skills in analytical methods of molecular biology.

Furthermore, they have individually specialised in two of the following modules:

- Cell factory (biotechnological plant engineering, molecular biotechnology)
- Environmental technology and monitoring (water and soil remediation, eco-toxicology, bioindication)
- Quality of food and feed (food additives, toxicology, legal aspects)
- Biogenic agents (extraction, purification and formulation)

Additional management skills (quality control and assurance, organisation, marketing, project financing) have completed the professional training.

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF

4

JUNIOR RESEARCH POSITIONS (INCL. PH.D. STUDENTS):

3

KEY RESEARCH EQUIPMENT

LIST OF DEVICES

- Analytical Lab (ESI-TOF MS, FTIR- u. FTNIR Spectral Photometer, GC/GC-MS, HPLC, Microarray Printer)
- Environmental Technology Lab
- Biotechnology Lab with Fermentors

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- Molecular Biology Lab
- Active Agents Lab (Extraction Systems)

MAIN PROJECTS

- Establishing Analytical Methods
- Bioanalytics for Food and Feed Safety
- Silage Optimisation
- Extraction of Biogenic Agents
- Spectroscopic Soil Assessment (Soil Drift)

ACHIEVEMENTS

Publications:

- Characterization and application of isotope-substituted (13C15)-deoxynivalenol (DON) as an internal standard for the determination of DON. Häubl, Georg/ Berthiller, Franz/ Rechthaler, Justyna/ Jaunecker, Günther/ Binder, Eva Maria/ Krska, Rudolf/ Schuhmacher, Rainer; Food Additives and Contaminants 23/11, 1187-1193, 2006.
- Characterization of (13C24) T-2 toxin and its use as an internal standard for the quantification of T-2 toxin in cereals with HPLC-MS/MS. Häubl, Georg/Berthiller, Franz/Hametner, C./Rechthaler, Justyna/ Jaunecker, Günther/Freudenschuss, Martin/Krska, Rudolf/ Schuhmacher, Rainer; Analytical & Bioanalytical Chemistry, 2007.
- Monolayers at Solid-Solid Interfaces Probed with Infrared Spectroscopy; Analytical and Bioanalytical Chemistry 388, 55-64, 2007.
- Cleavage of Zearalenone by Trichosporon mycotoxinivorans to a Novel Nonestrogenic Metabolite. Vekiru, Elisavet/Hametner, Christian/ Mitterbauer, Rudolf/ Rechthaler, Justyna/ Adam, Gerhard/Schatzmayr, Gerd/Krska, Rudolf/Schuhmacher, Rainer; Applied and Environmental Microbiology, 76/7, 2353-2359, 2010.

MAIN COLLABORATING PARTNERS

COLLABORATION WITH ACADEMIC PARTNERS

- Medical University, Vienna, Austria
- Austrian Institute of Technology, Tulln, Austria
- University of Natural Resources and Life Sciences, Vienna /Austria
- University of Vienna /Austria
- Vienna University of Technology /Austria
- Joanneum Research Graz, Hartberg / Austria
- Reutlingen University /Germany

COLLABORATIONS WITH COMPANIES

- Sciotec, Tulln/Austria
- Riviera
- Biomin Tulln, Herzogenburg/Austria
- Romerlabs Tulln/Austria
- Biopure Tulln/Austria
- 55pharma Tulln/Austria
- ISF Schaumann Forschung Pinneberg, Wahlstedt/Germany

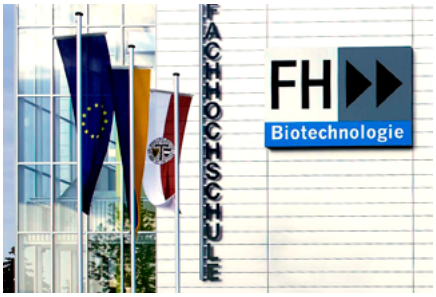
EXPECTATIONS

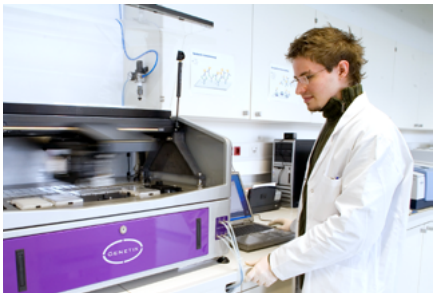
REQUIREMENTS

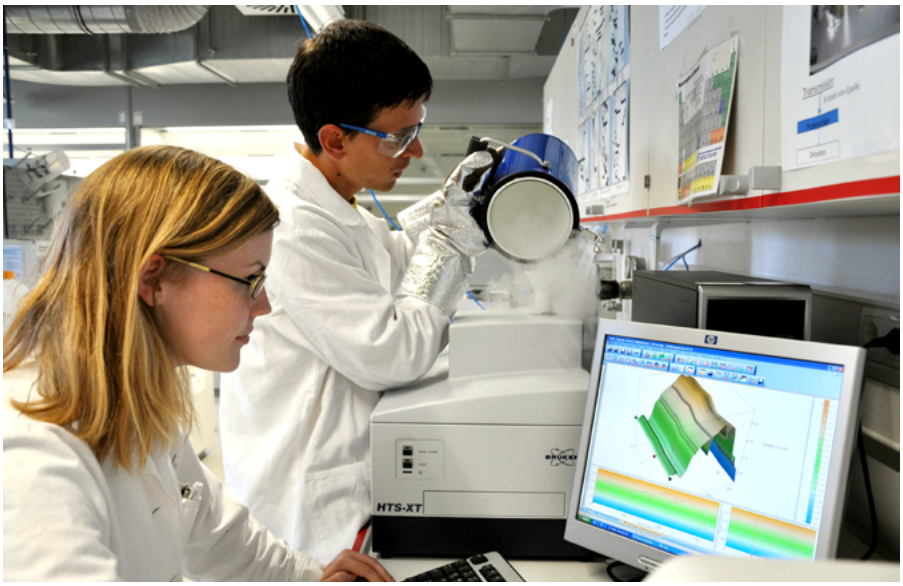
- Partner universities interested in student exchange
- Project cooperation

OFFERS

- Development and Optimisation of Analytical Methods
- Commission Analysis







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CENTER FOR ANALYTICAL CHEMISTRY

/ DEPARTMENT FOR AGROBIOTECHNOLOGY, IFA-TULLN

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THEMATIC RESEARCH FOCUS

RESEARCH AREA

- Analytical Chemistry

EXCELLENCE

- Development of rapid test kits (immunobased assays) for the determination of mycotoxins, pesticides and hidden allergens to ensure food safety.
- Isolation, characterisation, and determination of (allergenic) proteins as well as bioactive secondary metabolites.
- Organisation of frequent interlaboratory comparisons for proficiency testing in water analysis.
- Production of certified reference materials (CRM).
- Detection and structural characterisation of secondary fungal and plant metabolites and their conversion products. Biological inactivation and chemical transformation by processing.
- LC-MS and GC-MS based metabolomics for the study of microbes, plants as well as their interaction.
- qPCR methods for the determination of Fusarium genes.
- Multianalyte methods for the simultaneous quantification of mycotoxins in foods and indoors.

MISSION

The scientific mission of the Center for Analytical Chemistry is to perform fundamental and applied research in the following areas: Mycotoxins in Food and Indoors, Water Analysis and Novel QA Systems, Bioactive Substances and Metabolomics, Mycotoxin-Metabolism, Detection of Allergens in Foods and Molecular Diagnostic Tools. The mission is completed through numerous partnerships in particular within EU on the one hand and a variety of national and international training courses and seminars on the other hand.

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH

The aims and activities of the division are manifold. They range from the development and validation of modern analytical methods in environmental, food and feed analysis and the preparation and certification of reference materials to the coordination of interlaboratory comparisons and a proficiency testing scheme for a great variety of parameters and substances. A further core theme consists in the development of a mass spectrometry based metabolomics platform for the study of plant – microbe interactions. Please have a look at the working group's pages for more detailed information.

MAIN CAPABILITIES

- Development of novel analytical methods (rapid test systems and mass spectrometric methods)

FIELDS OF RESEARCH RESULTS APPLICATION

- Analytical laboratories
- Agriculture
- Animal nutrition
- Feed additives
- Food industry
- Hygiene
- Plant breeding
- Plant protection

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF
7

JUNIOR RESEARCH POSITIONS (INCL. PH.D. STUDENTS):
33

KEY RESEARCH EQUIPMENT

LIST OF DEVICES

QLiquid Chromatography

- HPLC-UV (HP 1050)

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- HPLC-DAD/FLD (HP 1090)
- HPLC-DAD/FLD (Agilent 1100)
- HPLC-DAD (Agilent 1200)
- HPIC-PAD (DIONEX DX 500)
- post column derivatisation unit (PCX5200)

Gas Chromatography
- GC-ECD/FID (HP 5890)
- GC-NPD/ECD (HP5890)
- GC-MSD (HP 6890-HP 5973)
- GC-MSD (HP 6890-HP 5975B (EI/CI), MPS 2XL Twister, Gerstel)
- GC-MSD (HP 7890-HP 5975C, Dual PAL, CTC)
- Headspace (Agilent)
- Purge and Trap (OI 4560)

Mass Spectrometry
- QTrap 2000 LC-API-MS/MS (ESI and APCI sources, Applied Biosystems)
- QTrap 4000 LC-API-MS/MS (ESI and APCI sources, Applied Biosystems)
- QTrap 5500 LC-API-MS/MS (ESI und APCI, Applied Biosystems)
- 6460 Triple Quad LC/MS System (Agilent)
- Element 2 HR-ICP-MS (Thermo Finnigan)
- Orbitrap XL LC-HR-MS (Thermo Scientific)

Electrophoresis
- CZE (HP 3D-CE)

Spectroscopy
- ETAAS (PE 4100 ZL)
- FAAS/CVAAS/HGAAS (PE 4100)
- UV/VIS-Spectrophotometer (PE and Shimadzu)
- FTIR-Spectrometer (Bruker Vector 22, DTGS detector)
- FTIR-Spectrometer (PE System 2000 FTIR, DTGS and MCT detectors)
- HATR Accessory (SensIR Technologies DuraSamplIR, Diamond IRE)
- Diffuse Reflection Unit (Perkin Elmer)
- Fluorescence Photometer
- ELISA reader (Tecan)

Immunodiagnostic strip tests
- ZX1000 dispensing platform with two Frontline contact tips and one Airjet Quanti 3000
- (BioDot, Irvine, CA, USA)
- CM4000 guillotine cutter (BioDot, Irvine, CA, USA)

Elementary Analysis
- Kjehldal-system
- Total organic carbon system (Shimadzu TOC-VCPH)

Sample Preparation
- High pressure asher
- Microwave digestion and microwave assisted extraction (MLS)
- Solid phase extraction
- Solid phase microextraction
- Ultra sonic homogenisation

BUDGET

TOTAL (ANNUAL BUDGET): 2 Mio €

MAIN PROJECTS

- Christian Doppler Laboratory for Rapid Test Systems for Allergenic Food Contaminants
- Christian Doppler Laboratory for Mycotoxin Metabolism
- Proficiency testing (PT) scheme for water analysis
- HITEA – Health Effects of Indoor Pollutants – Integrating microbial, toxicological and epidemiological approaches (EU – FP 7)
- MYCORED – Novel integrated strategies for worldwide mycotoxin reduction in food and feed chains (EU – FP 7)
- Fusarium metabolites and detoxification reactions (FWF Austrian Science Fund)
- New bioactive substances for the development of nutraceuticals and natural pesticides

ACHIEVEMENTS

- Dr. Wolfgang Houska Price 2005
- Agrana Research Award 2005
- Dr. Brigitte Gedek Science Award 2006
- ALVA Science Award 2011 for the best Diploma Thesis
- ALVA Science Award 2011 for the best Ph.D. Thesis
- Highly Cited Mycotoxin-Papers (sciencewatch.com): Nr.4 world-wide ranking of institute head among most cited authors of the last decade in the area of "mycotoxins". The database included 9,727 authors, 107 nations, 793 journals, and 2,654 institutions

MAIN COLLABORATING PARTNERS

- BOKU, Department of Applied Genetics and Cell Biology
- BOKU, Institute of Animal Nutrition, Products and Nutrition Physiology
- Center for Microbial Biotechnology, Technical University of Denmark, Copenhagen
- Centre de Recerca en Epidemiologia AmbientaL, CREAL, Barcelona, Spain
- Cranfield University, UK
- Department of Organic and Industrial Chemistry, University of Parma, Italy
- Department of Pharmacology and Toxicology, Medical University Vienna, Austria
- Department of Plant Breeding and Seed Production, University of Warmia and Mazury, Olsztyn, Poland
- Fungal Genomics Unit, University of Natural Resources and Life Sciences Vienna, Austria
- Health Canada, Food Directorate, Bureau of Chemical Safety
- Hebrew University of Jerusalem, Jerusalem, Israel
- Institute of Agri-Food and Land Use, Queen´s University of Belfast, Northern Ireland

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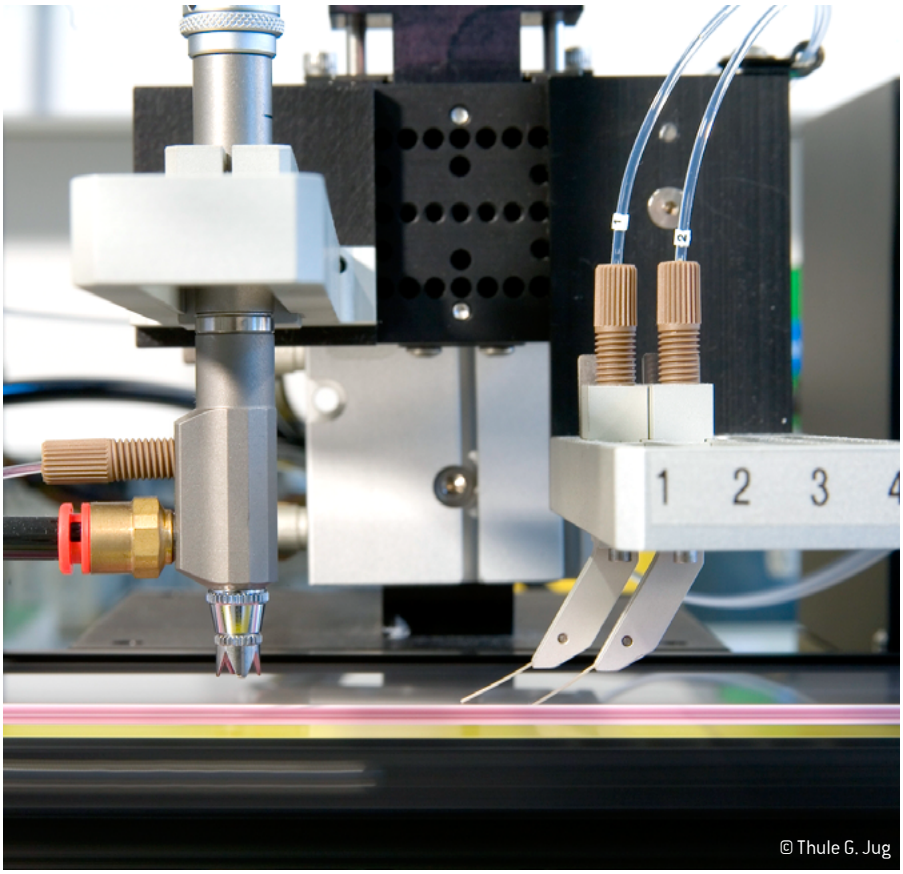
- Institute of Applied Synthetic Chemistry, Vienna University of Technology, Austria
- Institute of Chemical Technology, Prague, Czech Republic
- Institute of Crop Science and Resource Conservation, University of Bonn, Germany
- National Food Administration, Uppsala, Sweden
- National Institute for Health and Welfare (THL), Kuopio, Finland
- National Research Council – Institute of Science of Food Production (CNR-ISPA), Bari, Italy
- Slovak University of Agriculture, Nitra, Slovakia
- South African Medical Research Center, Tygerberg
- Texas A&M University, College Station, USA
- University of Lund, Sweden
- University of Parma, Dipartimento di Chimica Organica e Industriale, Parma, Italy
- University of Utrecht, The Netherlands
- Vienna University of Technology, Institute of Applied Synthetic Chemistry
- Vienna University of Technology, Institute of Chemical Technologies and Analytics
-
- Federal Ministry of Agriculture, Forestry, Environment and Water Management, Austria.
- Environment Agency, Austria

COLLABORATIONS WITH COMPANIES

- BIOMIN Holding GmbH, Herzogenburg, Austria
- General Accident Insurance Institution (AUVA), Vienna, Austria
- Institution for Statutory Accident Insurance and Prevention in the Trade and Goods Distribution, Mannheim, Germany
- Mycologia, Perth/Sydney, Australia
- Nestec Ltd., Vevey, Switzerland
- Romer Labs Diagnostics, Tulln, Austria



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CHRISTIAN DOPPLER LABORATORY FOR MYCOTOXIN METABOLISM
CENTER FOR ANALYTICAL CHEMISTRY
/ DEPARTMENT FOR AGROBIOTECHNOLOGY, IFA-TULLN

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THEMATIC RESEARCH FOCUS

RESEARCH AREA
- Analytical Chemistry

EXCELENCE
- Determination of mycotoxins and their metabolites, in particular by using liquid chromatography - mass spectrometry.

MISSION
We aim to investigate the metabolism of mycotoxins in plants, microbes and animals.

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH
Despite huge research investment on mycotoxins (poisonous, low molecular weight, secondary metabolites of moulds), prevention and control remains difficult and the food industry continues to be vulnerable to problems of contamination. Continued research has led to some understanding of fungal metabolism, but has also highlighted the complexity of fungal/plant interactions and the fact that when analytical work is undertaken to monitor foods only a part of the total mycotoxins present is released and a significant fraction of bound or masked mycotoxins remains undetected. The toxicological fate of these substances is largely unknown. Recognising these significant gaps in current knowledge, we aim to investigate the metabolism of mycotoxins in plants, microbes and animals, which form three integrated modules in our group. We concentrate our efforts on the Fusarium mycotoxins deoxynivalenol, zearalenone and fumonisin B1, as these compounds are significant contaminants of European cereal crops.

The first module establishes the extent of formation of bound mycotoxins in plant systems. The second module investigates microbial interactions with free and bound toxins with a view to identifying possible detoxification routes. The third module pursues animal feeding trials to establish the fate of bound toxins in vivo, as well as the effectiveness of detoxification strategies.

MAIN CAPABILITIES

- Analysis of mycotoxins and their metabolites by hyphenated analytical methods
- Development of isotope labelled mycotoxins
- Development of biomarker methods for mycotoxins
- Support in the development of mycotoxin deactivators
- Dissemination of knowledge mainly by publication and lectures

FIELDS OF RESEARCH RESULTS APPLICATION
- Food Industry
- Animal Nutrition
- Feed Additives
- Agriculture
- Plant Breeding

ALUMNI PROFILE
Our alumni are trained to work in an interdisciplinary environment, combining expertise in various fields of natural sciences. Nonetheless, a strong focus is put on analytical chemistry.

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF
1

JUNIOR RESEARCH POSITIONS (INCL . PH.D. STUDENTS)
7

KEY RESEARCH EQUIPMENT

LIST OF DEVICES
- 2 Liquid Chromatography – Tandem Mass Spectrometers

ACHIEVEMENTS

- Worldwide first discovery of deoxynivalenol-3-glucoside in crop plants

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- Brigitte Gedek Science Award 2006 of the German Society for Mycotoxin Research
- ALVA Science Award 2011 for the best Diploma Thesis
- ALVA Science Award 2011 for the best Ph.D. Thesis
- Co-Organisation of the ISM conference 2009 in Tulln (420 participants)
- 70+ international and national publications in the last 7 years

MAIN COLLABORATING PARTNERS

COLLABORATIONS WITH ACADEMIC PARTNERS

- BOKU, Dept. IFA-Tulln, Institute of Biotechnology in Plant Production
- BOKU, Institute of Animal Nutrition, Products, and Nutrition Physiology
- BOKU, Department of Applied Genetics and Cell Biology
- Vienna University of Technology, Institute of Applied Synthetic Chemistry
- University of Parma, Dipartimento di Chimica Organica e Industriale, Parma, Italy
- Institute of Chemical Technology, Prague, Czech Republic
- Health Canada, Food Directorate, Bureau of Chemical Safety

COLLABORATIONS WITH COMPANIES

- BIOMIN Holding GmbH, Herzogenburg, Austria
- Nestec Ltd., Vevey, Switzerland

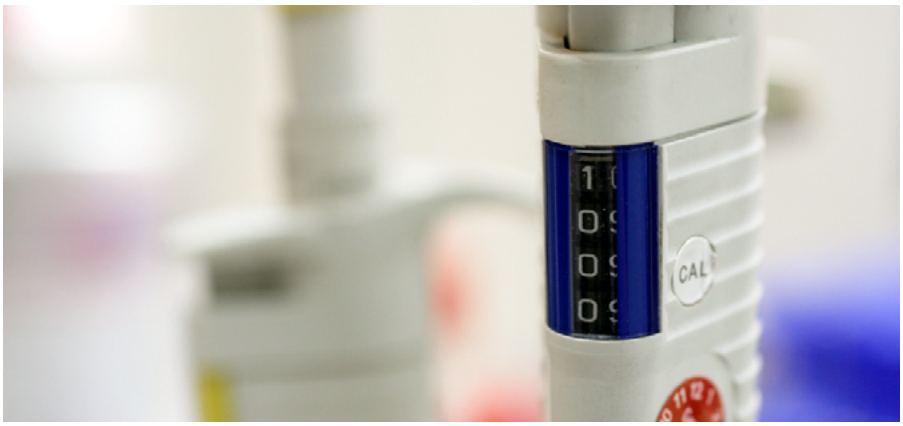
EXPECTATIONS

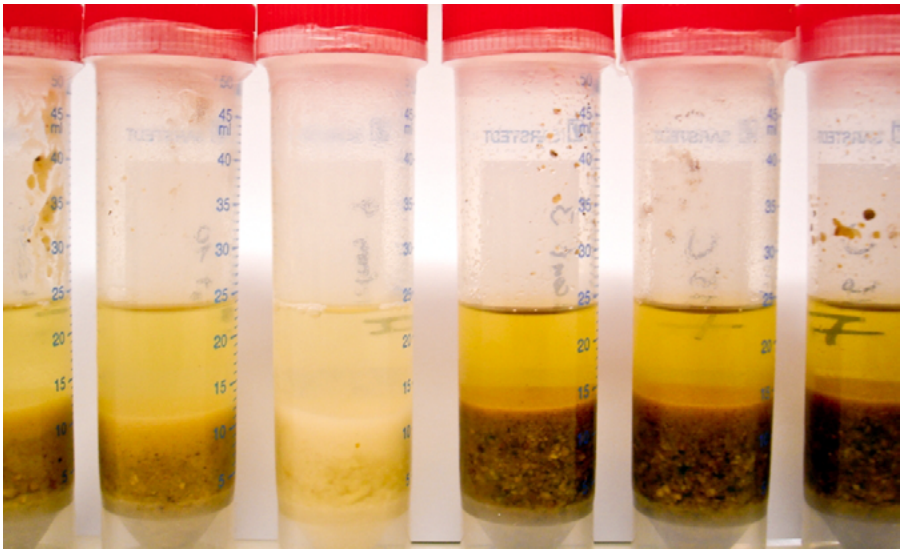
REQUIREMENTS

- Research interest in the formation of mycotoxins and their metabolites
- No conflict of interest with our current partners

OFFERS

- Participation in the research project





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IMMUNOANALYTICS AND FOOD ALLERGENS CENTER FOR ANALYTICAL CHEMISTRY

/ DEPARTMENT FOR AGROBIOTECHNOLOGY, IFA-TULLN

RESEARCH GROUP CONTACT

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THEMATIC RESEARCH FOCUS

RESEARCH AREA
- Analytical Chemistry

EXCELENCE
- Method development for food protein extraction and purification
- Characterisation of proteins
- Antibody development (polyclonal and monoclonal)
- Development of immuno-based assays like enzyme linked immunosorbent assays (ELISA) and Lateral Flow Devices (LFD)

MISSION
The Christian Doppler Laboratory for Rapid Test Systems for Allergenic Food Contaminants started in October 2007. The mission of the laboratory is the development of rapid and easy-to-handle immunoanalytical tests for the determination of allergenic proteins in different foodstuffs. The industrial partner is RomerLabs Diagnostic GmbH, which has already been a cooperation partner for many years. The first successful evaluation was after 1.5 years in May 2009. In general, Christian Doppler Laboratories have a run time of 7 years.

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH
Allergenic proteins are examples of naturally occurring substances that have to be avoided by allergic consumers. The EC-directive 2003/89/EC listed in Annex IIIa lists potential allergens that have to be labeled and declared. The list originally contained 12 food ingredients and was later expanded to 14, including milk, egg, fish, crustacean, peanut, nuts, soybeans, cereals, mustard, molluscs, lupine, sesame, celery and sulphite that is not an allergy elicitor per-se but closely related to histamine intolerance (EC-Directive 2007/68/EC). A rapid identification of food ingredients is already required during production to guarantee safe food products. Immuno-based test systems have to be developed, which lead to rapid qualitative and semi-quantitative results although there are no threshold levels for food allergens given. Research within the Christian Doppler Laboratory for Rapid Test Systems for Allergenic Food Contaminants comprises allergen and marker protein preparation and characterization by e.g. MS-methods. Polyclonal and monoclonal antibodies as a base for the immunoassays are prepared in-house. The development of immunoanalytical test systems (ELISA; LFD) follows to enable a rapid detection of food allergens.

MAIN CAPABILITIES

- Protein extraction, purification and characterisation
- Antibody development
- Immuno-based assay development – ELISA, LFD

FIELDS OF RESEARCH RESULTS APPLICATION
- Analytical laboratories
- Food industry

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF
1

JUNIOR RESEARCH POSITIONS (INCL . PH.D. STUDENTS)
6

KEY RESEARCH EQUIPMENT

LIST OF DEVICES
- ELISA-Reader
- Membrane sprayer/cutter
- FPLC
- Cell culture laboratory equipment

MAIN PROJECTS

Christian Doppler Laboratory for Rapid Test Systems for Allergenic Food Contaminants

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MAIN COLLABORATING PARTNERS

COLLABORATION WITH COMPANIES

- Romer Labs Diagnostic GmbH

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WATER ANALYSIS AND QA-SYSTEMS CENTER FOR ANALYTICAL CHEMISTRY

/ DEPARTMENT FOR AGROBIOTECHNOLOGY, IFA-TULLN

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THEMATIC RESEARCH FOCUS

RESEARCH AREA
- Analytical Chemistry

EXCELLENCE
- Quality assurance in analytical chemistry
- Interlaboratory comparisons
- Proficiency testing schemes
- Water analysis
- Trace analysis of environmental and biological samples

MISSION
Reliable analytical data can only be achieved by a number of quality assurance measures. Interlaboratory comparisons are the major tool of external quality assurance in order to obtain comparable results.

The working group focuses on the optimisation of analytical methods to their highest possible accuracy and precision.

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH
In 1995, the Center for Analytical Chemistry at the IFA-Tulln started to build up a PT scheme for external quality assurance in water analysis on behalf of the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW). Since then, this scheme has been extended to a multiplicity of inorganic and organic parameters. It has become an important part of the nationwide measurement programme.

MAIN CAPABILITIES

Interlaboratory comparison samples are prepared at the IFA-Tulln. They usually consist of synthetic ground or surface water, which is made from pure water, salts and pure standard chemicals. Reference concentrations are calculated from the gravimetric data of the sample preparation. The estimation of the laboratories' performance is based on the recoveries of these reference concentrations. The concentrations are chosen with respect to the situation in natural ground and surface waters. It is always aimed to represent the relevant inorganic matrix as close to natural water samples as possible. Thus, our PT samples are not simple standard solutions, but prepared in such a way that they practically do not differ from real water samples. They can be analysed exactly like real samples in routine analysis. Based on numerous quality assurance measures during the sample production, we can ensure high accuracy of the target concentrations. The correctness of the reference values, homogeneity and stability of the PT samples are carefully checked at the IFA-Tulln. For this purpose, samples are randomly selected and analysed for the target compounds before sample dispatch and after the closing date. The results of these measurements are presented in the reports that are published on the internet.

FIELDS OF RESEARCH RESULTS APPLICATION
Proficiency testing in analytical chemistry – external quality assurance in analytical laboratories

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF
1

JUNIOR RESEARCH POSITIONS (INCL. PH.D. STUDENTS):
4

KEY RESEARCH EQUIPMENT

LIST OF DEVICES
- High resolution inductively coupled mass spectrometry
- Atomic absorption spectrometry
- Ion chromatography
- UV-vis spectrometry
- Titrations

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MAIN PROJECTS

- Proficiency testing (PT) scheme for water analysis
- Characterisation of ancient wheat species
- Development of precise analytical methods

MAIN COLLABORATING PARTNERS

COLLABORATION WITH ACADEMIC PARTNERS

- Federal Ministry of Agriculture, Forestry, Environment and Water Management, Austria.
- Environment Agency, Austria
- Department of Plant Breeding and Seed Production, University of Warmia and Mazury, Olsztyn, Poland

COLLABORATIONS WITH COMPANIES

Up to now, over 400 analytical laboratories have participated in our interlaboratory comparisons.

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ANALYSIS OF INDOOR MOULDS
CENTER FOR ANALYTICAL CHEMISTRY
/ DEPTARTMENT FOR AGROBIOTECHNOLOGY, IFA-TULLN

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THEMATIC RESEARCH FOCUS

RESEARCH AREA
- Analytical Chemistry

EXCELLENCE
- Quantitative analysis of a broad range of microbial metabolites in indoor relevant matrices (settled dust, building materials)
- Method development for indoor relevant microbial metabolites
- Identification of microbial species based on the metabolite pattern
- Assessment of success of intervention strategies for moisture-damaged buildings
- Linking metabolite exposure to epidemiological data

MISSION
Our main goal is to elucidate the role of exposure to microbial metabolites in symptoms reported by inhabitants of moisture-damaged, mouldy indoor environments.

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH
- Our group tries to fill the methodological gaps that exist in the analysis of fungal and bacterial secondary metabolites in the indoor environment. The contribution of these bioactive, sometimes extremely toxic substances to the health hazards posed by microbes that are prevalent in damp indoor environments is a matter of a hot debate, mainly due to the lack of methods for an accurate determination of their on-site concentration.

- So far, reliable methods have been determined for only few substances e.g. for sterigmatocystin (a class 2B carcinogen produced by Aspergillus versicolor) and for macrocyclic trichothecenes (produced by Stachybotrys charatarum, which is the most feared "black mold"). In our group, an approach based on liquid chromatography-tandem mass spectrometry has been developed for the simultaneous analysis for over 250 metabolites from a broad variety of fungal and microbial species.

- Using this method, we found that meleagrin (an antibiotic substance produced by Penicillium chrysogenum) is the most prevalent compound beside sterigmatocystin on building materials in moderately damaged buildings in Austria. In more severely damaged buildings, even more toxic compounds such as satratoxins or chatoglobosins can be found. The most important finding however, was the identification of several bacterial metabolites such as valinomycin, chloramphenicol, nonactin and monactin, which are produced by Streptomyces spp. This raises concerns about the possibility of synergistic effects caused by chronic co-exposure to low levels of toxic bacterial and fungal metabolites.

MAIN CAPABILITIES

The developed analytical methods may be used to
- Determine the on-site exposure to microbial metabolites in damp indoor environments
- Evaluate the success of intervention strategies (pre- and post-intervention measurements)
- Prove the presence of microbial species that are not amenable to culturing techniques
- Screen the capability of the related microbes for metabolite production in culture

FIELDS OF RESEARCH RESULTS APPLICATION
- Construction
- Hygiene

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF
1

JUNIOR RESEARCH POSITIONS (INCL. PH.D. STUDENTS):
1

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KEY RESEARCH EQUIPMENT

LIST OF DEVICES

- QTrap 4000 LCMS/MS system (AB Sciex), coupled to an Agilent 1100 HPLC
- QTrap 5500 LCMS/MS system (AB Sciex), coupled to an Agilent 1290 HPLC

MAIN PROJECTS

- HITEA – Health Effects of Indoor Pollutants – Integrating microbial, toxicological and epidemiological approaches (EU – FP 7)
- IFUMEP – Determination of mould and fungal metabolite prevalence in buildings (Austrian Research Promotion Agency)

MAIN COLLABORATING PARTNERS

COLLABORATION WITH ACADEMIC PARTNERS

- National Institute for Health and Welfare (THL), Kuopio, Finland
- University of Lund, Sweden
- Slovak University of Agriculture, Nitra, Slovakia
- Centre de Recerca en Epidemiologia AmbientaL, CREAL, Barcelona, Spain
- University of Utrecht, The Netherlands

COLLABORATIONS WITH COMPANIES

- Romer Labs Diagnostics, Tulln, Austria
- Institution for Statutory Accident Insurance and Prevention in the Trade and Goods Distribution, Mannheim, Germany
- General Accident Insurance Institution (AUVA), Vienna, Austria
- Mycologia, Perth/Sydney, Australia

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MYCOTOXIN ANALYSIS
CENTER FOR ANALYTICAL CHEMISTRY
/ DEPARTMENT FOR AGROBIOTECHNOLOGY, IFA-TULLN

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THEMATIC RESEARCH FOCUS

RESEARCH AREA
- Analytical Chemistry

EXCELLENCE
- Method development for quantitative determination of multiple fungal contaminants in food and feed matrices
- Analysis for currently (04/11) 270 microbial metabolites in food and feed matrices down to the ng/kg-level
- Quantification is based on one of the world's largest collection of reference substances
- Method accuracy is verified by proficiency testing / analysis of reference materials
- Occurrence studies of less investigated fungal metabolites
- Chemotaxonomy – fungal metabolite profiling in cultures
- Linking toxicological and mycological data

MISSION
Our main goal is to get an overview of the occurrence of a broad range of mycotoxins and other fungal metabolites in food and the feed chain.

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH
Approximately 300-400 compounds are currently recognised as mycotoxins. Despite that, most analytical methods focus on those fungal metabolites that are addressed by legislation and some of their derivatives, which make up approximately two dozens compounds. In contrast to that, occurrence data on the remaining metabolites ranges from scarce to non-existent.

In our research group, we use the latest generation of fast-scanning tandem mass spectrometers to create a quantitative LC-MS/MS protocol for the simultaneous determination of several hundred fungal metabolites in a single chromatographic run. In several publications we have proved that the instruments´ sensitivity, selectivity and robustness allow the accurate determination of low µg/kg concentrations of the target substances even in crude extracts of complex matrices.

Based on the data we have obtained so far, it can be concluded that conventional methods cover only the tip of the iceberg regarding human exposure to fungal metabolites in foodstuffs. In cereals from countries with a moderate climate, "emerging" Fusarium metabolites such as enniatins, aurofusarin, apicidin, etc. are at least as prevalent as trichothecenes and zearalenone (which are addressed by legislation). In addition, consumers may be exposed to considerable concentrations of various Penicillium metabolites through the consumption of spoiled food (a visible inspection is not always feasible, e.g. use of mouldy tomatoes in ketchup). In tropical countries, aflatoxins (which include the most potent naturally occurring carcinogen Aflatoxin B1) and fumonisins are the most prevalent substance class, but aflatoxin bioprecursors (such as versicolorin C and averufin) and several other substances such as the Fusarium metabolites moniliformin, equisetin and fusaric acid might play a role as well.

In addition to these investigations, we develop methods for mycotoxin biomarkers in urine in order to evaluate the actual individual exposure.

MAIN CAPABILITIES

In numerous cooperations with international partners, the developed analytical methods are used to
- get qualitative and quantitative occurrence data of toxic fungal metabolite in food and feed
- evaluate the success of intervention strategies for mycotoxin reduction in the food and feed chain (pre- and post-harvest measurements)
- verify the accuracy of rapid test-kits for mycotoxins
- screen the capability of the related microbes for metabolite production in culture

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- identify microbial species based on their metabolite profile

FIELDS OF RESEARCH RESULTS APPLICATION
- Agriculture
- Animal nutrition
- Food industry

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF
2

JUNIOR RESEARCH POSITIONS (INCL. PH.D. STUDENTS):
4

KEY RESEARCH EQUIPMENT

LIST OF DEVICES
- QTrap 4000 LCMS/MS system (AB Sciex), coupled to an Agilent 1100 HPLC
- QTrap 5500 LCMS/MS system (AB Sciex), coupled to an Agilent 1290 HPLC

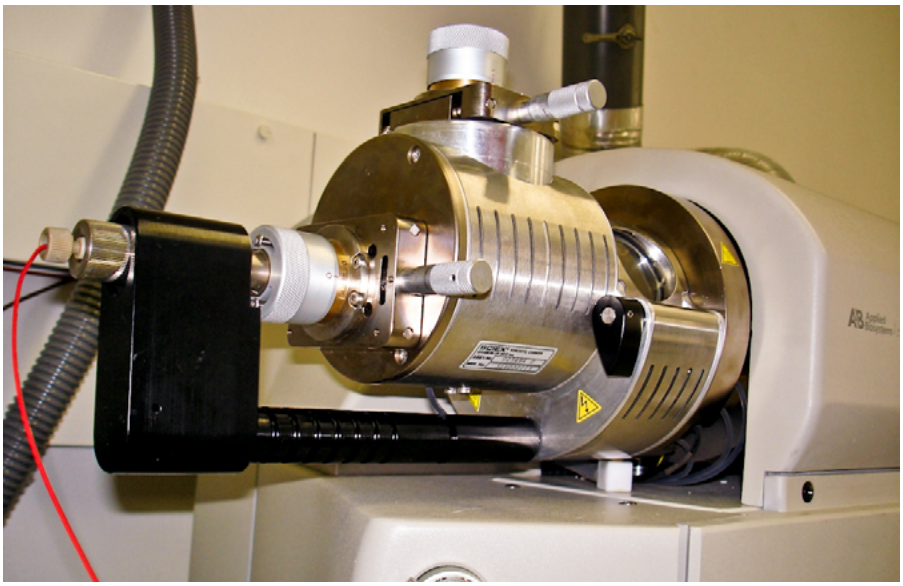
MAIN PROJECTS

- MYCORED – Novel integrated strategies for worldwide mycotoxin reduction in food and feed chains (EU – FP 7)
- TOXI-GENOME – Understanding and exploiting epigenetic chromatin regulation mechanisms to mine fungal genomes for novel secondary metabolites (WWTF – Vienna Science and Technology Fund)
- MONIQA – Monitoring and Quality Assurance in the Food Supply Chain (EU-FP 6)

MAIN COLLABORATING PARTNERS

COLLABORATION WITH ACADEMIC PARTNERS
- Center for Microbial Biotechnology, Technical University of Denmark, Copenhagen
- Cranfield University, UK
- Department of Organic and Industrial Chemistry, University of Parma, Italy
- Department of Pharmacology and Toxicology, Medical University Vienna, Austria
- Department of Plant Breeding and Seed Production, University of Warmia and Mazury, Olsztyn, Poland
- Fungal Genomics Unit, University of Natural Resources and Life Sciences Vienna, Austria
- Institute of Agri-Food and Land Use, Queen´s University of Belfast, Northern Ireland
- Institute of Applied Synthetic Chemistry, Vienna University of Technology, Austria
- Institute of Crop Science and Resource Conservation, University of Bonn, Germany
- National Food Administration, Uppsala, Sweden
- National Research Council – Institute of Science of Food Production (CNR-ISPA), Bari, Italy
- South African Medical Research Center, Tygerberg

COLLABORATIONS WITH COMPANIES
- Romer Labs Diagnostic GmbH



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ANAEROBIC DIGESTION
/ TECHNOLOGY CENTER

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THEMATIC RESEARCH FOCUS

RESEARCH AREA
- (Anaerobic Digestion) anaerobic utilization of waste materials, energy crops and waste water
- consulting activities for AD plants (focus on analytics and chemical, biological process-control)
- Plant optimisation

EXCELLENCE
- Optimisation of biogas plants (with the fermentation of hard degradable substances)
- Reduction of process inhibition
- Pre-treatment technologies
- Fermentation of nitrogen substrate

MISSION
- Our goal is to integrate the results of the research programmes into full scale AD applications to increase the efficiency and sustainability of this technology (e.g. integration of AD into industrial processes)
- AD of slaughterhouse waste
- Optimisation of AD from industrial residues
- Economical and ecological optimisation of AD plants and processes
- Integration of AD into industrial processes

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH
- Pre-treatment of substrates to increase the methane-yield
- Optimizing the technology of AD plants
- Enabling the utilization of certain substrate groups
- Reduction of inhibition processes
- Characterisation of the involved micro-organisms
- Treatment of digestate

MAIN CAPABILITIES

- Implementation of AD in industrial processes
- Biotechnology

FIELDS OF RESEARCH RESULTS APPLICATION
- Plant and apparatus engineering
- Waste water treatment
- Energy production
- Agriculture
- Food and Beverage (organic waste)
- Construction – civil engineering
- Waste industry
- Renewable energy
- Biotechnology

ALUMNI PROFILE
Our alumni have broad knowledge in all sectors of anaerobic digestion and fermentation technology.

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF
2

JUNIOR RESEARCH POSITIONS (INCL. PH.D. STUDENTS):
6

KEY RESEARCH EQUIPMENT

LIST OF DEVICES
- HPCL
- GC
- ICP
- Reactors for anaerobic digestion
- Different analytics (COD, TKN, ...)

BUDGET

TOTAL: 0.5 Mill. EUR

PART OF THE TOTAL BUDGET COMING FROM PRIVATE RESOURCES (%): 100 %

PART OF THE TOTAL BUDGET COMING FROM FOREIGN RESOURCES (%): 5 %

MAIN PROJECTS

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- Bioenergy 2020+ (K1-Kompetence centre; 2 projects)
- EAD.TNP
- Enercycle
- MobioAct

ACHIEVEMENTS

- Phönix (Abfallwirtschaftspreis 2010)

MAIN COLLABORATING PARTNERS

COLLABORATION WITH ACADEMIC PARTNERS

- Vienna University of Technology
- Joanneum Research

COLLABORATION WITH COMPANIES

- Agrana
- AAT
- Großfurtner
- Enbasys
- Wien Energie Gasnetz
- Rohkraft
- Biogas Strem


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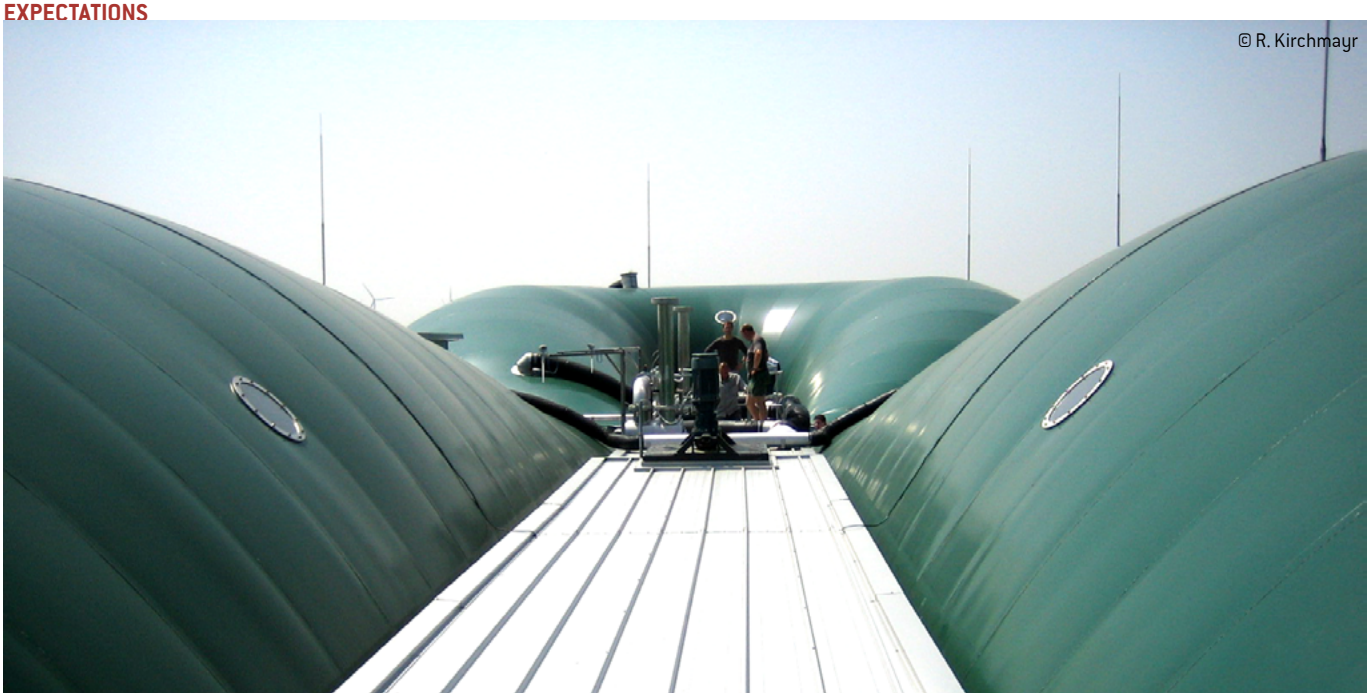
EXPECTATIONS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ECOTOXICOLOGY AND MICROBIOLOGY

/ DEPARTMENT FOR AGROBIOTECHNOLOGY, IFA-TULLN

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THEMATIC RESEARCH FOCUS

RESEARCH AREA
- Biotechnology in Plant Production,
- Natural Resources,
- Environmental Analytics,
- Environmental Biotechnology,
- Biotechnology in Animal Production

EXCELLENCE
- Combining prevention and treatment technologies for sustainable agricultural production and zero waste material cycles.

MISSION
Investigating human influences on microbial ecology in soil and water ecosystems is considered to be a fundamental research area. The knowledge accumulated should provide basic information about the big element circles in the biosphere (Carbon, Nitrogen, Phosphorous, Sulphur), which are dominated by microbes and on which all other life depends on.

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH
Development of microbiological and molecular methods to describe microbial populations for
- investigation of population shifts due to the introduction of biodegradable organic matter in soil (carbon cycle in humus)
- characterisation of microbiological metabolic functions in the rhizosphere
- description of advanced cultivation methods for water analysis

MAIN CAPABILITIES

The following methodology was established and validated and is available for customers and research cooperation:
- conventional and molecular microbiological analysis including ecological interpretations
- aquatic ecotoxicological methods including hazard analysis (for waste and deposits)
- determination of biodegradability of polymer materials including eco-efficiency-analysis of certain applications
- analysis of biological effects of secondary plant metabolites and their beneficial use in agriculture

FIELDS OF RESEARCH RESULTS APPLICATION
- Polymer composition for designed lifetime of biodegradable tools in agriculture
- Formulation of plant based dyes for wood protection
- Screening for bioactive secondary plant metabolites
- Microbiological analysis for several forms of product quality control
- Analysis of the environmental behaviour of new chemicals, of product formulations and of waste
- Aiding of authorities and NGO-bodies concerning environmental hazard of man made products
- Applied studies concerning use of bio-based polymers for packaging

ALUMNI PROFILE
Our alumni have acquired a broad understanding of human influence on soil and water microbial ecology and on the eco-friendly use of bio-based chemicals and polymers.

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF
1

JUNIOR RESEARCH POSITIONS (INCL. PH.D. STUDENTS):
3

KEY RESEARCH EQUIPMENT

LIST OF DEVICES
- Instruments for molecular analysis, such as PCR, DGGE, capillary electrophoresis, imaging systems
- Infrastructure for all forms of microbiological analysis including anaerobic devices

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- Biodegradation equipment for biodegradation tests in an aquatic environment and in soil and compost including all related analytics
- Full equipment for aquatic biotests with bacteria, algae, daphnia, earthworms and higher plants
- Instrumental analysis, such as HPLC, HPLC-MS, ITP, ICP-AES, TKN, TOC, CSB

BUDGET

TOTAL: 0.3 MILL. EUR

PART OF THE TOTAL BUDGET COMING FROM PRIVATE RESOURCES (%): 30 %

PART OF THE TOTAL BUDGET COMING FROM FOREIGN RESOURCES (%): 70 %

MAIN PROJECTS

- FateAllChem - Fate and toxicity of allelochemicals in relation to environment and consumer
- INTERLAND - Innovative technologies for remediation of landfills and contaminated soils
- AquaMicro - Development of analysis methods for rapid and mobile microbiological drinking water quality monitoring

ACHIEVEMENTS

Neptune Water Prize of the Government of Lower Austria

MAIN COLLABORATING PARTNERS

COLLABORATION WITH ACADEMIC PARTNERS

- Several Departments of the University of Natural Resources and Life Sciences Vienna, Austria
- University of Innsbruck, Austria
- Technical University Zvolen, Slovakia
- Technical University of Hamburg-Harburg, Germany
- University of Padua, Italy
- University of Cadiz, Spain
- University of Barcelona, Spain
- University of Vilnius, Estonia
- University of Copenhagen, Denmark
- Wageningen University, Netherlands
- University of Ghent, Belgium
- University of Wagga-Wagga, Australia
- University of Tsukuba, Japan

EXPECTATIONS

OFFERS

- Research cooperation and customer analysis concerning microbiology, ecotoxicity and related environmental analysis for chemicals, formulated products and polymer materials.

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INSTITUTE FOR BIOTECHNOLOGY IN PLANT PRODUCTION

/ DEPARTMENT FOR AGROBIOTECHNOLOGY, IFA-TULLN

RESEARCH GROUP CONTACT

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THEMATIC RESEARCH FOCUS

RESEARCH AREA

- Plant breeding and applied plant genetics
- Plant-pathogen interaction
- Disease resistance in cereals and maize
- Biological control of plant diseases
- Development of Fusarium resistant triticeae/ wheat germplasm

EXCELENCE

- Marker assisted breeding in triticeae species; Field- and greenhouse inoculation trials with the toxigenic fungus Fusarium graminearum. Propagation of toxigenic Fusarium strains and spore cultures. Testing for fungal disease resistance in cereals: Fusarium sp., Puccinia sp., Tilletia sp.
- Comparative transcriptomic analysis of candidate cultivars and genetic investigation of traits.

MISSION

Generating Fusarium resistant and high yielding wheat germplasm and elucidating the genetic determinants of resistance in the triticeae species is our main scientific interest. Our findings are relevant for both the scientific community and applied plant breeders.

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH

- Marker assisted breeding of triticeae species, QTL analysis
- Generation of DH-, RIL- crossing populations and near isogenic lines (NIL)
- Maintenance of an extensive, well-characterized wheat mapping population
- Development of new molecular markers, like SNP/SSR/ALFP markers
- Cultivation and collection of Fusarium graminearum isolates
- Cultivation and collection of isolates from other Fusarium species
- Virulence assays and inoculation experiments
- Production of spore suspensions and isolation of Fusarium toxins
- Glass house/field trials with artificial spray inoculation or injection of spores or toxins into wheat heads
- Phenotypic assessment of disease development
- Phenotyping of maize for Fusarium ear-rot resistance
- Development and evaluation of biocontrol agents for crop protection
- Transcriptomic analysis of the wheat/pathogen interaction via commercial and custom-built microarrays, deep transcriptome sequencing and cDNA-AFLP.
- Transient knock-down of candidate genes via Virus-Induced Gene Silencing (VIGS)
- Generation of a TILLING population for functional analysis of candidate genes
- Cloning of candidate genes
- Molecular and classical genetic analysis of quantitative disease resistance in cereals (Fusarium sp., Puccinia sp., Tilletia sp.)
- Marker assisted breeding of oilseed pumpkin (Cucurbita pepo)
- Disease resistance in pumpkin
- Tools for hybrid breeding in pumpkin

MAIN CAPABILITIES

Our institute is closely associated with research institutes in the same field but also has extensive collaborations with research facilities in other disciplines working in plant-pathogen interactions. Researchers and students at our institute are encouraged to pursuit an interdisciplinary approach in their work – our staff hosts agronomists, plant pathologists, toxicologists and molecular biologists alike. Our outstanding international reputation is founded on continuous publication in international peer-reviewed journals and active participation in scientific exchange. Still, the institute has always maintained strong collaborations with local and European breeding programmes.

FIELDS OF RESEARCH RESULTS APPLICATION

- Agriculture
- Plant breeding

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- Food safety, Toxicology
- Plant protection
- Patent application

ALUMNI PROFILE
Alumni have acquired a pronounced understanding of the relationship of quantitative traits to phenotype in cereals, the generation of mapping populations and the molecular biology/chemical interaction of plant and pathogen. Alumni have a thorough understanding in plant breeding and phytopathology.

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF
2

JUNIOR RESEARCH POSITIONS (INCL. PH.D. STUDENTS):
5

KEY RESEARCH EQUIPMENT

LIST OF DEVICES
- Molecular biology laboratory including PCR machines and qPCR machine, capillary sequencer (MegaBace) TyphoonTRIO fluorescence scanner and LICOR DNA analysers.
- Controlled growth chambers, green house and facilities for field experiments including 5000 m2 mist irrigation
- Black lipid bilayer and patch-clamp equipment,
- Laboratory and growth chamber facilities for investigations with GMOs

BUDGET

TOTAL: 0.43 MILL. EUR

MAIN PROJECTS

- Functional genomics to understand the Fusarium resistance response of wheat (Special research program "Fusarium" of the Austrian Science Fund)
- Investigation of the resistance of wheat against T2, HT2, DON and NIV Fusarium mycotoxin contamination ("Fusatox" FSOV, France)
- Methods for hybrid-breeding in oil pumpkin (Austrian research promotion agency, Saatzucht Gleisdorf)
- Novel integrated strategies for worldwide mycotoxin reduction in food and feed chains (Commission of the European Communities)
- Identification and production of microorganisms and bioactive compounds to control Fusarium Head Blight (Technopol research program of lower Austria)
- Investigation of the association of reduced-height genes with Fusarium
- resistance in wheat (Austrian Science Fund)

ACHIEVEMENTS

- A publication of the IFA-Tulln research group (Buerstmayr et al. 2002) was identified as a fast breaking paper in October 2003 by Thomson-ISI [**LINK**] and as highly cited article (top 1% citations this field of research) in April 2005.
- Buerstmayr H, Lemmens M, Hartl L, Doldi L, Steiner B, Stierschneider M, Ruckenbauer P (2002) Molecular mapping of QTLs for Fusarium head blight resistance in spring wheat I: resistance to fungal spread (type II resistance). Theor. Appl. Genet. 104: 84-91.
- Lemmens, M; Scholz, U; Berthiller, F; Dall'Asta, C; Koutnik, A; Schuhmacher, R; Adam, G; Buerstmayr, H; Mesterházy, A; Krska, R; Ruckenbauer, P (2005): The ability to detoxify the mycotoxin deoxynivalenol colocalizes with a major quantitative trait locus for Fusarium head blight resistance in wheat. Mol Plant Microbe Interact. 2005; 18(12):1318-1324
- Buerstmayr, H; Ban, T; Anderson, JA (2009): QTL mapping and marker-assisted selection for Fusarium head blight resistance in wheat: a review. PLANT BREED. 2009; 128(1): 1-26 **(Invited Review)**

MAIN COLLABORATING PARTNERS

COLLABORATION WITH ACADEMIC PARTNERS
- Department of Applied Plant Genetics and Cell Biology, BOKU, Vienna, Austria
- Center for Analytical Chemistry, BOKU, Department IFA-Tulln, Austria
- Helmholtz Center, Munich, Germany
- IPK, Gatersleben, Germany
- Department of Agronomy and Plant Genetics, Univ. Minnesota, St. Paul, U.S.
- Cereal Research Institute, Szeged, Hungary
- Austrian Agency for Health and Food Safety, Austria

COLLABORATIONS WITH COMPANIES
- Saatzucht Donau, Austria
- Saatzucht Edelhof, Austria
- Saaten-Union, Germany
- Syngenta
- Pioneer
- Saatbau Linz, Austria
- KWS Saat, Germany
- Gie Bioplante, France
- Arvalis, France

EXPECTATIONS

REQUIREMENTS
Cooperation in plant breeding, plant genetics and genomics with both basic research facilities and partners in applied development.

OFFERS
Field experiment sites, greenhouse capacities and growth chambers; molecular genetic tools/marker analysis; virulence testing of fungal isolates, cereal germplasm

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INSTITUTE FOR ENVIRONMENTAL BIOTECHNOLOGY

/ DEPARTMENT FOR AGROBIOTECHNOLOGY, IFA-TULLN

RESEARCH GROUP CONTACT

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THEMATIC RESEARCH FOCUS

RESEARCH AREA
Contaminated Land Management

EXCELLENCE
- Investigation of the fate and transport of organic pollutants in the soil / subsurface environment
- Development of innovative, eco-efficient and cost effective In Situ and On Site remediation strategies

MISSION
- Focusing on high standard fundamental and applied research in the area of environmental pollution and chemodynamics.
- Establishing and improving risk assessment and management procedures for contaminated sites.
- Employing innovative analytical methods, both physical-chemical and biological to study pollutant behaviour particularly in soil environment.
- Investigating potential limitations of microbial pollutant degradation and developing competent large scale remediation techniques.

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH

Investigation of Pollutant Behaviour in the Environment
- Bioavailability of Organic Pollutants
- Influence of the Soil Architecture on Retention and Release of Contaminants
- Influence of the Soil Organic Matter Structure on the Sorption / Desorption of Hydrophobic Organic Contaminants
- Degradation of Persistent Organic Chemicals in Complex Matrices like Soil

Ecological and Human Health Risk Assessment
- Ecotoxicological Evaluation of Contaminated Soil
- Assessment of Acute, Chronic and Genotoxic Effects of Contaminants
- Toxicity Monitoring of Remediation Measures

Development of Remediation Technologies (In Situ and On Site Remediation Technologies)
- Vadose Zone: Bioventing
- Saturated Zone: Biosparging, Groundwater Circulation Wells
- Alternative Electron Acceptor Processes
- On Site: Biopile Remediation
- Feasibility Studies in the Laboratory

MAIN CAPABILITIES

- Experienced and innovative researchers for developing new analytical methods and remediation strategies.
- **From lab to land** - developing science based technologies including pilot tests and field demonstrations.
- Interdisciplinary collaborations with industrial partners, authorities and research institutes for solving complex environmental challenges.

FIELDS OF RESEARCH RESULTS APPLICATION
- Risk Assessment of Chemicals and Contaminated Sites
- Contaminated Soil Treatment
- In-Situ Remediation Technologies
- Environmental Analysis

ALUMNI PROFILE
Acquired knowledge may contribute to a broad variety of regulative and industrial applications spanning from risk assessment of new chemicals being released into the environment up to environmental engineering of pollution disasters.

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF
2

JUNIOR RESEARCH POSITIONS (INCL. PH.D. STUDENTS):
4

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KEY RESEARCH EQUIPMENTS

LIST OF DEVICES

- cGCxGC-MS (Comprehensive 2-dimensional Gas Chromatography coupled to a Mass Spectrometric Detector, AGILENT, ZOEX)
- 2 GC MS
- Particle Size Analyzer (BECKMAN)
- LumisTox (Luminous Bacteria Test, HACH LANGE)
- Ion Chromatography (DIONEX)
- GC FID ECD (AGILENT)
- GC FID TCD (AGILENT)
- HPLC 3D-FLD/DAD (AGILENT)
- Simultaneous Carbon-Water Analyzer (LECO)
- Soil reactors in various sizes ranging from 0.1 to 1,000 litres
- Incubation chambers for biodegradation and ecotoxicity studies

BUDGET

PART OF THE TOTAL BUDGET COMING FROM PRIVATE RESOURCES: 75 %

PART OF THE TOTAL BUDGET COMING FROM FOREIGN RESOURCES: 25 %

MAIN PROJECTS

- SoilDrift
- ISPAK
- OmiCRUDE
- FAMOS
- NutzRaum
- OBIO
- HetReMed
- InnoSan
- INTERLAND
- FoPH

ACHIEVEMENTS

Dr. Wolfgang Houska Preis 2010 (Project InnoSan); eight other awards for scientific work and publishing

MAIN COLLABORATING PARTNERS

COLLABORATION WITH ACADEMIC PARTNERS

- Main partners include:
- Several Depts. of University of Natural Resources and Life Sciences, Vienna (BOKU), Austria
- Austrian Institute of Technology (AIT), Austria
- University of Applied Science (FH), Tulln, Austria
- Technical University (TU), Vienna, Austria
- NERI, Department of Environmental Chemistry and Microbiology (DMU), Denmark
- CSIRO Land & Water, Australia

COLLABORATION WITH COMPANIES

Main partners include:

- OMV Aktiengesellschaft, Vienna, Austria
- Wien Energie Gasnetz GmbH, Vienna, Austria
- HASENÖHRL GmbH, St. Pantaleon, Austria
- TERRA Umwelttechnik GmbH, Korneuburg, Austria
- G.U.T – Gruppe Umwelt + Technik GMBH, Linz, Austria
- Sowatec GmbH, Schäffern, Austria

EXPECTATIONS

REQUIREMENTS

- Your interest
- Professional and reliable cooperation
- Mutual benefit

OFFERS

- Research and Technology Development in the above presented scope

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INSTITUTE FOR NATURAL MATERIALS TECHNOLOGY

/ DEPARTMENT FOR AGROBIOTECHNOLOGY, IFA-TULLN

RESEARCH GROUP CONTACT

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THEMATIC RESEARCH FOCUS

RESEARCH AREA

- Preparation of natural materials for extrusion and injection moulding purposes
- Extrusion and injection moulding of natural materials
- Materials testing of polymer compounds
- Development of new materials and biopolymer compounds

MISSION

Finding new applications for natural materials and waste streams of wood, pulp and paper industry in combination with biopolymers and synthetic resins using extrusion and injection moulding.

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH

- Vacuum-pressure impregnation of solid wood - NATwood
- Compounding technology for natural materials
- Injection moulding of wood-polymer-compounds and biopolymers
- Profile extrusion of by-products of pulp and paper industry

MAIN CAPABILITIES

The core capabilities of the Institute for Natural Materials Technology are injection moulding and extrusion of natural and renewable resources. Starting with the characterisation of the raw materials across their conditioning and processing up to the mechanical tests of the developed materials, all works are accomplished in our institute. Vegetable fibres and biopolymers like starch and protein in non-food area serve as raw materials. Compounded with synthetic polymers or bioplastics they are modified to reach the specifications, and thus accomplish new sales markets for agricultural products.

FIELDS OF RESEARCH APPLICATION

- The developed injection moulding materials are used in the production of consumer goods.
- Profile extrusion recipes are mainly used in outdoor applications like decking, fencing, railing and siding.

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF

2

JUNIOR RESEARCH POSITIONS (INCL. PH.D. STUDENTS):

1

KEY RESEARCH EQUIPMENT

LIST OF DEVICES

- Devices for preparation of raw materials (Drying, Milling, Sieving, Mixing, Pellezising)
- Profile extrusion and compounding line
- Injection moulding machines
- Universal testing machine
- Moulding presses
- Laboratory extruder

MAIN PROJECTS

- Development of bioplastics-compounds using different types of bioplastics and cellulose fibres. The goal of this project is to find the right additives and proportion of ingredients to improve processability, impact strength and heat deflection temperature.
- Optimisation of compounding technologies for natural-fibre-filled polymers. The combination of a new extruder with modular screws and a hot-cut pelletisation should lead to higher output and better homogenisation of highly filled polymers.
- Utilisation of waste streams in paper industry. Non-recyclable paper including layers of polyolefins were used for the development of materials for outdoor applications as mentioned above.

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ACHIEVEMENTS

Publications:

- Compatibility of Softwood Flour and Commercial Biopolymers in Injection Moulding. Polymer Composites 2010
- Extrusion of five biopolymers reinforced with increasing wood flour concentration on a production machine, injection moulding and mechanical performance. Composites Part A 2009

MAIN COLLABORATING PARTNERS

COLLABORATION WITH ACADEMIC PARTNERS

- Institute of Wood Science and Technology, University of Natural Resources and Life Sciences, Vienna, Austria
- Transfercenter für Kunststofftechnik GmbH, Austria
- Wood Kplus Competence Centre, Austria

COLLABORATIONS WITH COMPANIES

- Ana-U Ltd., Austria
- battenfeld-cincinnati Austria Ltd.
- Demel Ltd., Austria
- Fasal Wood Ltd., Austria
- Fritz Egger Ltd., Austria
- Stora Enso, Finland
- UPM Kymmene, Finland

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INSTITUTE OF ANIMAL NUTRITION, PRODUCTS, AND NUTRITION PHYSIOLOGY

/ DEPARTMENT FOR AGROBIOTECHNOLOGY, IFA-TULLN

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THEMATIC RESEARCH FOCUS

RESEARCH AREA

- Animal nutrition and feed sciences
- Quality and security of animal products
- Nutrition physiology

EXCELLENCE

- Experimental studies with livestock and model animals to humans (pigs, rats) on metabolism of nutrients and on the impact of functional dietary components
- Analysis of nutrients (incl. minerals and trace elements) in biological material
- Quantification of fractional fluxes in the intact organism (absorption, excretion, metabolism, turnover of nutrients and other dietary components)

MISSION

The Institute of Animal Nutrition, Products, and Nutrition Physiology (APN) represents the start of the supply chain of food of animal origin. It focuses on adequate feeding of agricultural livestock and the significant impact of animal nutrition on quality and safety of primary products, such as milk, meat and eggs. Aside from nutrients, special emphasis is paid on secondary effects of food components on digestion, metabolism and health.

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH

- Determination of amino acid requirements in monogastric livestock
- Applicability of new/alternative feedstuff (e.g.: industrial by-products such as dried distillers grains with solubles, DDGS) in feed for monogastric livestock
- Impact of various feed additives (probiotics, prebiotics, dietary fibre, essential oils, organic acids, enzymes, rare earth elements) on zootechnical performance, carcass characteristics, nutrient digestibility, gut functionality and morphology, gut microflora of livestock and model animals
- Effect of feeding or genetics on quality of food of animal origin, especially concerning composition, texture and sensory aspects
- Determination of nutrient contents in animal tissue or food of animal origin

MAIN CAPABILITIES

An authorisation by European Food Safety Authority's FEEDAP Panel is mandatory for every new feed additive prior to market launch. For this authorisation, the safety and efficacy of a potential feed additive has to be proven. Thus, scientific feeding trials performed by independent research groups are required, to demonstrate the impact of the product on livestock performance and health.

DDGS (Dried distillers grains with solubles) is an industrial by-product of bioethanol production, which is natively of low protein quality. Thus, DDGS has not been applied in feeding monogastric animals in the past. However, through our contributions to the precise determination of amino acid requirements in swine as well as poultry and the exact supplementation of essential amino acids on base of ileal digestible amino acids in feed containing DDGS, the applicability of DDGS in the nutrition of monogastric livestock such as pigs and poultry was accomplished.

FIELDS OF RESEARCH RESULTS APPLICATION

- Agriculture
- Stock farming
- Feed industry
- Utilisation of industrial by-products
- Food and Beverages
- Health and Nutrition

ALUMNI PROFILE

Our alumni have acquired profound knowledge in adequate feeding of agricultural livestock, in conducting scientific feeding trials as well as performing laboratory analyses in feed, animal tissue and food samples. Amongst others, these skills may be applied in the fields of feed industry, national/international regulatory agencies

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(e.g. AGES/EFSA, etc.), feed consulting and education.

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF:
2

JUNIOR RESEARCH POSITIONS (INCL. PH.D. STUDENTS):
5

KEY RESEARCH EQUIPMENT

LIST OF DEVICES

- 2 GC FID
- HPLC FD + ELS-D + UV-VIS
- Microwave (wet digestion) for species analyses
- AAS and UV-VIS-spectrophotometry
- Histology: Microtome, autostainer, laser-microdissection, fluorescence microscope
- Molecular biology: Biophotometer, capillary chip gel electrophoresis, Real-time thermocycler
- Bomb calorimeter
- Freeze dryer
- Instrumentation to assess oxidative stability of lipids
- Texture analyzer

BUDGET

TOTAL: 0,2 MIO EUR

PART OF THE TOTAL BUDGET COMING FROM PRIVATE RESOURCES (%): 55 %

PART OF THE TOTAL BUDGET COMING FROM FOREIGN RESOURCES (%): 15 %

MAIN PROJECTS

- Determination of digestibility of DDGS as the basis for energy evaluation of feedstuffs for pigs
- Quality of Austrian AMA quality seal beef from intensive Simmental bull fattening in dependence on genetics and feeding intensity with consideration on the improvement of the consumer's meat quality
- Effects of a phytogenic feed additive on gastrointestinal physiology and immunology in broilers

ACHIEVEMENTS

- H. Wilhelm-Schaumann-Prize, AGRANA Forschungsförderungspreis

MAIN COLLABORATING PARTNERS

COLLABORATION WITH ACADEMIC PARTNERS

- Various Departments of the University of Natural Resources and Life Sciences Vienna, Austria
- Technical University of Munich, Germany
- Agricultural Research and Education Centre (AREC) Raumberg-Gumpenstein, Irdning, Austria
- University of Veterinary Medicine, Vienna, Austria
- OFI Austrian Research Institute for Chemistry and Technology, Vienna, Austria
- Animal Production Research Centre, Nitra, Institute of Nutrition, Slovakia

COLLABORATIONS WITH COMPANIES

- Agrana Bioethanol GmbH, Pischelsdorf, Austria
- BIOMIN Holding GmbH, Herzogenburg, Austria
- Delacon Biotechnik GmbH, Steyregg, Austria
- ARGE Rind reg. Gen.mbH, Linz, Austria
- Lohmann Animal Health GmbH & Co. KG, Cuxhaven, Germany
- DSM Nutritional Products Ltd., Basel, Switzerland
- Agrarmarkt Austria GmbH, Vienna, Austria
- Treibacher Industrie AG, Althofen, Austria

EXPECTATIONS

REQUIREMENTS
Professional collaboration and scientific approaches

OFFERS
We offer projects and research cooperation in the conception and performance of feeding trials, in determination of nutrient contents in feed and food, the assessment of the physiological impact of nutrients and feed additives as well as their effect on the quality and technological suitability of feed of animal origin.

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MOLECULAR DIAGNOSTICS GROUP

/ IFA-TULLN

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THEMATIC RESEARCH FOCUS

RESEARCH AREA

- Analytical Chemistry

EXCELLENCE

- Quantitative detection and monitoring of mouldy fungi in food, feed, soil and any agricultural commodities: fungal monitoring projects, determination of plant resistance to certain pathogens and support of agricultural practices like the evaluation of the influence of tilling systems and crop rotation on toxigenic fungal plant pathogens.
- Quantification of indicator bacteria for faecal contamination in drinking water: Microbial Source Tracking (MST) is the identification of the origin of the contamination (e.g. human, cattle etc.).
- Development of custom solutions for the detection and quantification of fungi and bacteria in almost any environmental and food & feed related sample material

MISSION

Our mission is the development of bio-analytical tests – mainly based on DNA techniques – for the determination and quantification of (micro) organisms. Our focus is to provide a simple, rapid and inexpensive application of our assays.

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH

Our research activities are divided into two main areas: food & feed analysis and water analysis.

The food & feed research field focuses on the sensitive detection of undesired mouldy fungi in foodstuffs. We have developed several test methods to detect and quantify even minor amounts of toxin producing moulds like Fusarium or Aspergillus. Besides the analysis of food and feed we also search for these harmful fungi in soil or even in living plants. So, the techniques developed at the Vienna University of Technology also assist agricultural trial stations to evaluate the influence of parameters like fungicides, crop rotations or different tilling systems on the abundance of toxin producing fungi. Current developments of our food & feed research team can be applied in the detection of food allergens: a DNA based boost system for conventional ELISA systems significantly improves the sensitivity of these immunobased assays and thereby allows the determination of yet minimal amounts of compounds that must be labelled according to EU law.

The water analysis research field has developed worldwide unique test systems for faecal indicator bacteria in drinking water. In contrast to conventional microbiologic assays our technique allows the identification of the source of contamination. Based on specific indicator organisms, a discrimination of e.g. human or ruminant cause can reliably be determined and even more than one source of contamination can quantitatively be addressed. Due to the unrivalled competence of our team we closely cooperate with industrial partners belonging to the most important water suppliers in Europe.

MAIN CAPABILITIES

- DNA Based Analysis of Food and Feed
- Microbial Source Tracking in Water

FIELDS OF RESEARCH RESULTS APPLICATION

- Agriculture
- Food & feed industry
- Plant breeders
- Water supply management

ALUMNI PROFILE

Our alumni are specialised in DNA based analysis systems like conventional PCR, real-time PCR, immuno-PCR and related techniques. Besides the simple application of previously developed assays they are highly trained in development and optimisation of novel tests.

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF

1

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JUNIOR RESEARCH POSITIONS (INCL. PH.D. STUDENTS):
6

TECHNISCHE UNIVERSITÄT WIEN
Vienna University of Technology

biotrac.at
Plattform für molekulare Bioanalytik

KEY RESEARCH EQUIPMENT

LIST OF DEVICES
Real-time PCR instruments:
- 2 x Qiagene Rotorgene
- 2 x Eppendorf realplex 2S
- 1 x Applied Biosystems 7500FAST
- 1 x Biorad iQ5

Liqid handling stations:
- 2 x Qiagene Qiagility

Instruments for gel electrophoresis and documentation and DGGE

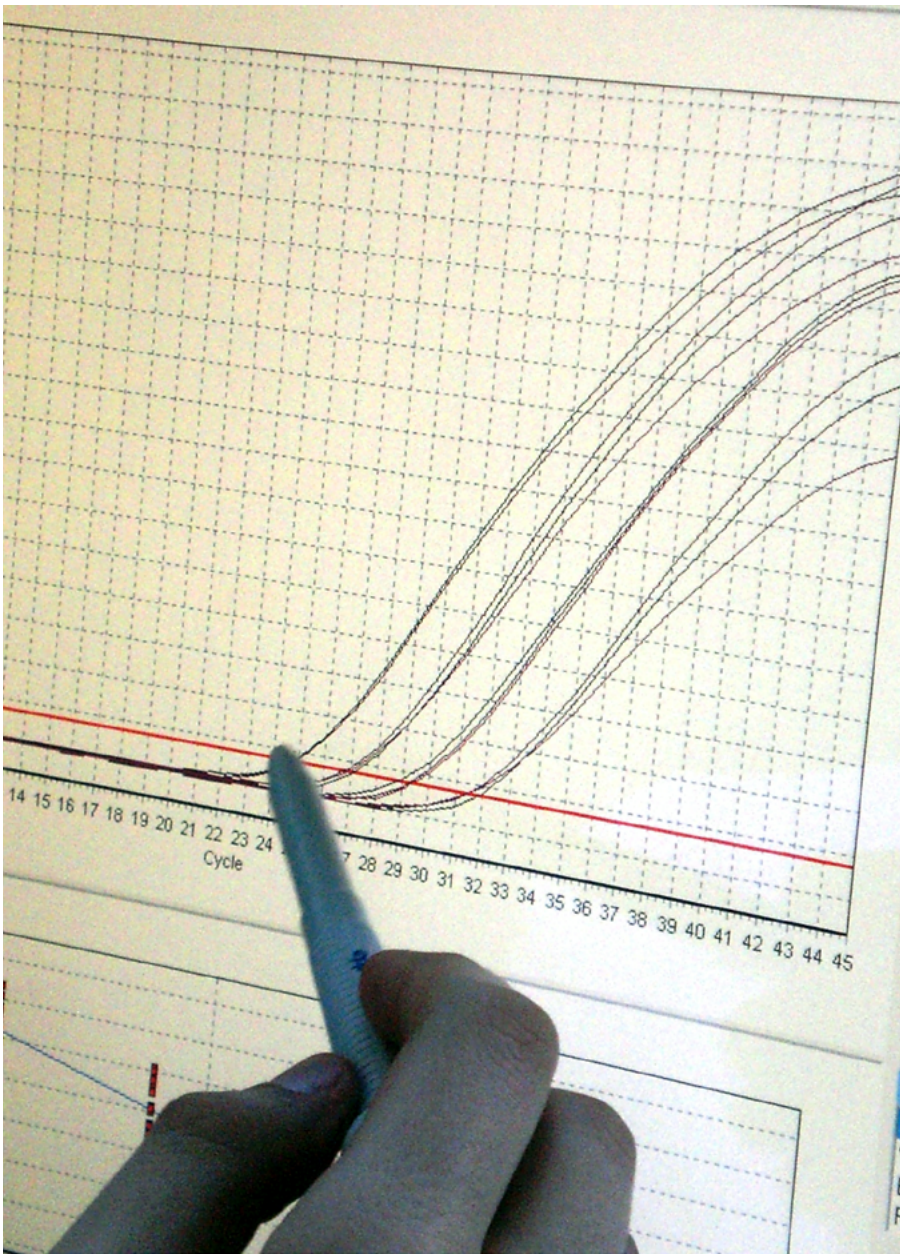
MAIN PROJECTS

- Development of Novel Molecular and Mass Spectrometry Methods for the Quality Assurance of Agricultural Products
- Biological Control of Aflatoxins in Maize for Enhanced Food Safety and Income in Burkina Faso

EXPECTATIONS

REQUIREMENTS
- Potential partners should be active in the field of environmental analysis, water analysis or food & feed analysis and be experienced in the design of rapid analysis systems like online bio-detectors for these commodities.

OFFERS
- Year-long expertise in identification of microorganisms based on their specific genomic fingerprint.
- Competence to design sensitive and selective detection systems using DNA based analysis techniques



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THEMATIC RESEARCH FOCUS

RESEARCH AREA
- operation of nuclear power plants
- training of the personnel of energy systems and devices
- operation of electricity distribution system

EXCELLENCE
- operation and enhancement of NPPs VVER type

MISSION
- research support of engineering tasks of energy production and distribution devices

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH
- investigation of ice coating impact at electric lines, development of devices for ice coating monitoring and removal
- investigation of surrounding electromagnetic fields of high-tension electric distribution systems, proposal of measures against adverse effects
- nuclear fuel limit conditions analysis and fuel utilisation optimisation
- NPP's operation regimes analysis, optimisation of its performance
- designing of nuclear devices innovation
- investigation of the material of nuclear devices, development of measures for degradation elimination
- programs for training development of energy devices operators
- simulators of energy facilities for operators training
- devices for maintenance and testing of nuclear devices development
- devices and procedures for radioactive waste management
- procedures and software for evaluation of radiation situation in the surrounding area of nuclear facilities by accident

MAIN CAPABILITIES

Applications of new technologies for energy devices and systems enhancement during maintenance and reconstructions, especially nuclear safety enhancement of nuclear power plants.

FIELDS OF RESEARCH RESULTS APPLICATION
Designing, commissioning, operating and decommissioning of energy production sources and distribution systems.

ALUMNI PROFILE
Graduates can get skilled in research problem solutions connected to NPP's, energy distribution system performance, and application of the solution with real devices and systems.

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF
52

JUNIOR RESEARCH POSITIONS (INCL. PH.D. STUDENTS):
46

KEY RESEARCH EQUIPMENT

LIST OF DEVICES
Calibration laboratories:
- Pressure gauge laboratory
- Temperature laboratory
- Vibration diagnostic laboratory

Testing laboratories:
- Vibration diagnostic laboratory
- Inspection of nuclear equipment
- Structural analyses
- Chemical modes and physical and chemical analyses
- Thermal ageing and testing under accidental environmental conditions
- Radiation dosimetry
- Power transformer measurement

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BUDGET

TOTAL: 60 mil. EUR

MAIN RESEARCH PROJECTS

- Protection of Slovak Republic population before electromagnetic fields impact
- Nuclear safety of NPP's enhancement and analysis
- Manipulator IRIS-ZOK for steam generator tubes testing development

MAIN COLLABORATING PARTNERS

COLLABORATION WITH ACADEMIC PARTNERS

- Slovak University of Technology in Bratislava:
- Faculty of Electrical Engineering and Information Technology
- Faculty of Material Sciences and Technology in Trnava
- Faculty of Chemical and Food Technology
- Faculty of Mechanical Engineering
- Trnava University in Trnava
- Technical University of Košice
- Comenius University Bratislava:
- Faculty of Mathematics, Physics and Informatics
- University of SS. Cyril and Methodius In Trnava
- University of Žilina

COLLABORATION WITH COMPANIES

- Slovenské elektrrárne, a.s.
- Slovenská elektrizačná a prenosová sústava,a.s.
- Jadrová a vyrad'ovacia spoločnost', a.s.
- Inžinierske stavby, a.s., Košice
- AITEN, a.s.
- Ministry of Finance of the Slovak Republic
- Ministry of Economy of the Slovak Republic
- Nuclear Regulatory Authority of the Slovak Republic
- PPA-Energo, s.r.o.
- VTZ systémy, s.r.o.
- ZTS VVÚ KOŠICE, a.s.
- ZTS INMART atóm, a.s.
- TECHNOS, a.s.
- Intrnational Atomic Energy Agency
- Paksi Atoműremű Zrt.
- ČEZ, a.s.
- ŠKODA JS, a.s.
- Ústav jaderného výzkumu Řež, a.s.

EXPECTATIONS

REQUIREMENTS

- collaboration in fields not implemented at our company
- involvement in a common project with a very broad spectrum of different specialisations

OFFERS

- collaboration by tasks in which energy problems are handled
- specialised laboratories for testing and calibration

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