SENSOR-ACTUATOR COMPETENCE

in education, research and business

Sensors and actuators with an increasingly high degree of miniaturisation, based on new or improved methods/principles, with low-cost production processes enable countless new areas of application. At the Technopol Wiener Neustadt, a high concentration of competence in this field of technology has been created.
The figures speak for themselves:

8 research facilities
18 areas of expertise
99 employees

Foto: Markus Digruber

TECHNOPOL WIENER NEUSTADT

The research institutes at the Technopol Wiener Neustadt have successfully applied their expertise in the Tribology technology field in many applications. Some examples are presented on the following pages.

- **Analysis, development and examination** of polymer materials and plastic products

- **Technical consulting** as service in damage analysis, process optimization and projecting of industrial electroplating facilities

SENSOR-ACTUATOR

- **Solving** sophisticated tasks for eletronic, mechanical and mechatronical systems
- **Development and implementation** of automated measuring and testing systems
- **Development and testing** of miniaturized energy converters
- **Development and testing** of ion emitters for e.g. FIB or FEEP applications
- **Development and testing** of propulsion systems for space applications
- **Development and testing** of chemical reactors and highly efficient combustion systems

- **Development** of customized sensors and actuators for sophisticated measurement and control tasks
- **Development** of high-performance communication and network solutions for complex sensor systems
- **Design** of integrated system solutions for complex sensor-based applications

Foto: iStockphoto.com/blackred

AAC
aerospace & advanced composites

- **Development, manufacturing and monitoring** of composite fiber components with integrated functions
- **Development and realization** of customized testing systems for innovative and metrologically sophisticated measuring tasks and functional tests

ACT Photonics GmbH

- **Implementation** of routine analytics of coatings and coating media and customized development of (nano) analysis instruments
- **Development** of functional and sensory nano layers

Technopol Wr. Neustadt
www.ecoplus.at/technopole

· Forschung
· Ausbildung
· Industrie

ACT research

CEST competence center

- **Development** of chemical, electrochemical and membrane-based biosensors

- **Analysis and optimization** of lubricants and exploration of their interaction with component surfaces. Examination of lubricant and fuel parameters. Design and implementation of measure and sensor systems for lubricants
- **Exploration** of tribological parameters and processes as well as designing application-specific optimized abration systems. Design and implementation of measuring and sensor systems for recording tribological characteristics. Characterization and test of materials and surface pairings in terms of optimized friction and wear behavior

TECHNOPOL WIENER NEUSTADT

Application example

Test systems based on customer specifications

To create customer-specific test systems, at **AAC**, first the underlying technical requirements (definition of metrics, modelling, development of the measurement method, creation of the specifications) are analysed. Based on these, the test systems can be designed by means of computer assistance and the measurement methods can be verified based on scientific standards. The next step involves the realisation of the test systems – from the mechanical construction to sensors and control all the way to evaluation software. Finally, **AAC** carries out scientifically sound test series for customers. The spectrum ranges from one-off studies to long-term testing. ■

Application example

Tribological measurement and test methods

At the **AC²T**, application-specific measurement and test methods are developed, such as measurement devices for continuous measurement of wear particles and their volumes in the (sub) micrometer range or to characterise specific tribological surface properties and topographies. In this way, screening and ranking of materials can be carried out, and the influence of surfaces (processing) and lubricant effectiveness as an essential contribution to development can be determined. Based on this, the assessment of the environmental parameters and load conditions as the basis for construction is possible, as are the validation and quality assessment of functional components and prototypes. ■

Development and realization of customized testing systems for innovative and metrologically sophisticated measuring tasks and functional tests

Exploration of tribological parameters and processes as well as designing application-specific optimized abration systems. Design and implementation of measuring and sensor systems for recording tribological characteristics. Characterization and test of materials and surface pairings in terms of optimized friction and wear behavior

Implementation of routine analytics of coatings and coating media and customized development of (nano) analysis instruments

"Attophonics develops novel processes and products in the fields of surface, coating, paint nano and sensor technologies and also offers a broad patent portfolio in this regard."
o.Univ. Prof. Mag. Dr. Thomas Schalkhammer
CEO of Attophonics

Development of chemical, electrochemical and membrane-based biosensors

Foto: Markus Digruber

Application example
Microfluidics for point-of-care applications

Attophotonics develops and manufactures sensor components and systems for biotechnological and chemical analysis. For example, using laser processing and hot stamping, microfluidic chips on a polymer basis are produced. REA chips have a special feature: They use nano-colour technology to detect analytes of medical relevance. The binding of the substance appears multi-coloured graphically or in writing, so costly digital displays are not needed. A new point-of-care microfluidic chip combines both technologies into a lateral flow rapid test, with which the analysis of small sample volumes with low response time and high sensitivity is possible. ■

Application example
Biosensors on graphs and a boron complex basis

At CEST, a great deal of expertise in development of sensors has been established. Thus, there is a great deal of competence in the design and manufacture of biosensor prototypes based on graphene-based field effect transistors as well as in the functionalisation of surfaces and interfaces for highly selective detection of substances in various gaseous and liquid media. With graphene-based field effect transistors, for example, toxins can be determined. Biosensors based on the synthesis of boron complexes are used to detect antibiotics and cystostatics. ■

Application example
Measurement and test systems

In recent years, numerous customer-specific testing facilities were developed at **FOTEC**. Examples of this include a screw testing facility to research reflow processes in injection moulding screws and a separate testing facility for micro injection moulding processes. In parallel, handling routines for the collection and testing of micro injection moulded parts were developed. But measuring and testing systems from **FOTEC** are also used in layer monitoring and in in-situ process monitoring of laser melting (3D printing) of metals. ■

Application example
Ion emitters for microdrives

At **FOTEC**, ion emitters for engines with the smallest thrust are developed and tested. For this purpose, the associated high voltage electronics are developed, microscopic structures for field emission (very fine needle tips of 2 to 4 microns of porous tungsten) are manufactured, and focus electrodes for ion beams are designed. Application examples include electric microdrives for ultra-precise attitude and orbit control of satellites, but also systems that are used for charge compensation in satellites or as ion sources for mass spectrometers. ■

Development of customized sensors and actuators for sophisticated measurement and control tasks

Design of integrated system solutions for complex sensor-based applications

"The aim for ZISS is to develop concepts and methods forintelligent sensors while taking into account their application and networking".

A.o.Univ. Prof. Dipl.-Ing. Dr. Thilo Sauter
Director of the Centre for Integrated Sensor Systems

Application example
Magnetic Lab-on-a-Bead

The point-of-care and home-care market is a branch of medicine that is experiencing strong growth. To implement patient-centred and personalised treatment, portable analysis devices are needed as an alternative to standard laboratory diagnosis. At ZISS, point-of-care devices for molecular diagnostics are developed, which include a new, highly sensitive detection method based on multifunctional nano particles. A rotation guided in the magnetic field of such smart nano particles is determined by the binding of biomolecules and is easily visible optically. The detection method is highly sensitive, easily feasible and compact. The performance of the concept has so far been demonstrated with streptavidin, BSD and HER2. ■

Application example
MANUbuilding

The aim of a project implemented at ZISS is energy-efficient manufacturing by mutual adjustment or optimisation of the process and building automation. Two top priority issues are addressed in industrial buildings: ensuring a controlled environment for the production process and reducing the energy consumed. The basis for these developments are Cooperating Objects (control concept for sensor networks) and IEC 61499 Function Blocks (flexible automation). Through the combination of these technologies and the development of distributed decision algorithms, a sustainable energy savings of 20 to 60 percent is pursued, without undermining the flexibility of production. ■

TECHNOPOL WIENER NEUSTADT

Europäische Union Investitionen in Wachstum & Beschäftigung. Österreich.

Technopol Wiener Neustadt is characterised by the five fields of technology, shown below, in medical and material technologies. The focus here is on the integration of research, education and business:

■ Material ■ tribology (friction, wear, lubrication)
■ Medical engineering ■ sensor-actuator ■ surfaces

The Technopol figures speak for themselves: e.g. 500 researchers, 3500 students, 17,500 m² of office and laboratory space, 4 COMET competence centres for tribology, electro chemistry, medical engineering and bio-resorbable implant materials, Fotec GmbH as a research company in the nearby University of Applied Sciences, the Centre for Integrated Sensor Systems of the Danube University at Krems, the business unit "Biomedical Systems" of the AIT - Austrian Institute of Technology, the Department of "Surface Engineering" of the OFI, as well as MedAustron, the cancer research and treatment centre, which is still under construction, AAC, Happy Plating, Attophotonics, FIANOSTICS and many others.NOSTICS und viele andere mehr.

■ Concentrated competence ■ Successful collaborations
■ Excellent education

The Technopol manager, active on-site, supports the development of the site as part of the Technopol programme.

This brochure is also available as an e-paper. Simply scan the QR code or download it at:

www.tfz-wienerneustadt.at

AN OVERVIEW OF CONTACTS

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In this brochure, all person-related statements apply equally to women and men. It is merely for the sake of simplicity that the masculine form was selected in the text.

Die Wirtschaftsagentur des Landes Niederösterreich