Bayern Innovativ

Life Science News

Edition 1, 2010: Analytics and Diagnostics in Biomedicine

CLUSTER BIOTECHNOLOGIE

Analytics for tomorrow's health care

The elucidation of the human genome and proteome provides novel options for analytics and diagnostics in biomedicine. This progress together with novel technologies enable the development of molecular methods with high sensitivity and specificity, less-invasive procedures for measurements in living cells or organisms as well as systems with a much higher throughput.

Bavaria with its leading research institutes, start-up and multinational companies working in the life science sector offers a broad spectrum of technologies, products and services in analytics and diagnostics to the biomedical sector. With this in mind, the current issue of the Life Science News 'Analytics and Diagnostics in Biomedicine' is highlighting two key topics: molecular imaging for visualisation of biological processes (pp 4-5) as well as the application of nanotechnology in biomedical research and drug development (pp 6-7). In this context, developments and projects of companies and institutes as well as current network activities are presented. At Analytica fair on 23 – 26 March 2010 in Munich, the Bavarian Joint Stand presents latest developments with regards to these unique competencies (see article below).

In January, the five winners of the recent cluster competition of the Federal Ministry of Education and Research were announced. Both Bavarian concepts – the m⁴ concept of the Munich biotech cluster focussing on personalised medicine as well as the initiative 'Excellence Center for Medical Engineering' of the European Metropolitan Region of Nuremberg (EMN) – were awarded. This outstanding success reflects the high level of biotech and medical research in Bavaria. These research proposals also address topics in the sector of analytics and diagnostics such as biomarker development or molecular imaging (see p 3).

Microscopy in pharmaceutical research. (Source: vfa)

Bavarian Joint Stand at Analytica 2010

23 – 26 March 2010, Munich

30 companies and institutes from the life science and biotechnology sector present their latest developments and current research results at the Joint Stand of Bayern Innovativ and the Cluster Biotechnology Bavaria at Analytica 2010, Hall A3 Booth 261/360. Main topics are analytical methods for biomedicine and drug development as well as nanotechnology, including:

NMR analytics (LipoFIT), mass spectrometry (TRION Pharma), colloid and interface research (BZKG, University of Bayreuth), fluorescent analysis and imaging markers (ChromoTek; Institute of Organic Chemistry, Ludwig-Maximilians-University Munich), bioinformatics and software solutions (BioBlick; infoteam Software; quattro research; Wimasis), pathogen and toxicity testing (Hyglos), nanotechnology for analysis of biomolecule interactions (NanoTemper Technologies), as well as genomic research (BayGene) and services (IMGM Laboratories), biochips (FRIZ Biochem) and RNAi (SIRION Biotech).

The Bavarian Clusters Biotechnology and Nanotechnology as well as the international Network Life Science of Bayern Innovativ present their current activities.

Content

New funds for biomedical research and diagnostics

Recently, a significant amount of funding and financing has been approved for clusters, alliances and companies in Bavaria working, at least partly, in the sector of diagnostics. Some of them will be presented in the following sections.

Two Bavarian winners of the Federal Cluster Competition

Two out of five winners of the second round of the 'Spitzencluster-Wettbewerb' (Top Cluster Competition) of the Federal Ministry for Education and Research announced in January 2010 are part of the Bavarian health care sector: 'm⁴ – Personalised medicine and targeted therapies – a new dimension in drug development in the Munich region' and 'Medical Valley – Excellence Center for Medical Engineering' of the EMN. Each of them will be supported with Euro 40 million by the Ministry within the next five years. Another Euro 40 million will be invested by the industrial partners.

The Top Cluster Competition is part of the High-Tech Strategy for Germany. The main aim of this initiative of the Federal Government is to build bridges between business and scientific communities and bundle regional cooperation. The health care sector is one of the growing markets of the future. The Bavarian Top Clusters aim - at least partly - to facilitate better diagnosis as well as to make drug development more efficient and effective. Companion diagnostics and analytics accompanying the drug development process are important topics in this context.

The aim of the initiative '**Excellence Center for Medical Engineering**' managed by Medical Valley EMN e.V. is to develop only products, services, and solutions contributing to effectiveness and efficiency in health care, and to develop the European Metropolitan Region of Nuremberg (EMN) into a model region for optimal health care. Companies from the region around Erlangen-Nuremberg such as Siemens HealthCare (see p 5) are already worldwide leading in medical engineering, and there are numerous small and medium-sized companies with high innovation potential. Moreover, medical engineering is one focus of research at the universities and institutes in this region and numerous clinics are also located there.

The guiding themes of the initiative are intelligent sensor systems, therapy systems, ophthalmology, and imaging for diagnostics. More than 70 partners are involved in the planned 43 projects. Ten of the projects are covering imaging for diagnostics and aim at an optimised therapy through earlier diagnosis, e. g. at the development of a concept for gentle and highly sensitive diagnosis of breast cancer.

The Top Cluster '**m⁴ – Personalised medicine and targeted therapies – a new dimension in drug development in the Munich region**' managed by Bio^{M} Biotech Cluster Development GmbH involves more than 100 partners from industry, research institutes and clinics. The aim is to enhance efficiency in the drug development process and effectiveness of drugs through the implementation of personalised and targeted medicine along the entire value chain. This should be achieved on the one hand within the scope of research projects, mainly focusing on cancer, and on the other hand through several structural activities. Those are 'm⁴ Biobank Alliance' as network of Munich-based blood and tissue banks for biomarker identification, in strong connection with 'm⁴ Trial Service Centre' as central clinical study centre to support the joint development of therapeutics and diagnostics, 'm⁴ Scouting & Incubation' as strategic concept for the support of early projects and of company foundations and 'm⁴ Academy' as educational programme. In addition to the federal financing, m⁴ will receive Euro 14 million by the Bavarian State Government for the expansion of the cluster management, for company foundations and for building up a finance fond for especially promising projects.

Representatives of the Bavarian Winners: Dr G. Kääb and Prof H. Domdey, Bio^{M} Biotech Cluster Development GmbH; Prof E. Reinhardt and Prof J. Schüttler, Medical Valley EMN. (from left to right; Source: BIOCOM)

New Research Alliance FORPROTECT

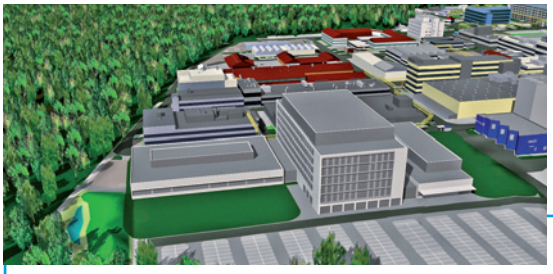
A Bavarian Research Alliance was started in January 2010 with the aim to develop novel genome-based diagnostics and therapies. In the alliance called **FORPROTECT**, researchers from the universities in Munich, Regensburg and Würzburg will work together with seven industrial partners from the biotech sector. The eight projects are organised around three topics: virological and bacterial diagnostics as well as therapeutics through targeted modification of pathogens. The alliance is supported with Euro 2.6 million within the next three years by the Bavarian Research Foundation.

Venture Capital for NMR analytics

LipoFIT Analytic, which was founded as a spin-off of the University of Regensburg in 2004, received a growth financing of Euro 4 million by SHS Gesellschaft für Beteiligungsmanagement, KfW Bankengruppe and Bayern Kapital. The company offers NMR spectroscopy expertise using very strong magnetic fields. This allows the simultaneous analysis of a multitude of components in a sample, e. g. the identification of entire human metabolic processes in a blood or urine sample. The investment should help to transform this technology into diagnostic products. Another important step in this direction is the appointment as COO of Dr Volker Pfahlert, who formerly headed the Roche divisions Roche Professional Diagnostics and Roche Applied Science.

Roche Penzberg - Research, Development and Production

Roche, the world's largest biotech company, is a leader in research-focused health care with combined strengths in pharmaceuticals and diagnostics. Roche is also the world leader in *in vitro* diagnostics, tissue-based cancer diagnostics and a pioneer in diabetes management. The group's personalised health care strategy aims at providing medicines and diagnostic tools for significant improvements. Its Bavarian site in Penzberg is the only Roche location with research, development and production units for both divisions – Diagnostics and Pharma. Besides the comprehensive pharmaceutical activities, Penzberg, with about 4,600 employees, is one of the leading centres for research, development and production of diagnostics in Europe. Also within the Diagnostic division, the entire value chain has been established in Penzberg. Roche Applied Science maintains its global headquarters here, complemented by the business area of Roche Professional Diagnostics.



The Diagnostics Operations Complex at Penzberg will house offices, laboratories and production halls. (Source: Roche)

Roche Applied Science (RAS) supplies scientists in academia as well as biotech and pharmaceutical industries with instruments and highly specific reagents and test kits for a broad range of research applications. Key areas are gene, cell and protein analysis.

Roche Professional Diagnostics (RPD) is a leading supplier of instruments, tests, software and services for laboratories and of decentralised testing products to support clinical decision making at the point of care. In Penzberg, RPD is looking for new biomarkers not only for early diagnosis and prevention of cancer, infectious, or immune diseases. Furthermore, the diagnostics research unit in Penzberg provides an essential contribution to the profiling of diseases and the stratification of patients by identifying and characterising appropriate biomarkers.

This year, a new Diagnostics Operations Complex will start operating in Penzberg. With the decision to invest Euro 136 million, Roche is expanding the development and biotechnological production capacities for both units, RAS and RPD. The Life Science market is still stimulated by genomics research. Thus more production capacity is needed for PCR based product lines. Also raw materials and components for immunological test kits will be produced here. Applications are for example cardiovascular diagnosis using biomarkers involved in chronic heart failure and cardiac arrest or the analysis of cancer markers, as well as therapy monitoring markers.

Innovation in Biopharmaceutical Development

Cooperation Forum of Bayern Innovativ in Benediktbeuern on 18 May 2010

As coordinator of the Network Life Science, Bayern Innovativ conceives and organises the 2nd Cooperation Forum 'Biopharmaceuticals: Development, Optimisation, Production' together with Roche as strategic partner. Additional partner is the Cluster Biotechnology Bavaria.

Experts from pharma and biotech industry will present new strategies for the development of biologics, novel scaffolds, technology platforms for the optimisation of biopharmaceuticals as well as trends in the production of biologics. Furthermore, the successful Munich Top Cluster concept 'm⁴' focussing on personalised medicine will be presented.

The cooperation forum will focus on current developments contributing to further progress in diagnosis and therapy, such as bispecific antibodies, novel binding proteins, improved drug delivery, optimisation of glycosylation and elongation of plasma half life by PASylation and HESylation. A further focus will be on novel technologies and concepts for the production of biologics.

The forum will be the ideal platform to gain new insights into concepts and technologies in the area of biopharmaceuticals as well as to initiate future cooperation.

The Monastery in Benediktbeuern, venue of the Cooperation Forum.

The cooperation forum will take place on 18 May 2010 at the 'Zentrum für Umwelt und Kultur' at the Monastery in Benediktbeuern, which is embedded in a beautiful countryside close to the Alps in proximity to Roche. Participants will also have the opportunity to visit the biotech production at the Roche site in Penzberg on the preceding day, 17 May 2010.

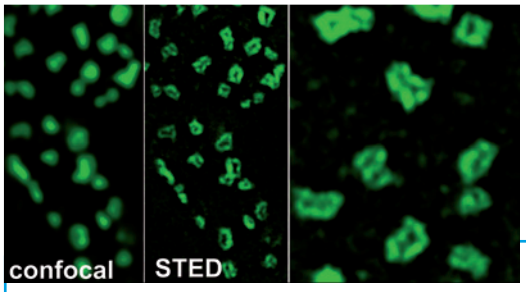
Making molecular processes visible in living systems

Molecular imaging combines latest developments in molecular biotechnology and imaging of biological processes in living organisms without perturbing them. It offers new opportunities in drug discovery, diagnostics and eventually, the treatment of complex diseases.

Application of bio-imaging in basic research and drug discovery

The Bio-Imaging Centre of the **Rudolf-Virchow-Centre** at the University of Würzburg establishes new discoveries within the innovative field of imaging and particularly, integrates these findings in recent biomedical research and in drug discovery. Research at the centre focuses on imaging signal transduction pathways, as well as the analysis of bio-molecules in living cells and the architecture of synapses in model organisms. In October 2009, the new site of the centre was inaugurated.

Prof Martin Lohse, the Director of the Rudolf-Virchow-Centre, and his group are studying G protein-coupled receptors (GPCRs). The receptors are located in the cell membrane and are involved in various fundamental biological functions, such as transmitting senses, regulating cell proliferation and differentiation as well as triggering hormone and neurotransmitter functions. GPCRs play a key role in drug development since they are targets of pharmacological compounds for the treatment of e. g. inflammation, allergies, high blood pressure or cardiovascular diseases. By generating a fluorescent sensor, receptor-generated signals can be visualised in intact cells and even *in situ* in animal models. Recent studies revealed, how signalling and termination actually occurs in space and time and may be the basis to novel pharmacological approaches for a wide range of diseases.



Comparison of imaging with confocal and STED microscopy. (Source: Rudolf-Virchow-Zentrum)

Another example of how microscopic imaging can reveal novel insights into disease pathology is the study of prion diseases. Prion diseases, such as Bovine Spongiform Encephalopathy (BSE) or Creutzfeldt-Jakob disease (CJD), are fatal neurodegenerative disorders. However, neuropathological changes do not necessarily correlate with the onset of symptoms. To investigate the molecular mechanism triggering the disease, confocal and ultramicroscopy methods are used to demonstrate that prion protein induces a disruption of the axonal transport. Results of this *in vivo* study may lead in future to novel targets for therapeutic and diagnostic approaches.

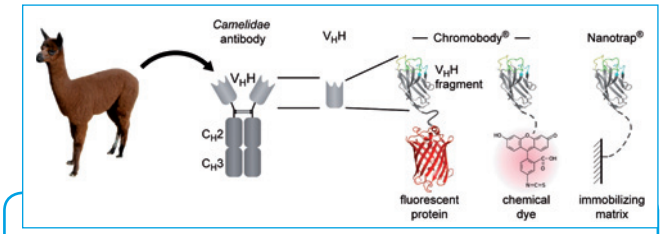
Using stimulated emission microscopy (STED) combined with molecular biology and electrophysiology, the establishment and maintenance of synapses can be studied. STED is a novel technique using the non-linear de-excitation of fluorescent dyes through drastically increasing the resolution of fluorescent microscopy, making even the imaging of synapse connections possible (see picture).

Nanomarkers for imaging of cellular processes within living cells

Innovative molecules to analyse cellular processes have been developed by **ChromoTek**, a spin-off of the LMU-Biocenter founded in 2008. The technology is based on small, stable antibodies which were discovered in camels and related South American species such as lamas and alpacas. Conventional antibodies cannot be used within living cells, whereas fusion proteins of nanobodies – fragments of the *Camelidae* antibodies (see picture) – with chemical dyes or fluorescent proteins such as GFP (green fluorescent protein) can. Those so-called 'Chromobodies' thus can be used as markers to monitor cellular processes in real-time without affecting the cellular structure. Pre-commercial development of Chromobodies is planned to be finished until the end of 2010.

The first product of ChromoTek at the market is the GFP-Trap consisting of GFP-binding nanobodies coupled to an immobilized matrix. It can be used to isolate GFP fusion proteins from cell extracts, working faster and cleaner than established methods. The simple structure of the nanobodies allows their cheap and unlimited production in recombinant systems like bacterial or yeast. Further applications of nanobodies could be in the field of classic diagnostic methods such as ELISA. They could also be used for the inhibition or modification of target structures, opening up novel possibilities for the visualisation and manipulation of cellular processes.

The foundation of ChromoTek was supported by Exist-Seed funding from the Federal Ministry of Economics and Technology. In 2008 the Junior Group of Dr Rothbauer at the LMU-Biocenter received Euro 1.5 million for further research and development based on the Chromobody technology from the GO-Bio programme of the Federal Ministry of Education and Research.



From Alpaca to molecular trap. (Source: ChromoTek)

Imaging from the bench to clinical applications

The development of novel *in vivo* imaging technologies, applied to basic and drug discovery research up to pre-clinical and clinical questions, is the objective of the **Institute for Biological and Medical Imaging (IBMI) at the Helmholtz Zentrum München**. A major focus of director Prof Vasilis Ntziachristos and his team of researchers is the design of methods, which can image significantly deeper than what is allowed by modern microscopy methods. Further emphasis is placed on the translation from basic research to clinical application. This is possible due to Prof Ntziachristos´ Chair of Biological Imaging at the Technische Universität München and its close cooperation with university hospitals and medical facilities. Main topics are for example the development of imaging technologies for diagnosis as well as disease monitoring and treatment in areas including cancer, inflammation, cardiovascular and neurodegenerative diseases.

For instance, the Laboratory for Experimental Biological Imaging Systems (EBIS) combines the use of near-infrared fluorescent beacons and probes with multi-spectral opto-acoustic and fluorescence tomography techniques appropriate for whole mouse or select human tissue imaging to analyse molecular expression patterns in living subjects. Examples include the imaging of tumour growth and apoptosis, based on sub-cellular biomarkers, and three-dimensional imaging of fluorescent proteins in entire small animals.

In parallel, another laboratory, the Medical Imaging Laboratory, is concerned with the clinical translation of these methods. Improved fluorescence imaging methods for intra-operative and endoscopic imaging are e. g. validated in animal models and an overall imaging strategy is established to generate an appropriate method for further propagation into the clinic. Clinical studies are already ongoing.

Nuclear medicine and ultrasound for molecular imaging

Siemens HealthCare is one of the largest health care providers worldwide. The German headquarters of this sector of Siemens AG is located in Erlangen. Siemens HealthCare comprises three divisions: 'Workflow & Solutions', working on the improvement of data processing and process execution in clinics and surgeries, 'Diagnostics', which is a novel business area at Siemens in the field of *in vitro* diagnostics, and 'Imaging & IT'. At the Imaging & IT division, one focus of research is tomographic methods for molecular imaging. Traditional methods for molecular imaging are nuclear medicine methods such as PET (positron emission tomography) and SPECT (single photon emission computed tomography). Using radioactively labelled molecules, so-called tracers, the metabolism of cells and organs can be visualised *in vivo*.

The main research focuses in the sector of nuclear medicine at Siemens HealthCare are the development and analysis of novel biomarkers, the improvement of data exploitation, the optimisation of imaging devices as well as the development of novel hybrid devices. The coupling of devices for nuclear imaging with imaging devices for the visualisation of the tissues such as CT (computed tomography) or MRI (magnetic resonance imaging) is one important working area at Siemens HealthCare. Coupling reduces the time and number of examinations and improves diagnosis by adding structural information to the functional analysis. For example, the exact localisation of a tumour with elevated metabolic activity significantly improves its characterisation and classification and thus, the subsequent therapy. Current hybrid devices are mainly coupling PET and SPECT with CT (see picture). The Technische Universität München and the University of Erlangen are partners of Siemens HealthCare in a project on the combination of PET with MRI in a hybrid device.

Siemens HealthCare is also conducting research in the novel field of using ultrasound as a method for molecular imaging. Novel contrast agents are developed: specific molecules are coupled to the surface of the contrasting microbubbles. The molecules then dock to a target structure which can be visualised. The advantage of ultrasound is that the contrast agents are very compliant and do not emit radiation, like those used in PET or SPECT do. Moreover, the examination can take place at the patient's bed. One perspective is to use the microbubbles as a vehicle for drugs, which are released at the target tissue via the application of a short, strong ultrasound impulse.

Example for integrated diagnostic imaging: PET/CT hybrid device. (Source: Siemens)

Miniaturisation of analytical methods

The miniaturisation of biochemical and molecular biological analytical processes is an important tool to make diagnosis more efficient, faster, and cheaper. For example, the limitation of available sample volume and the high cost of reagents can be circumvented through miniaturisation. Standardised, easy-to-use lab-on-a-chip systems could be used for point-of-care-testing.
The advantages of miniaturisation can also improve drug development, allowing for example parallelisation of assays or a more detailed characterisation of single cells or even single molecules within a cell.
To enable miniaturisation, several technological developments are important: the advance in microelectronics allows for smaller measuring devices, and handling of small fluid volumes is enabled through microfluidics. Further downscaling is achieved through the usage of nanotechnology.

Networks for nanotechnology

As nanotechnology is a trans-disciplinary science including physics, engineering, chemistry, biology, and medicine, networking is especially important in this field. It was identified as one of the technologies with high importance for the future of Bavaria. Thus, within the scope of the Cluster Initiative of the Bavarian State Government, the Bavarian **Cluster Nanotechnology** was established in 2006. One major topic is to collect and disseminate information on nanotechnology, e. g. through the compilation of reports on specialised topics or the conception of school programmes. To support close cooperation between business and research and to promote transfer of research results into applications, the Cluster organises, for example, workshops on specialised nanotechnological topics or joint stands at trade fairs.

In Bavaria, there is strong scientific expertise in the sector of nanotechnology, supported by several networks for research in nanotechnology focussing also on applications in medicine and pharmacy. In order to link research groups and young companies in the region of Munich working in nanobiotechnology, the **Excellence Network NanoBioTechnology (ENNaB)** was founded in October 2003 as joint project of the Federal Ministry of Economics and Technology and the Bavarian Ministry for Economics.

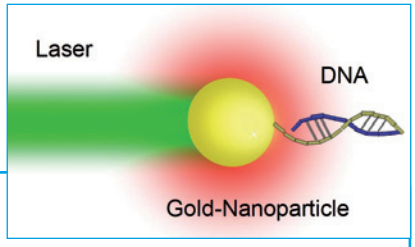
One of the Clusters of Excellence selected by the German government's 'Excellence Initiative' in October 2006 is the **Nanosystems Initiative Munich (NIM)**. NIM brings together more than 300 researchers within the Munich region from different disciplines investigating nanoscale systems for applications in medical science, information technology and for energy conversion and storage; special emphasis is put on providing an attractive research environment especially for outstanding young scientists.

There is a strong collaboration of NIM with the **Center for Nanoscience (CeNS)**. As one of the first nanoscience centres worldwide, CeNS was founded in 1998 at the Ludwig-Maximilians-University Munich (LMU). It crosslinks the work of about 80 senior and junior scientists and 200 PhD and diploma students coming from the LMU as well as the Technische Universität München and the University of Augsburg.

CeNS builds its work on three pillars: the stimulation and support of multidisciplinary research cooperation, an educational programme including the International Doctorate Programme NanoBioTechnology, as well as the promotion of the transfer of scientific research into industrial applications. This last aim has proven its success by the foundation of several spin-off companies by CeNS members. Some of those developing nano-technological applications in the sectors of diagnosis and drug development, e. g. Nanostove, NanoTemper Technologies, Nanion Technologies, ibidi, and Advalytix, will be described in the following sections in detail.

High-throughput DNA analysis

One research project of the **Chair of Photonics and Optoelectronics at the LMU Munich** which is part of CeNS/NIM is a method for ultra-fast DNA analysis. As DNA defects cause a change in the melting temperature, analysis of the DNA melting curve can be used, for example, for the diagnosis of genetically caused diseases. In current methods, the whole sample solution has to be heated up, making the process time-consuming and cost-intensive. In the novel method, gold nanoparticles are heated up directly with a laser pulse, turning them into 'nanostoves' allowing controlled melting of bound DNA samples (see picture). This shortens the process to milliseconds instead of minutes and thus allows a high-throughput, cheap analysis of genetic defects. The project was initially part of a cooperation with Roche Diagnostics, Penzberg supported by the Bavarian Research Foundation and receives an EXIST funding by the Federal Ministry of Economics and Technology. In the next phase, a spin-off company called **Nanostove** will be founded by mid-2010.



Gold particles used as nonostoves for controlled melting of bound DNA samples. (Source: Nanostove)

Detecting bio-molecule interactions

NanoTemper Technologies, a recent spin-off of the Chair of Systems Biophysics at the LMU Munich, developed a technology called microscale thermophoresis for the fast measurement of bio-molecule modifications or interactions in small sample volumes. It is based on the laser-induced generation of microscopic temperature gradients and analysis of the induced movement of molecules which depends on their hydration shell. Changes in the hydration shell of bio-molecules are triggered by structural changes and binding events which can thus be measured. In cooperation with Advalytix, this method will be adopted for diagnostic applications (see below). The method offers a broad application range and can also be a very valuable tool in drug development and basic research. In contrast to standard methods, even very small molecules can be analysed, and measurements can be performed in complex biological liquids such as blood serum. Thus, the binding of a lead compound to a disease-relevant target, for example, can be measured in close-to-physiological conditions, allowing improved selection of the ideal drug candidate prior to expensive clinical trials. The potential of the technology is underlined by several awards for NanoTemper, such as the first prize in the German-wide business plan competition 'CyberOne' in 2009. Recently, NanoTemper was named one of three finalists for the European award ACES for most promising spin-out companies.

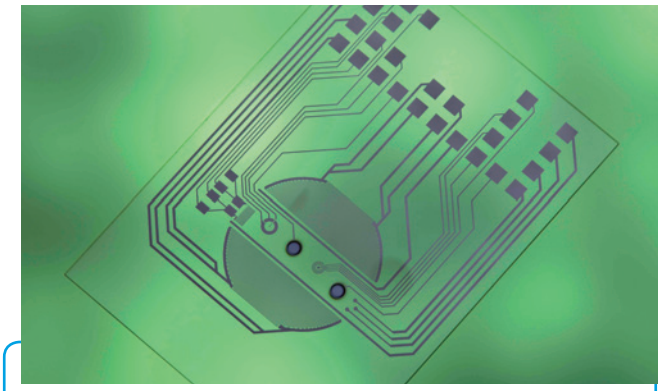
Measuring ion channels

A technology for high-throughput screening for ion channel active drugs has been developed by **Nanion Technologies**. In contrast to the usual patch clamp technique working with a pipette, the system uses planar patch clamp chips. On this basis, automated patch clamp instruments have been developed. Due to the extraordinary growth of the company and the market leadership potential, Nanion was awarded the German Founder Award in 2009. The company, which was founded in 2002, also received the Step Award 2009, a business award for innovative and fast-growing companies.

Studying cells on a chip

To be able to conduct biochemical and cell-based experiments under controlled close-to-native conditions and in small volumes is one of the major advantages of so-called labs-on-a-chip. **ibidi**, a bionanotech company founded in 2001, develops and produces cell culture chips (µ-slides) for the – mainly microscopical – analysis of living cells. In 2009, ibidi received the 'Fast 50' award as one of the fastest growing high tech companies in Germany.

One important prerequisite for such lab-on-a-chip applications is the ability to miniaturise certain devices and processes. For example, mixing in fluid volumes approaching the microliter range becomes increasingly difficult with conventional methods. Microfluidics is thus a key technology for diagnostics and molecular biology research. A technology for the manipulation and agitation of small fluid volumes using surface acoustic waves was the basis for the foundation of **Advalytix** in 2000. The company was aquired by Olympus Life and Materials Science Europa GmbH in March 2005. As the Olympus Diagnostics Business was sold to Beckman Coulter in August 2009, Advalytix is now Beckman Coulter's global competence centre for cell-based molecular biology. The non-invasive micro-agitation technology allows novel lab-on-a-chip applications in routine diagnostics and is used in instruments for biochemical research. The characterisation and analysis of single cells by means of immunophenotyping using flow cytometry, combined with highly sensitive PCR techniques for molecular diagnostics is a focus. For example, in a cooperation with NanoTemper Technologies (see above), a new measurement method for RNA/DNA diagnostics is developed. The scope of the joint project is the development of a high-throughput PCR method in a 1µl format with the power to detect single molecules and to resolve point mutations and short tandem repeats within a single droplet.



BioChip for the assessment of parameters of vitality and simultaneous microscopic analysis of cells. (Source: cellasys)

Microelectronic tools for diagnosis and therapy are developed at the **Heinz Nixdorf-Lehrstuhl für Medizinische Elektronik** at the Technische Universität München. The basis are biohybrid interfaces between cellular micro/nanosystems and solid or polymer-based signal transducers. The spin-off company **cellasys** offers whole cell-based systems for label-free, parallel, continuous, real-time measurement of several parameters such as pH and pO_2 allowing conclusions on the state of living cells (see picture). Possible applications are, for example, cell-based testing of drugs or personalised cancer chemotherapy. Future projects include implants of sensor chips for controlled drug release and thus, for the individualised control of tumour growth.

Calendar of Events (Short List)

23. – 26.03.2010	**'Analytica 2010'**, Bavarian Joint Stand, Munich www.analytica.de
27.04.2010	**'Cluster Day'**: Presentation **'Bavarian Biotech Report 2009'** and Conference **'Healthcare of Tomorrow – Personalized Medicine in Bavaria'**, Munich www.biotech-bayern.de
03. – 06.05.2010	**'BIO 2010'**, Bavarian Joint Stand, Chicago, USA www.convention.bio.org
05.05.2010	**'IKOM Life Science'**, Recruiting Forum, Freising-Weihenstephan www.ikom.tum.de/students/lifescience
18.05.2010	**'Biopharmaceuticals'**, Cooperation Forum, Benediktbeuern www.bayern-innovativ.de/biopharmaceuticals2010
29.06.2010	**'Medical Biotechnology'**, Event of the vfa bio together with Bayern Innovativ, Munich www.vfa.de
30.06. – 01.07.2010	**'MedTech Pharma 2010'**, International Congress and Exhibition, Nuremberg www.medtech-pharma.de
05. – 07.10.2010	**'Biotechnica 2010'**, Bavarian Joint Stand, Hannover www.biotechnica.de
11.11.2010	**'Biopolymers'**, Cooperation Forum, Straubing www.bayern-innovativ.de/biopolymers2010
15. – 17.11.2010	**'BIO-Europe'**, International Partnering Conference, Munich www.ebdgroup.com/bioeurope

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