Bioeconomy BW

Ten outstanding ideas in biotechnology and medical technology

The results of the feasibility studies funded under the "Idea Competition in Biotechnology and Medical Technology" were presented in the Haus der Wirtschaft in Stuttgart between 16th and 18th January 2012. Ten of the 42 project ideas were recommended for further funding. More than 150 stakeholders from politics, research, science and industry participated in the event organized by the Baden-Württemberg Ministry of Education, Research and the Arts and supported by Project Management Jülich (PTJ) and BIOPRO Baden-Württemberg GmbH.

42 groups from Baden-Württemberg presented the results of their feasibility studies in oral and poster presentations. A team of renowned reviewers selected the 10 most promising projects, which will now be advanced further: five from the medical technology sector, three from the bioprocess engineering sector and one each from the synthetic biology and molecular bionics sectors. "Although only ten out of the 42 project ideas presented were given awards, nobody lost out. I believe that the scientific exchange between the participants from a broad range of different disciplines made everybody a winner," commented Dr. Ralf Kindervater, CEO of BIOPRO Baden-Württemberg, at the end of the event.

Baden-Württemberg has huge research potential in biotechnology and medical technology. In order to more effectively exploit this potential, the Baden-Württemberg Ministry of Education, Research and the Arts launched the "Idea Competition in Biotechnology and Medical Technology" in 2010 with the objective of identifying innovative ideas with a high developmental risk in the fields of medical technology, bioprocess engineering, molecular bionics and synthetic biology, enabling the initial evaluation of ideas and further developing the best ideas.

Following the selection of the best projects, from left to right: Prof. Dr. Blechschmidt-Trapp, Ulm University of Applied Sciences; Dr. Marion Wehner, Project Management Jülich; Dr. Katharina Caesar, Baden-Württemberg Ministry of Education, Research and the Arts; Stephan Allgeier, Karlsruhe Institute of Technology; Dr. Renate Fischer, Baden-Württemberg Ministry of Education, Research and the Arts; Prof. Dr. Harald Gießen, University of Stuttgart; Prof. Dr. Cristina Tarín, University of Stuttgart; Julien Mintenbeck, Karlsruhe University of Applied Sciences; Dr. Arnulf Hache, Project Management Jülich; Dr. Andreas Maurer, Novalung GmbH; Dr. Stefan M. Schiller, University of Freiburg; Dr. Günter Tovar, University of Stuttgart; Jürgen Burger, University of Freiburg; Tobias Hahn, Karlsruhe Institute of Technology; Prof. Dr. Rolf Backofen, University of Freiburg

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The reviewers selected the following projects:

Medical technology:

"Innovative CO_2 absorbers for mobile, artificial lungs," Dr. Andreas Maurer, Novalung GmbH, Heilbronn
Artificial lungs that are light and comfortable to wear need to guarantee the simple and safe exchange of gas. The company Novalung develops innovative gas absorbers that take up carbon dioxide and release oxygen to patients.

"Microrobots in medical technology and medical laboratory technology," Prof. Dr. Ramon Estana, Julien Mintenbeck, Karlsruhe University of Applied Sciences
The project “Microrobots in medical technology” involves the analysis and development of a system for the diagnosis of solid and liquid laboratory samples. The microrobots carry out individual tasks, are freely configurable and autonomously work together in a joint working platform.

"Non-invasive measurement and analysis of the glucose level of diabetes patients using metamaterials," Prof. Dr. Harald Gießen, Prof. Dr. Cristina Tarín, University of Stuttgart
The project “Non-invasive measurement and analysis of the glucose level of diabetes patients by way of metamaterials attached to contact lenses” involves the development of an innovative medical device: extremely small structures are printed onto a material that resembles contact lenses that are inserted into the eyes of diabetes patients where the measurement of the refraction index provides information about the glucose level in tear fluid.

"Control of eye movement by way of computer-controlled fixation marks for the development of mosaic pictures of the cornea," Stephan Allgeier, Karlsruhe Institute of Technology (KIT)
Confocal laser scanning microscopy (CLSM) of the cornea has huge potential for use in the non-invasive diagnosis of early stage nerve damage. Due to the small image section of an individual image (0,4 x 0,4 mm^2), reliable diagnosis requires the large-scale reconstruction of a continuous series of images. The KIT researchers have developed a novel approach that enables the series of images to be automatically acquired. This approach enables the researchers to specifically focus the patients’ viewing direction using a computer-controlled fixation mark.

"A new method for monitoring Parkinson’s disease therapy," Prof. Dr. Ronald Blechschmidt-Trapp, Ulm University of Applied Sciences
This project is aimed at developing new methods for monitoring the therapy of Parkinson’s disease, including a specific interface linked to treating neurologists which involves an animated avatar. The avatar makes it possible to objectively assess the patient’s condition at home.

Bioprocess engineering:

"Model-based cause of error diagnostics for liquid-chromatographic applications," Prof. Dr. Jürgen Hubbuch, Tobias Hahn, Karlsruhe Institute of Technology (KIT)
Based on cause-effect analyses and computer simulations, the project seeks to identify the causes of error and uncertainty occurring in ion exchange chromatography (IEX). IEX is used for the highly resolved analysis of protein mixtures and the production of biopharmaceutical substances. The rapid, efficient and intuitive diagnosis of causes of errors of the kind provided by the project team’s work is especially important for the production of biopharmaceutical substances.

"Protein translator: development of a simple hand-held device for the generation of protein microarrays from DNA microarrays," Jürgen Burger, University of Freiburg
Despite being difficult to produce, protein arrays have become important research tools as they allow the investigation of a wide variety of biological questions. The protein translator makes protein arrays much simpler to produce; it produces a copy of a DNA array in the form of a protein array. The newly developed copying device is easy to operate and creates a protein copy within as little as 30 minutes.

"Scalable biological production of signal peptides for applications in regenerative medicine," Dr. Stefan Schiller, University of Freiburg
The classical synthesis of peptide-based signalling molecules and pharmaceutical substances is extremely expensive, costing more than €2,000/g for a peptide consisting of 20 amino acids. Increasing the synthesis scale is possible but very difficult and direct biosynthesis of such peptides

is not possible at all. The feasibility study has provided the researchers with a solution to this challenge: the peptide sequence is multimerised into a larger protein; individual peptides are connected by very small sequence segments that are selectively cleaved following the biosynthesis of the peptides, which is a scalable process. The costs amount to less than €10/g.

Synthetic biology

"Synthetic switch mechanisms controlling the function and location of proteins within the cell," Prof. Dr. Rolf Backofen, University of Freiburg
The project is aimed at creating a biological construct that produces a novel interaction of RNA fragments that do not normally interact in nature. This leads to the generation of a new function. The project is aimed at developing a synthetic switch mechanism based on RNA fragments for the control of the function and localisation of proteins in animal and human cells. Such a switch mechanism has the potential to be used in many cell biology experiments and will help answer fundamental questions in the field of cell biology.

Molecular bionics

"Biomimetic process sensor," Prof. Dr. Günter Gauglitz, University of Tübingen, Dr. Günter Tovar, University of Stuttgart
Using optical measurement technology, a novel bionic sensor involving molecularly imprinted polymer nanoparticles that recognise special molecules was developed. The sensor has rapid response times and high selectivity and is also extremely robust. Based on successful basic research, the sensor has the potential to be applied in economically and technically interesting fields of application, including for example continuous process control in biotechnology and clinical diagnostics.

Impressions of the event

Article

06-Feb-2012
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