

PRESS RELEASE

Successful completion of a model co-operation in white biotech: BRAIN broadens Degussa's enzyme portfolio

Chiral alcohols from designer-microorganisms: Degussa-development team wins innovation award

Zwingenberg and Hanau-Wolfgang, March 2006 – The Biotechnology-corporation BRAIN AG and the Degussa AG disclose the conclusion of a collaboration agreement within the white biotechnology. Goal of the during a BMBF-project conducted co-operation was the identification and supply of novel alcohol-dehydrogenases (ADH) for the biotechnological production of enantiopure alcohols as precursors for innovative drugs.

In the meantime the Degussa-development team was awarded with the Degussa Innovation Prize 2005 for the successful project implementation entitled „The almost perfect industrial catalysis: designer cell based red-ox processes for alcohols and amino acids“.

According to the journal "Chemical & Engineering News" the market value of drugs on the basis of chiral compounds accounts to some 100 billion US dollars and shows annual growth rates of more than 10 per cent. These data are supported in a study by Frost & Sullivan, which predicts a revenue increase from 9.5 to 14.9 billion US dollars for chiral compounds between 2005 und 2009.

Currently, the bulk of industrial production of chiral alcohols as impor-

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tant building blocks for novel drugs is achieved through classical chemical catalysis using metal-catalysed asymmetric hydration.

The goal of the completed project directed by Degussa participated by BRAIN and supported by the “Bundesministerium für Forschung und Technologie” (BMBF) through allocation of funds within the program “sustainable bioproduction” was the establishment of a competitive biotechnological process for the enzyme-based, enantioselective production of alcohol-precursors thus enabling an access to chemically and optically pure (R-) and (S-) alcohols. The production yield was assumed to be above >95% and due to the allocated production scale the substrate concentration was targeted to be significantly above 100 gram per litre. Within an interdisciplinary BMBF-project team with biological and chemical competences besides Degussa and BRAIN also study groups of the Universities Stuttgart and Düsseldorf as well as the Bundesforschungsanstalt für Landwirtschaft in Braunschweig were engaged. Process development was performed within the team of Degussa’s “Service Center Biocatalysis” and was supported by Degussa’s “Projekthaus ProFerm”. Important know how dealing with markets, production, product processing and commercialisation were contributed by the Degussa business units „Exclusive Synthesis & Catalysts“ and „Food Ingredients“.

The evolutionary diversity of enzymes and metabolic pathways offers a biotechnological access to new and value able alcohol-dehydrogenase biocatalysts. Within the cooperation BRAIN AG identified and developed novel alcohol-dehydrogenases from their proprietary and highly complex BioArchive strains and Metagenome-libraries and transferred these to the project partner Degussa where the evaluation of biochemical properties and the design of appropriate whole cell took place. The results and the novel recombinant alcohol-dehydrogenases identified by BRAIN amend the established Degussa redox-enzyme portfolio in an attractive manner.

In the meantime the redox-technology platform developed by the Degussa-Team supported by the BMBF-project partners is estab-

lished in an industrial scale and since last year is being used for the regular production of chiral alcohols.

“By identifying and utilizing novel biocatalysts on the basis of alcohol-dehydrogenases we want to improve the cost effectiveness of industrial processes for the production of chiral alcohols”, says Dr. Stefan Buchholz, Director Exploration & Validation Biotechnology at Degussa AG. “The intensive cooperation within the research and development projects complements and accelerates our own activities in this sector and allows the faster transformation of an idea to production processes”.

The importance of the use of the designer cell concept for the production optically active alcohols emphasises Dr. Wolfgang Wienand, Head of the Degussa Service Center Biocatalysis: „The use of Designer-bugs, in which - in contrast to wild-type organisms - such enzymes needed for a specific process are accumulated in multiple and thus may positively affect the selectivity and productivity of biotechnological processes. Hence less biocatalyst is needed, by-products are accumulated in a lower extent or even can be completely suppressed. The respective processes turn better and cheaper.”

„The identification of optimized biocatalysts with modern screening-methods hallmarks the growing importance of white biotechnology for efficient production processes“, says Dr. Jürgen Eck, member of the board and head of research at BRAIN AG. “During the project with Degussa the high potential of the genetic screening approach was envisioned as a real alternative to classical screening methods”, Dr. Eck stated with great pleasure.

And as Dr. Holger Zinke, chairman of the board at BRAIN AG, remarks: “This exemplary and trusty co-operation between different units within Degussa, the BRAIN AG and academic groups yielded fruit. We supplied evidence, that co-operation networks within the white biotechnology sector do perfectly work, and that the combination of competences in partnership are the key to market success.”

In Mai 2002, the Degussa “Service Center Biocatalysis” and the

BRAIN AG disclosed a strategic co-operation on the production of biocatalysators.

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About BRAIN AG:

BRAIN Biotechnology Research and Information Network AG is an innovative company focusing on the discovery and development of novel enzymes and bioactives. Its novel EvoSolution® technology platform combines the untapped biodiversity of microorganisms and plants with modern methods of molecular biology. The company located in Zwingenberg within the research and industrial region Rhine-Main-Neckar has at its disposal a comprehensive BioArchive with over 100 million genes of unique and non-cultivable microorganisms. Based on these resources BRAIN identifies novel technical enzymes for biotechnological production and synthesis processes (biotransformation) in the chemical and life science industries as well as new bioactive substances and lead candidates for the pharmaceutical and cosmetics market, and develops the basis for their large-scale industrial production. The company, which was founded in Darmstadt in 1993, currently employs a staff of 45.

About Degussa AG

With the founding of the Project House Biotechnology, the new Degussa has created a company-wide centre of expertise in the field of biocatalysis. The interdisciplinary Projekthouse team, comprising micro- and molecular biologists, chemists, process engineers and a food chemist, focuses the technical capability and the market experience of the eight business areas involved.

As world wide number one in the speciality chemistry with innovative products and system solutions Degussa establishes indispensable value for the success of its customers. This is outlined in the claim "creating essentials". In the fiscal year 2005, its approximately 44,000 employees generated sales of € 11.8 billion and operating profits (EBIT) of € 940 million.



BRAIN AG: Listed Bauhaus building in Zwingenberg

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BRAIN AG: Screening campaign for suitable biocatalysators: Automated high throughput screening of interesting enzyme libraries.

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Degussa AG: Biotechnological production of chiral alcohols as starting point for innovative therapeutics.

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