

# RESEARCH, TEACHING AND PUBLICATION ACTIVITIES

THE UNIVERSITIES AND THEIR RESEARCH FACILITIES GET NEW IMPULSES: OUR ENDOWED CHAIRS ARE A MODERN FORM OF SCIENCE FUNDING PROVIDING FURTHER OPPORTUNITIES FOR THE ACADEMIC RESEARCH COMMUNITY WITH THEIR INTERDISCIPLINARY ORIENTATION.

With the establishment of the endowed chair, the Beilstein-Institut supported Frank Schulz in his research into new strategies for the synthesis and modification of natural products at the TU Dortmund University. He was a speaker at the Beilstein Bozen Symposium, has published his research results in the Beilstein Journal of Organic Chemistry and holds a chair of Organic Chemistry at the Ruhr-Universität in Bochum since October 2013.

RUHR-UNIVERSITÄT BOCHUM



PROFESSOR FRANK SCHULZ

# BEILSTEIN ENDOWED CHAIR

“Thanks to the support of the Beilstein-Institut,  
I was able to implement the projects which  
I had dreamed of as a post-doc.”



PROFESSOR FRANK SCHULZ

RUHR-UNIVERSITÄT BOCHUM →



# NEW WAYS FOR SCIENCES

Endowed professorships play an important role in many areas of university research. They support research in exactly defined areas, sharpen the profile of universities as innovative research facilities and, last but not least, mean important recognition of the professor with his or her often novel ways of thinking and approaches.

## Role model for inter- disciplinary exchange: Gisbert Schneider

The Beilstein-Institut has funded two endowed chairs since 2002. The first was a professorship over five years donated to the Goethe University in Frankfurt am Main. The focus of the research was to be the interdisciplinary exchange between chemistry, theoretical chemistry and pharmacy in the area of chemical informatics. The chair was awarded to Professor Gisbert Schneider, an excellent representative of his field. Together with his group he devoted himself to a wide range of important tasks ranging from active substance research on pain receptors to the synthesis of libraries of natural product derivatives.

In recognition of this important new research area, the Goethe University took it over in 2007 and transferred the chair into the regular operations of the university. The professorship was also an important stage for the university career of Gisbert Schneider. In 2010 he followed the call to the ETH Zurich as professor for computer-assisted drug design.

An important aspect of the endowed chair at the Goethe University was the “Beilstein Computer Center (BCC)” which was set up in 2003. Since then, it has been in continuous use to improve the subject-oriented training of students of chemistry and bio-informatics at the Riedberg site in Frankfurt am Main.



Since ten years the Beilstein Computer Center has become a part of the educational training at the Goethe University.

## RESEARCH ON THE WAY TO PHARMACEUTICAL APPLICATION: FRANK SCHULZ

After the positive experience of the first endowed professorship, the Beilstein-Institut established a second chair at the beginning of the winter semester 2009/2010 at the TU Dortmund University. There Frank Schulz focused on research into new strategies for the synthesis and modification of natural products: the objective was to obtain “natural-product-like” compounds for the development of active substances used in antibiotics and anti-tumor agents. Professor Schulz’s research group, which started in 2009 with two employees, had grown to 12 members by 2013 – post-docs, doctoral students, masters and bachelor students. Under the supervision of Frank Schulz, the chemists, biochemists and pharmacists of the group successfully brought a series of projects to completion.

During his time at the TU Dortmund University, Professor Schulz started a number of scientific collaborations, for example, with the Max Planck Institute for Coal Research in Mülheim, the Institute of Organic Chemistry in Karlsruhe, the Chemical Genomics Centre in Dortmund and the Fraunhofer Institute for Molecular Biology and Applied Ecology in Aachen.

This time the funding covered a time period of two terms of three years with a volume of 650,000 euros per term. The intermediate evaluation in July 2012 was concluded with a positive result. All project objectives had been achieved or surpassed, and Frank Schulz had successfully established himself and his research work in the scientific community. The Beilstein endowed chair was an important career step for Professor Schulz who in October 2013 took on a full professorship at the Ruhr-Universität in Bochum.

The search for new antibiotics and anti-tumor agents from natural sources was the focus of the work of Professor Frank Schulz at the TU Dortmund University.





Professor Frank Schulz (left) received the Thieme Chemistry Journal Award in 2012 for his research work.





Michael Huth researches as professor at the Institute of Physics at the Goethe University Frankfurt am Main. He is spokesman of NanoBiC, an interdisciplinary four-year research project bridging the gap between chemistry and physics. Furthermore, Professor Huth is a member of the Beilstein-Institut Foundation Council and Guest Editor of the Beilstein Journal of Nanotechnology; he was also a speaker at the Beilstein Bozen Symposia in 2010 and 2012.

GOETHE UNIVERSITY FRANKFURT AM MAIN →

← PROFESSOR MICHAEL HUTH



# NANOBiC

“With the funding through scholarships and for material resources, the Beilstein-Institut has successfully supported the interdisciplinary cooperation of chemists, physicists and materials scientists in the framework of NanoBiC.”



PROFESSOR MICHAEL HUTH

GOETHE UNIVERSITY FRANKFURT AM MAIN →

# NANOBiC

## COLLABORATION IN RESEARCH

Many chemical compounds show different physical properties on a nano-scale compared to the macro-molecular world. The decoding of these processes generates new knowledge that is of essential importance in many areas – for example, in technical applications such as ultrafine sensors, extremely dense data storage devices or novel micro-magnetic and self-illuminating components.

The exploration of the nano-scale worlds requires a multidisciplinary approach. NanoBiC brought together the four key disciplines nanotechnology, biology, chemistry and computing. The four-year research project, which started in 2009, involved scientists from chemistry, physics and materials science at the Goethe University in Frankfurt am Main, the Technische Universität in Darmstadt, the GSI Helmholtzzentrum für Schwerionenforschung GmbH (Helmholtz Center for Heavy Ion Research) in Darmstadt and the Frankfurt Institute for Advanced Studies. Within the framework of NanoBiC (Nano, Bio, Chemistry and Computing) it was possible to offer an ideal setting for a wide range of collaborative sub-projects. The central theme was the effect of high-energy radiation on objects in the nanometer range.

With a total sponsorship of 3.6 million euros over four years, NanoBiC had two main project areas: firstly, to examine how it is possible to construct functional elements exactly according to a blueprint – such as transistors, sensors, quantum dots or storage elements; secondly, to explore the effects of cosmic radiation on human cells in more detail – this is of great significance for manned space missions, for example.

NanoBiC brings together the four key disciplines nanotechnology, biology, chemistry and computing.

NanoBiC comprised seven sub-projects each examining how matter in its smallest dimensions reorganizes itself when certain particles are irradiated. The initial results of NanoBiC already showed that the intended interdisciplinary approach was successful and led to unexpected findings. The interim evaluation in September 2011 confirmed the positive results.

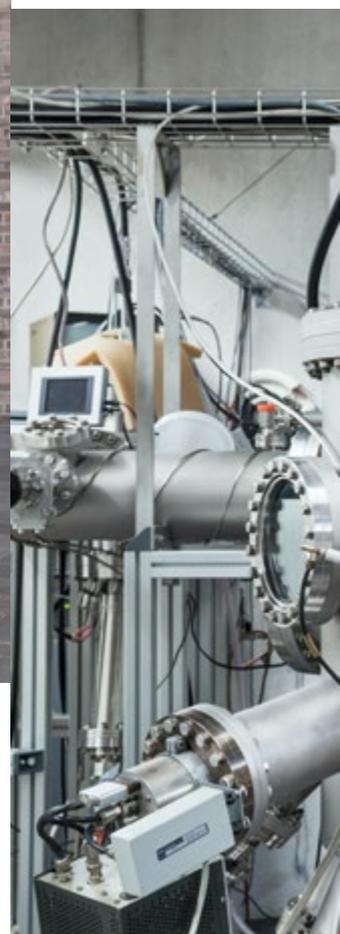
## Bridging the gap between chemistry and physics: at the level of research as well as in terms of scientific publications.

NanoBiC involved not only the specific collaboration of scientists, but also resulted in the publication and discussion of the research results. The project initiated, among other things, the Thematic Series “Radiation-induced nanostructures: Formation processes and applications” in the Beilstein Journal of Nanotechnology. Professor Michael Huth from the Institute of Physics at the Goethe University, the spokesman of the research project, was Guest Editor of this series. In addition, NanoBiC was present at scientific events: at a spring meeting of the German Physical Society held in March 2012 in Berlin, for example, two sessions on the topic of “Focused electron beam induced processing for the formation of nanostructures” were initiated by Michael Huth. About 100 participants attended both events – in total, ten lectures provided a detailed overview of the current state of research.

NanoBiC was also active in supporting young scientists: 34 scholarships – including 13 post-doctoral and 21 postgraduate students – received funding in 2012 alone. In May 2013, the Beilstein-Institut hosted a scientific colloquium, where the scholars presented their work and discussed it with the auditorium. This proved to be an excellent forum for exchanging ideas and networking.

With the scheduled project funding through the Beilstein-Institut coming to an end, it can be seen that NanoBiC has an important impact spreading on the scientific community: the project has generated more than 100 publications in renowned scientific journals. Numerous presentations at international conferences made references to NanoBiC and a patent was filed. There are nearly 100 scientists across Europe who are associated with NanoBiC. They will continue their joint research in the future.

Matter in smallest dimensions is able to reorganize itself when particles are selectively irradiated. In seven sub-projects NanoBiC examined the physical principles governing these processes.



Representatives of the institutions involved in NanoBiC – Goethe University in Frankfurt am Main, Technische Universität Darmstadt, GSI Helmholtzzentrum für Schwerionenforschung GmbH (Helmholtz Center for Heavy Ion Research) in Darmstadt and Frankfurt Institute for Advanced Studies in Frankfurt am Main – worked closely together to advance the project. The picture shows (from left to right) Professor Roser Valenti, Professor Michael Huth, Professor Max C. Holthausen, Professor Wolfgang Ensinger, Professor Matthias Wagner and Professor Andreas Terfort.



Dr. Maria Eugenia Toimil-Molares (left) and Professor Christina Trautmann supported the NanoBiC project at the GSI Helmholtzzentrum für Schwerionenforschung GmbH (Helmholtz Center for Heavy Ion Research) in Darmstadt.