



**New External Senior Fellow**



From June 2010 on Professor Tomohiro Kurosaki will be a fellow at LifeNet for two years. Kurosaki, group director at the RIKEN Research Center for Allergy and Immunology in Yokohama and professor at the WPI Immunology Frontier Research Center of the

Osaka University, is a trained physician and immunologist. After his graduation in Kyoto he worked at various institutes in the USA – ultimately becoming adjunct assistant professor at Yale University.

His FRIAS project in collaboration with immunologist professor Michael Reth is centered around the generation of memory B cells. The cellular outcomes of B cell receptor (BCR) signaling events are dependent on the developmental stage of the B cells and the quality/quantity of these signals. Kurosaki's home laboratories focus on understanding the molecular mechanisms of signaling pathways that lead to maintain naïve and memory B cells. At Freiburg he aims to pursue two different lines of research:

- 1) How does BCR transmit a signal?
- 2) What is the molecular basis underlying the longevity of antigen-experienced memory B cells?

**National Delegation to Washington**

LifeNet Director Professor Leena Bruckner-Tuderman travelled to Washington with the Federal Minister of Education and Research, Prof. Annette Schavan, and her delegation from February 17-19, 2010.

The Federal Minister signed a scientific-technology cooperation agreement between >>>

the governments of the German Federal Republic and the United States of America. In addition she promoted workshops with American and German scientists on rare diseases and regenerative medicine. The American delegation was represented by the Office of Rare Diseases, NIH. A workshop was held for fact finding and planning of American-European cooperation between individual scientists and in particular between networks, consortia and research sponsors. Following the European example, joint American-European proposals for research of rare diseases should arise.

Leena Bruckner-Tuderman and Rudolf Korinthenberg presented, as positive examples, the national and international networks of excellence for rare diseases which are coordinated in Freiburg, as well as the interdisciplinary structures founded in the Freiburg Center for Rare Diseases.

**Hauke Busch, Junior Fellow, has received a BMBF research grant**

Hauke Busch has received a research grant within the BMBF funded project 'Gerontosys' to investigate the causes of aging in the human skin. In a German-wide interdisciplinary consortium consisting of clinicians, biologists, mathematicians and physicists from Düsseldorf, Heidelberg, Munich and Freiburg, the Busch group will receive € 431.000 for three years to develop mathematical models that describe the effect of aging on the human skin.

**Junior Fellow Jörn Dengjel becomes an associated bioss member**

Since April Jörn Dengjel is an associate bioss member. Together with Ralf Baumeister, Kathrin Thedieck (Institute for Biology III), and Tobias Huber (Department of Nephrology), he applied for a bioss-WOW project on "Signaling Networks Regulating Kidney Aging" which was positively evaluated. The group will study aging-related signaling networks in different model organisms using genetic and proteomic approaches.

**Bernhard Breit and Michael Krische fuse their expertise to implement catalytic C-C bond formation for soft matter synthesis**

Having met in the early 1990s as postdocs, Michael Krische, University of Texas, and Bernhard Breit, University of Freiburg, started their scientific collaboration in 2008 through the School of Soft Matter Research. "FRIAS was the spark that enabled the project with Krische," Breit explains. Krische was invited to join FRIAS as External Senior Fellow for two years. Breit himself became a founding FRIAS Internal Senior Fellow for a period of 27 months.

The goal of the collaborative research was to develop highly selective, by-product-free catalytic carbon-carbon bond forming reactions applicable to abundant, renewable alcohols and carbon dioxide, since carbon backbones form the basis of any soft matter material. Towards this goal the expertise in catalyst design in the Breit group was interconnected with that of the reaction systems in the Krische group.

The catalysts employed rely in general on a late transition metal salt that is modified by two monodentate or a chelating  $\sigma$ -Donorligand. To find the optimal ligand, the Breit group has developed a new concept to generate ligand/catalyst libraries by the principle of self-assembly inspired by base pairing in DNA leading to bioinspired catalysis. With this approach one can generate large catalyst libraries which have been screened and have allowed the identification of the most active and most selective catalysts.

Krische's research has established hydrogenation as a method for C-C bond formation having shown that hydrogenation may be used to couple diverse  $n$ -unsaturated reactants to carbonyl compounds, imines and even alcohols offering a by-product-free alternative to stoichiometrically preformed organometallics in a range of classical C=X (X = O, NR) addition processes.

During the past year of collaboration Breit and Krische succeeded in developing a new regioselective hydroxymethylation reaction of 1,3-dienes with formaldehyde using >>>

a ruthenium catalyst (published in JACS 2009,131, 10366).

The reaction allows forming of quaternary carbon centres which are difficult to construct by other means. This represents an alternative to 1,3-diene hydroformylation, for which efficient regioselective catalytic systems remain undeveloped.

Besides the authentic and significant contributions to chemical science, Michael Krische also engaged himself otherwise at the University of Freiburg. He held courses within the DFG sponsored international research training group IRTG 1038 "Catalysts and catalytic reactions for organic synthesis" at the universities of Freiburg and Basel, and interacted with the research groups in the Organic Chemistry Department. Furthermore, he and Bernhard Breit initiated a student exchange programme



with the University of Texas that allows students from Freiburg to spend their research practical course in Austin, Texas. To sustain their, in many respects, promising collaboration Bernhard Breit and Michael Krische have co-authored a proposal to the National Science Foundation/DFG.

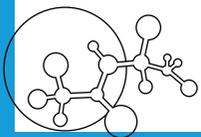
**DFG research grant for Dario Bercioux**

Dario Bercioux (postdoc) has received additional funding from the German Research Foundation in support of his project "Spin Effects in Quantum Transport in Carbon Nanotubes". He and Hermann Grabert (School Director) will focus on the calculation of charge current and spin current in double and triple-pole contact nanotubes.

**Makromolekulares Kolloquium 2010**

The annual *Makromolekulares Kolloquium*, founded in 1950 by Hermann Staudinger, has developed into the most important conference in its field in Germany.

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This year – its 60<sup>th</sup> anniversary – record figures of more than 900 participants (national and international, including many from industry) were reached and the colloquium was celebrated as an international event in English for the first time ever.

### Quantum Efficiency Seminar and Colloquium

After the striking success of the 2<sup>nd</sup> Black Forest Focus on Soft Matter “Quantum Efficiency: From Biology to Material Science” last year, the School of Soft Matter Research and the Department of Physics have started an in-depth analysis of nontrivial quantum effects – such as quantum coherence and multipartite entanglement – as a technological resource. Mathematicians, physicists, chemists, and engineers meet weekly at the “Quantum Efficiency Seminar and Colloquium” to discuss this topic.

The seminar, open to all university members, intends to promote the introduction of quantum mechanics as a conceptual basis for device engineering, in particular, in the specific context of photosensitive processes. Colloquium speakers include such distinguished scientists as Robert Silbey (MIT), Gregory Scholes (Toronto University), and Jenny Nelson (Imperial College).

[www.frias.uni-freiburg.de/QE](http://www.frias.uni-freiburg.de/QE)

### New External Senior Fellow

Osamu Tabata, Professor at the Department of Micro Engineering, Kyoto University, will join the School in May 2010 for a period of two years.

His research focuses on micro/nano process, MEMS and micro/nano system synthetic engineering. Recently, Osamu Tabata started a research line to realize a unique and novel nanosystem by assembling the various functional components such as a microchip etc., with sizes ranging from the nanometer to

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micrometer scale on a few mm square MEMS substrate. This technology is termed SENS (synthetic engineering for nano systems) and experimental and theoretical research on the establishment of SENS is being pursued.



At FRIAS Osamu Tabata will focus on the project “Configurable self-assembly of DNA functional blocks”. Programmed self-assembly techniques of sub-micron-scale functional building block on Micro Electromechanical Systems (MEMS) using a “Nano Electromechanical Systems (NEMS) Assembler” will be investigated. [www.frias.uni-freiburg.de/Tabata](http://www.frias.uni-freiburg.de/Tabata)

### Appointments

Junior Fellow Dr. Sabine Ludwigs has been offered the W3-chair (incl. directorial duties) for ‘Structure and properties of polymeric materials’ at the Institute of Polymer Chemistry, Faculty of Chemistry, at the University of Stuttgart.

### EXTERNAL SENIOR FELLOW TO COME

#### Natalie Stingelin

Department of Materials  
Imperial College London, UK

“Electronic processes in organic soft matter - Unravelling electronic processes in organic soft matter through structural control on different length-scales”. 10/2010-9/2012

### EVENTS TO COME

#### June 2-5, 2010

3<sup>rd</sup> Black Forest Focus on Soft Matter “Frontiers in Dynamics - from Random to Quantum Walks”, Hotel am Münster, Breisach.

#### July 20-23, 2010

4<sup>th</sup> Black Forest Focus on Soft Matter “Soft Matter Micro- and Nanofabrication”, Hotel Saigerhöh, Titisee, Black Forest.

### FURTHER EVENTS

[www.frias.uni-freiburg.de/softmatter-events](http://www.frias.uni-freiburg.de/softmatter-events)

### Fellows of the School of Life Sciences unlock the door to controlling embryonic stem cell networks

A team of Freiburg-based systems biologists led by the two FRIAS Fellows Professors Wolfgang Driever and Jens Timmer, as well as Dr. Daria Onichtchouk from the Faculty of Biology, have shed light on important characteristics of embryonic stem cell networks and have thereby been able to show how the development of embryonic stem cells is regulated. Their findings have very recently been published in the leading academic journal “Molecular Systems Biology”.

Biomedical researchers believe that stem cell research has the potential to improve the treatment of human disease, especially in an ageing population. Breakthroughs achieved in recent years in the production of so-called “induced pluripotent stem cells” are fuelling the hope of being able to exploit this medical potential in practice. However, the diverse development possibilities of these pluripotent stem cells also hold dangers: how can it be ensured that stem cells will go on to form stable cells of the desired type and not develop into tumours? In order to preclude these sorts of risks, researchers are trying to gain a better understanding of the regulatory steps that govern the natural differentiation of stem cells in the embryo. Until now it was known that complex networks of transcription factors and signals control this differentiation; how this occurs had, however, remained unclear. It is precisely this regulatory network that has now been studied and its key aspects clarified by the Freiburg systems biologists.

One of the most important stem cell factors in this process is Pou5f1/Oct4. However, little was known about the structure and function of the transcription factor network regulated by it. This network can maintain the pluripotency of a stem cell, that is, its ability to develop in every type of cell present in the organism. At the same time, the network enables the allocation of embryonic cells to the various main cell lines.

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The Freiburg scientists have researched these correlations in zebra fish, a tried and tested model organism. Within their systems biology approach they combined embryology, transcriptome analysis, bioinformatics and mathematical modelling, and in doing so have been able to very successfully gain a wider understanding of the basic regulatory mechanisms of early embryonic transcription networks.

### The LifeNet Symposium on “Theoretical Aspects of Complex Biological Systems” took place on April 9, 2010

The symposium served as a framework for the selection of a new Junior Fellow for the FRIAS School of Life Sciences. Three applicants from Belgium, France and Germany, pre-selected by a LifeNet commission and the LifeNet Advisory Board, presented their current research projects as well as future perspectives.

### EXTERNAL SENIOR FELLOW TO COME

#### Nir Ohad

Department of Plant Sciences  
Tel-Aviv University, Israel

“Molecular and biochemical characterization of P. patens. Polycom mutants”. 7/2010-6/2012

### EVENTS TO COME

#### June 3-5, 2010

3<sup>rd</sup> Conference on Systems Biology of Mammalian Cells (SBMC 2010), Concert Hall Freiburg.

#### June 22, 2010, 5:15 p.m.

Hermann Staudinger Lecture - Nobel Laureate Aaron Ciechanover: “Intracellular proteolysis and the ubiquitin system: From the backyard of biological research to the forefront of the patient bed”, Chemistry Lecture Hall, Albertstrasse 21, Freiburg

### FURTHER EVENTS

[www.frias.uni-freiburg.de/lifenet-events](http://www.frias.uni-freiburg.de/lifenet-events)

