



Presse Release No. 22/2010

**3rd EuCheMS Chemistry Congress - Chemistry – the Creative Force
August 29 - September 2, 2010, Nürnberg / Germany**

**European Chemistry Congress:
Fluorescing Enzymes, Metal Clusters in a Biosheath and the
Somewhat Altered DNA**

Frankfurt a.M., June 9, 2010

All of life's processes are based on (bio)chemical reactions. To understand these processes, one has to observe the small and large acting molecules and, in the field of medicine, find ways to counteract faultily regulated processes on a molecular level. Many scientists are dealing with this fascinating area of molecular life sciences at the 3rd EuCheMS Chemistry Congress in Nürnberg where they will present a focal point of biological and medical research: the (bio)chemical analysis.

Professor Dr. Barbara Imperiali and her work group at the Massachusetts Institute of Technology are dealing with the structure, function and structure of proteins. In Nürnberg, she will present the wealth of information gained for biology and medicine by means of fluorescence methods. With these methods, biomolecules, for example enzymes, are marked with fluorescing, i.e. light-emitting, molecules that thereby allow biological samples to be observed. Even though these techniques are not new, they are increasingly being refined via suitable fluorescence markers and observation methods so that one can reliably examine the most complex material, e.g. tissue or blood samples in clinical-chemical diagnostics. In her talk, the chemist Imperiali will show how one can successfully follow the phosphorylation of specific target molecules of kinases (i.e. enzymes that catalyze the transfer of phosphate groups to proteins) by exploiting the newly developed sulfonamide oxines as fluorescence markers. Other fluorescence markers based on aminophthalimide- and naphthalimide chromophores have been developed in order to investigate slight changes in continuously occurring biological processes, e.g. in protein-protein interactions.

In Nürnberg, about 100 talks and far over 100 posters will show the rapid gain in knowledge in the molecular life sciences. A focal point hereby is also the clarification of structures of larger biological molecules up to biopolymers that are also used to develop bio-inspired substances and materials. One of the invited speakers hereby is Professor Yoshihito

Watanabe of Nagoya University in Japan. Among other aspects, his research work concerns the design of metallo-organic enzymes with the aim of producing new inorganic (nano)materials with biomimetic properties. Since it is not yet sufficiently understood, attaching metal ions to the surfaces of the substances of the protein scaffold is difficult to accomplish. In order to obtain tailored inorganic materials, the binding mechanisms, including all their intermediate steps, have to be better understood with regard to the docking of metal ions to the protein surfaces. Watanabe has exemplarily studied this on palladium (Pd) ions. He began work on apoferritin, the protein sheath of the iron-storing ferritin, whose protein scaffold or –cage has varying amounts of Pd-ions embedded into it. By using X-ray crystal structure analysis, he could draw conclusions about the specific binding sites. By additionally applying quantitative inductive-coupled plasma (ICP) analysis, an emission spectroscopic technique, on apoferritin with various Pd-concentrations, Professor Watanabe could infer the kind of constantly occurring changes in the coordination structures. Upon reducing the number of Pd-ions in the apoferritin cage, one obtains a metallic Pd-cluster that acts as a catalyst in hydrogenations. Nevertheless, Watanabe considers the catalytic effect of Pd-ion-apoferritin structures to be more important during the Suzuki coupling, a reaction with which important natural materials for applications in medicine and in plant protection as well as liquid-crystalline compounds can be synthesized.

Besides the themes “Biostructures, Bipolymers and their Conjugates”, the Nürnberg congress will also handle peptide nucleic acids (PNA). Not only are PNA being discussed as precursors of DNA and RNA in the chemical evolution but, by addition of amino acid side chains, they can be modified such that they become interesting in the development of new medicines. Thus, they act similar to short-chained synthetic DNA yet are clearly much more stable in the body. In addition, the following current topics will be handled: the nickel enzyme-catalyzed oxidation of methane under the exclusion of oxygen; the fatty acid transport in the body via the human serum albumin, the application of biosensors and the functionalization of their surfaces; the investigation of virus proteins which interfere with cell reactions; and the Ras-protein which regulates cell growth and which becomes mutated in 30 % of human tumors. Moreover, the congress will involve the modeling of a mitochondrial biomembrane, i.e. membrane proteins which enable the transport of various substrates through the cell membrane and, last but not least, elastin-like bio-block copolymers for technical and biomedical applications, e.g. to produce artificial tissues (“tissue engineering”).

The most important European chemistry congress, the EuCheMS Chemistry Congress, is being sponsored by the European Association of Chemical and Molecular Sciences (EuCheMS) which, in this year, is expecting about 3,000 participants. As of June 7th, the host and main organizer, the German Chemical Society (Gesellschaft Deutscher Chemiker (GDCh)) and the second-largest EuCheMS member society, could already register over 1,500 participants from 51 countries. Under the motto “Chemistry—The Creative Force”, the congress is expecting current research results from all the important partial areas of chemistry. Especially pronounced are topics with societal relevance such as innovative materials, raw materials and sustainability, molecular life sciences as well as catalysis.