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## From Natural to Artificial Cells

### Petra Schwille Appointed New Director at the MPI of Biochemistry

Recently, Petra Schwille signed a contract as a Director at the Max Planck Institute (MPI) of Biochemistry in Martinsried near Munich, Germany. The biophysicist is regarded as one of the internationally leading scientists in her field. In addition to her official duties at the MPI of Biochemistry, she will continue her teaching and research at the TU Dresden until April 2012. She will then move to Munich together with her husband and their three children, and take up her work at the MPI of Biochemistry. The new Research Department "Cellular and Molecular Biophysics" is going to investigate the interactions between different biomolecules inside the cell.

Cells consist of various biomolecules, such as proteins, lipids and nucleic acids. But how exactly do these single components interact with each other? In her position as Director at the MPI of Biochemistry, Petra Schwille will be looking for answers to such questions. In addition to research on living cells and organisms, she will also try to remodel the structures of a cell with the help of a modular approach. In doing so, she gradually wants to achieve a better understanding of the fundamental features and mechanisms of living systems. "Our vision is to combine modules of natural and artificial biomolecules step by step, to eventually attain a minimal version of the cell", the biophysicist explains.

Just recently, Petra Schwille and her team have succeeded in building a minimal system capable of biological self-organization. It consists of two protein types, an artificial membrane and the energy source ATP. With the help of this model, the scientists could observe that the proteins form patterns and surface waves when supplied with energy. "In the future, I would like to use similar approaches in order to analyze and understand processes like cell division as well as the polarization and differentiation of living systems from the bottom up," illustrates Petra Schwille.

### Development and Application of Innovative Methods

"Quantifying interactions and dynamics of biomolecules is crucial for understanding living systems", says 43-year-old. In the course of her work, she applies state-of-the-art methods such as Fluorescence Cross Correlation Spectroscopy (FCCS). Petra Schwille and her team were significantly involved in the development of this novel technique, which is regarded one of the most important biophysical tools in modern cell and molecular biology. This highly sensitive optical method enables scientists to detect interactions between single biomolecules – directly in living cells or organisms such as the nematode *C.elegans* or the zebrafish. "In this way, we can illustrate biochemical processes with hitherto unrivaled precision and very little disturbance of the cell's system as a whole", Petra Schwille explains.



**Personal Data**

Petra Schwille studied Physics and Philosophy at the universities of Stuttgart and Göttingen. She did her PhD in the lab of Nobel Laureate Manfred Eigen at the Max Planck Institute of Biophysical Chemistry. After a postdoc at the Cornell University (Ithaca, New York, USA), she returned to Germany and to the MPI of Biophysical Chemistry in 1999. There she headed her own research group. In 2002, she accepted a professorship in Biophysics at the Biotechnology Center of the TU Dresden (BIOTEC), which she will end in April 2012. For the time being, she is additionally working as a part-time Director at the MPI of Biochemistry. From May 2012 on, she will work in Martinsried on a full-time basis. Petra Schwille was awarded the Philip Morris Research Award 2004 and the Gottfried Wilhelm Leibniz Prize 2010 of the German Research Foundation (DFG) for her groundbreaking work on the development of FCCS.

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