

Summerschool

CHANNELS, CHIPS and NANOPORES

BIOSENSING WITH CHANNELS

L.V.T. –Ile de Berder- 56870 LARMOR-BADEN France,
25-31 Août 2007



Local organizing committee

Loïc Auvray and Philippe Guégan (university of Évry)

Frank Artzner (university of Rennes)

Sergey Bezrukov (National Institute of Health), Mathias Winterhalter (International University Bremen)

Charlie Gosse (CNRS, Laboratoire de Photonique et Nanostructures, Marcoussis)

Jérôme Mathé (university of Évry)

Scientific committee

Chairman : Sergey Bezrukov (National Institute of Health, USA),

Co-chairman : Mathias Winterhalter (IUB)

Members: Alexandre Ghazi (CNRS, Orsay), Horst Vogel (Ecole Polytechnique Fédérale, Lausanne), Roland Benz (université de Würzburg), François Châtelain (DSV, CEA), Ulrich Bockelman (ESPCI)

Presentation

In biological systems, ions and macromolecules are processed and transported through highly selective protein channels. Studying, exploiting and imitating these “secretion”, “extrusion”, “gating” phenomena and structures open up numerous prospects of applications for detecting molecules, characterizing molecular interactions, sequencing DNA, or watching peptide folding. Combining these investigations with microfluidics setups allows for instance high throughput detection of cells and makes electrophysiology and “patch-clamp on a chip” interesting for drug screening. Complementary to biological channels, recent advances in technology allow creating artificial nanometre-sized pores in solid materials.

The aim of the school is to teach a broad and interdisciplinary perspective of this field. It concerns interested biologists, physicists, chemists and engineers. The core program includes invited general and research talks from experts in the field. Special emphasis will be given on the outline of current developments and the discussion of promising future research directions. Participating students and postdocs will have the opportunity to present and discuss their own research in poster sessions and student seminars.

Working program

The program will include lectures on the following topics:

- natural channels : ion channels, mechano-sensitive channels, porins, toxins, nuclear pores, translocons,
- natural processes of transport of ions and macromolecules : biopolymer synthesis and degradation, transport of nucleic acids through nuclear pores, infection of cells by viruses, translocation and secretion of proteins,
- biophysics of lipid membranes, fusion, fission, poration, exo- and endocytosis,
- chemical synthesis of artificial channels,
- microfabrication, functionalization and use of artificial nanopores and nanotubes,
- electrical and optical detection of the transport of molecules at the scale of one single channel,
- proteins translocation and folding,
- forces measurement and conformations detection by translocation,
- physics of confined polymers,
- lipid bilayers and channels based biosensors,
- electronic detection of bio-macromolecules.

One half-day will be devoted to presentations by companies working in the field of microfluidics, patch-clamp on a chip, electrophysiology, drug screening and biosensors.

One evening of popularization of the subjects of the school will be organized.

Organization

This summerschool is the third of a series, which took place in 2005 and 2006, organized at the International University of Bremen on the same topics. The 2005 school was entirely financed by the Volkswagen foundation. The 2006 one was financed by the French-German University under the responsibility of the universities of Bremen (IUB) and Évry.

The summerschool is open to about 75 students and 25 lecturers.

It will take place in the small island of Berder (<http://www.lvt-berder.com/>). The participants will be lodged in single and double rooms.

Applying

In order to select participating students we ask for a few informal lines on your motivation and your field of interest with a short CV to give us an idea on your contribution to the program. Please send the application via email to one of the contacts below.

Costs

The costs for the course will be 450 Euro including meals and housing, payable on the bank account of the university of Évry.

Travel

By train : the closest railways station is VANNES, 20 mn by shuttle. The VANNES station is easily reached from Paris by fast train (Paris-Vannes 3h).

By Airplane : LORIENT airport: 50 km, NANTES international airport : 120 km, RENNES airport 120 km.

Contacts

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