

Micro-/Nano-Instrumentation for Biophysical Measurements and Cryomicroscopy

Přednáška je organizována v rámci Strategie AV21 Akademie věd České republiky, výzkumný program Diagnostické metody a techniky



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- 2001 Diplom in Physics, ETH Zurich, Switzerland
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Micro- and nanofabrication technologies have greatly expanded our ability to measure and manipulate biological systems. In my seminar I will present some new micro- and nanofabrication-based approaches of our laboratory towards studying biological samples at the cellular and sub-cellular scale.

First, I will provide an overview of our research in the areas of precision mass sensing, optofluidic measurements, and nanofiltration. We expect that the combination of these techniques will enable many exciting applications in biochemistry, biotechnology, and pharmacy.

In the main part of my talk, I will focus on a new microsystems-based approach to achieve high time resolution in correlative live-cell imaging and electron microscopy (EM). Before entering the high vacuum of an electron microscope, biological samples must be fixed chemically or frozen. Due to the time required for this preparation, it is currently not possible to precisely correlate high-resolution EM images of cell structure with dynamics previously observed in the light microscope. Here I present a technique that overcomes this challenge by cryo-immobilizing the object to below $-140\text{ }^{\circ}\text{C}$ directly in the light microscope and with millisecond time control. Key to this is a liquid nitrogen cooled microsystem which suppresses ice crystallization through controlled cooling at more than $\sim 10^4\text{ }^{\circ}\text{C/s}$. This new instrument can be integrated with conventional correlative light and electron microscopy workflows to open the path for understanding temporal relationships between cell activation and response in fields from neuroscience and immunology to pharmaceutical sciences.

Přednáška začíná ve 14:30, malé občerstvení bude podáváno v předsálí ÚPT od cca 14:00.

Uvítáme vyplnění registračního formuláře do 29.5. 12:00: <http://goo.gl/sglM0m>