Nanopores for Single-Molecule Analysis

by

Meni Wanunu

Depts. of Physics and Chemistry/Chemical Biology,
Northeastern University, Boston

Abstract:

Much more than ever, nucleic acids are recognized as key building blocks in many of life's processes, and the science of studying nucleic acid-based phenomena at the single-molecule level is thriving. A new method of doing so has been introduced in the mid 1990's. This method is exceedingly simple: a nanoscale pore that spans across an impermeable thin membrane is placed between two chambers that contain an electrolyte, and voltage is applied across the membrane using two electrodes. Nucleic acid molecules in solution can be driven through the pore, and structural features of the biomolecules are observed as changes in the trans-membrane ion current, measured via the electrodes. In essence, a nanopore is a high-throughput ion microscope and a single-molecule force apparatus. Nanopores are taking center stage as a tool that promises to read a DNA sequence, promise that has resulted in overwhelming academic and industrial interest. By optimization of the nanopores dimensions using state-of-the-art nanofabrication methods, we have improved the resolution of nanopores to make them extremely sensitive to the nucleic acid type and its structural features. In this talk, I will discuss some of these efforts, which have enabled the analysis of various nucleic acid structures such as microRNAs, RNA drug targets, and RNA switches.

Monday, November 19th, 2012, 13:00

ZNN Seminar Room EG 0.001

Contact: Prof. Hendrik Dietz, dietz@tum.de, phone: 89 -289 -11615