OMICS Group Conferences
Accelerating Scientific Discovery

International Conference and Exhibition on
Nanotechnology & Nanomedicine
March 12-14, 2012 Omaha Marriott, USA

TITLE

Single-molecule Science with a nanopore:Inspiration from nature

Liviu Movileanu
Syracuse University, USA

A nanopore may act as an amazingly versatile single-molecule probe that can be employed to reveal several important features of nucleic acids and proteins. The underlying principle of nanopore probe techniques is simple: the application of a voltage bias across an electrically insulated membrane enables the measurement of a tiny picoamp-scale transmembrane current through a single hole of nanometer size, called a nanopore. Each molecule, translocating through the nanopore, produces a distinctive current blockade, the nature of which depends on its biophysical properties as well as the molecule-nanopore interaction.

Such an approach proves to be quite powerful, because single small molecules and biopolymers are examined at very high spatial and temporal resolutions. I will discuss our recent work that provided a mechanistic understanding of the forces that drive protein translocation through a nanopore. These measurements facilitate the detection and exploration of the conformational fluctuations of single molecules and the energetic requirements for their transition from one state to another.

I will also describe our recent strategies for engineering new functional nanopores, in organic and silicon-based materials, with properties that are not encountered in nature. From a practical point of view, this methodology shows promise for the integration of engineered nanopores into nanofluidic devices, which would provide a new generation of research tools in nanomedicine and high-throughput devices for molecular biomedical diagnosis.

Biography

Liviu Movileanu studied physics 1985-1990 and received a PhD in Biophysics from the University of Bucharest 1997 He held postdoctoral positions at the University of Missouri Kansas City Missouri 1997-1998 and the Texas AM University Health Science Center College Station Texas 1999-2004. He is currently an Associate Professor of Physics at Syracuse University Syracuse New York.