Northeastern University Distinguished Lecture Series on
"Nanotechnologies through Materials Innovation"

Co-hosted by Physics and Chemical Engineering Departments

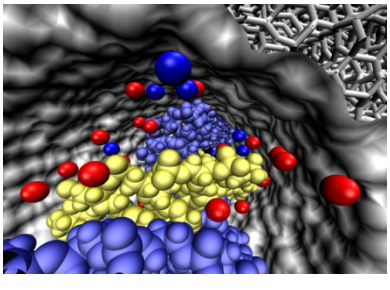
Presents

Professor Alek Aksimentiev

Department of Physics
University of Illinois at Urbana-Champaign

"Reinventing a DNA Sequence Reader"

Date: Thursday, February 20th
Time: 12pm
Location: 114 Dana Research Center



It has been suggested that the sequence of a DNA molecule can be read by threading the molecule through a nanopore in a thin insulating membrane and measuring the electric signals resulting from DNA interactions with the nanopore. Over the past years, this idea has captured the imagination of tens of thousands of researchers and continues to generate excitement among both scientists and entrepreneurs. Spectacular progress in using enzymes to control DNA translocation through biological nanopores has made nanopore sequencing of DNA plausible. However, to sequence a human genome with 99.99% accuracy in under 15 minutes, several major challenges must be met. In this lecture, I will describe our efforts to reinvent nanopore sequencing through large-scale computer simulations. I will demonstrate how nanoscale interactions between DNA and man-made materials can be controlled through heat, light and electric charge and how such control can be utilized for electronic readout of a DNA sequence.

Aleksei Aksimentiev received his Master's degree in physics from the Ivan Franko Lviv State University, Lviv, Ukraine, and his Ph.D. in chemistry from the Institute of Physical Chemistry, Warsaw, Poland. After a brief postdoctoral training at Mitsui Chemicals, Japan, he joined the Theoretical and Computational Biophysics Group, Urbana, IL, as a postdoctoral research associate. In 2005, he became a faculty member of the Physics Department at the University of Illinois, where he is currently an associate professor of physics. His research interests include systems that combine biological macromolecules and man-made nanostructures, membrane proteins, and molecular machinery of DNA replication.