University of Texas at San Antonio

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Time: 3:00 p.m.-4:00 p.m.

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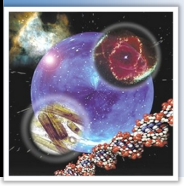
Toward Nanopore DNA Sequencing: How to Make a Nano Bar-code Scanner

In this talk, I will discuss recent progress in the emerging field of nanopore biophysics. A nanopore is a nanometer-scale pore inside an insulating membrane (which can be of solid-state materials such as Si3N4 or of biological origin such as lipids). When biased with a voltage, the ionic current through the nanopore is sensitive to large molecules (such as a DNA) moving through ("translocation"). The original idea of "nanopore DNA sequencing" by Kasianowicz et al. was to read out the genetic sequence of the DNA by measuring the temporal variation of the ionic current through the pore when a single-stranded DNA is pulled through. The intense research followed Kasianowicz's proposal revealed interesting physics of DNA translocation through a nanopore, but the goal of DNA sequencing using the physics of ionic current remains elusive. This talk will discuss the alternative methods attempted by us and others to use solid-state nanopores for DNA sequencing. Our approach is to combine the biology of DNA hybridization with the physics of nanopores, and our goal is to achieve sequencing by detecting the location of hybridization probes. We demonstrated that one can indeed use a solid-state nanopore as a nanoscale bar-code scanner for the hybridization probes.

[1] Venkat S.K. Balagurusamy, Paul Weinger, & X. S. Ling, "Detection of DNA hybridizations using solid-state nanopores", Nanotechnology 21, 335102 (2010).
[2] Hongbo Peng and X.S. Ling, "Reverse DNA translocation through a solid-state nanopore by magnetic tweezers", Nanotechnology, 20, 185101(2009).



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