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Nanopore analysis is emerging as a single-molecule technique for translating the activity and the identity of biomolecules into electrical signals. It involves using a voltage to drive charged molecules through a nanoscale pore in a thin membrane separating two liquid electrolytes and monitoring the modulation in ionic current as individual molecules pass through it. Driven by the prospect of low-cost DNA sequencing, the field of nanopore sensors has seen many exciting developments in the last few years.

In this talk, I will introduce the concept of nanopore sensing and how it can be applied for single-molecule analysis. I will review the recent advances in the quest for rapid, direct sequencing of single DNA molecules, but also highlight the challenges remaining for the development of nanopore-based technologies. In particular, I will discuss: (i) the need for increasing the specificity of the electrical signal through the use of alternative detection schemes; (ii) the necessity for controlling capture, passage, and ultimately the motion of biomolecules through these nanoconfined geometries; (iii) the obligation of developing novel methods for inexpensive mass-fabrication of solid-state nanopores, as current approaches relying on tightly focused high-energy particles to drill sub-10 nm pores can only sustain the research activities of academic laboratories.

*Figure: Schematic of proteins bound to DNA translocating through an array of solid-state nanopores.

Thursday, February 14, 2013

Room 101

Sir James Dunn Building

11:30 am

***Light lunch will be provided***