

2014-2015 Projects

The "Applied Single-Molecule Biophysics Group" (www.tcossalab.net) is dedicated to the development of novel techniques and methods to manipulate and characterize single-molecules using nanofluidic devices, to unravel the basic physics governing the behaviour of biological molecules in nanoconfined geometries, and ultimately to translate these discoveries into new tools for the life sciences. The T.-Cossa laboratory is located in the recently renovated state-of-the-art Center for Interdisciplinary NanoPhysics, in the basement of MacDonald Hall - see the Infrastructure page at www.biophysics.uottawa.ca

Project – Solid-State Nanopores for Single-Molecule Biophysics –

Solid-state nanopores are emerging as versatile single-molecule analytical tools for a host of applications, including rapid DNA sequencing. The T.-Cossa Lab has developed a novel method for nanofabricating nanopores and controlling their size with sub-nm precision on a thin freestanding dielectric membrane. As part of our group on-going efforts to develop nanopore-based technologies, the student would be involved in any number of these tasks:

- Assist during the nanofabrication of sub-10 nm nanopores;
- Characterize their electrical behavior as a function of various experimental conditions;
- Fabricate advanced nanopore devices by microfabrication techniques involving, atomic layer deposition (ALD), photolithography, and wet chemical etching.
- Perform DNA translocation experiments to confirm their ability to detect single molecules, and investigate polymer dynamics during passage;
- Integrate a nanopore with a PDMS microfluidics chip for Lab-on-a-chip applications;
- Perform simultaneous single-molecule fluorescence and electrical measurements of DNA passage through nanopores.

Students enrolled in a Physics program (Major or Minor in Physics) will be given priority, but all highly motivated Science (e.g. Biochemistry) and Engineering (e.g. Electrical Engineering) students are strongly encouraged to apply. This position is a unique opportunity to be trained on state-of-the-art equipment and acquire valuable multidisciplinary research skills.

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