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Optimizing Nanopores for Single-Molecule Counting and Target Quantification

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Nanopores have proven to be useful single-molecule sensing tools in the past two decades. One of the many promising applications of these electrical nano-sensors is to act as molecular counting devices with single-molecule sensitivity, essentially determining concentrations of specific molecular species. To achieve this, it is essential to develop a better understanding of the nanopore capture process and the factors affecting the reliability and accuracy of such nano-devices.
This poster will present our investigation of the mechanisms controlling the nanopore capture process and the factors affecting its reliability for nanopores specifically fabricated using the recently developed controlled dielectric breakdown (CBD) technique. Using 50bp dsDNA to translocate through the nano-sensors, the energy barrier and system resolution limit of pores of different sizes are studied and are used to determine what parameters are optimal for efficiently counting this type of molecule.

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