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Rapid fabrication of sub-5nm solid-state nanopore for low cost biosensing HAROLD KWOK, KYLE BRIGGS, VINCENT TABARD-COSSA, University of Ottawa — Nanopores-based technologies are emerging as a powerful tool for single molecule analysis. They are also the leading candidates for future generation DNA sequencing platforms. Despite all of these potentials, current solid-state nanopore fabrication techniques, based on focused beams of energetic particles, remains low throughput, complex and expensive. Such drawbacks greatly limit the breadth of applications, and are major barriers to commercialization of any nanopore-based technologies. We have demonstrated a simple, highly scalable and low cost method to fabricate solid-state nanopores. It relies on stressing a thin dielectric membrane with high-electric field while submerged in aqueous salt solution. The technique allows a single sub-5nm nanopore be fabricated within a minute directly in liquids. In addition, a pore can be precisely enlarged by the similar used of high-electric field stressing. We will describe the fabrication method, present our current understanding of the physical mechanism leading to pore formation, and demonstrate its usefulness for single-molecule detection by studying DNA translocation kinetics. The discovery of this new method opens a wide range of possibilities for single-molecule biophysics and commercial sensing applications.

Harold Kwok
University of Ottawa

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