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Nanofluidic Device with Embedded Nanopore YUNING ZHANG, WALTER REISNER, McGill Univ — Nanofluidic based devices are robust methods for biomolecular sensing and single DNA manipulation. Nanopore-based DNA sensing has attractive features that make it a leading candidate as a single-molecule DNA sequencing technology. Nanochannel based extension of DNA, combined with enzymatic or denaturation-based barcoding schemes, is already a powerful approach for genome analysis. We believe that there is revolutionary potential in devices that combine nanochannels with nanpore detectors. In particular, due to the fast translocation of a DNA molecule through a standard nanopore configuration, there is an unfavorable trade-off between signal and sequence resolution. With a combined nanochannel-nanopore device, based on embedding a nanopore inside a nanochannel, we can in principle gain independent control over both DNA translocation speed and sensing signal, solving the key draw-back of the standard nanopore configuration. We demonstrate that we can detect - using fluorescent microscopy - successful translocation of DNA from the nanochannel out through the nanopore, a possible method to 'select' a given barcode for further analysis. We also show that in equilibrium DNA will not escape through an embedded sub-persistence length nanopore until a certain voltage bias is added.

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