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Nanopore with Self-aligned Transverse Tunneling Junction for DNA Detection and Sequencing SANJANA MUKHERJEE, YUAN WANG , JOSHUA SADAR , CHING-WEI TSAO, QUAN QING , Arizona State University — The integration of transverse electrodes with solid-state nanopore can open new opportunities for real-time detection and sequencing of DNA/RNA and other biomolecules, but the fabrication of such structure has been very challenging. We developed a new fabrication strategy to accurately produce solid-state nanopore device self-aligned with a pair of transverse metal tunneling junction, all integrated on a microfluidic chip. The nanopore and tunneling junction size is precisely regulated by electrochemical deposition method to selectively deposit or remove metal at the tip of the electrodes using an impedance based-feedback mechanism. With this design, we have demonstrated the first high yield (>93%) correlated detection of translocating DNAs from both the ionic channel and the tunneling junction with enriched event rate and have also observed events attributed to DNA bridging the transverse electrodes. In this talk, I will introduce the fabrication and characterization of the devices, and preliminary analysis of the signals obtained from translocating double strand DNAs. I will also discuss briefly on the optimization of electrochemical deposition parameters in the confined nanoscale device.

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