Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Suspended Solid-state Membranes on Glass Chips with Sub 1-pF Capacitance for Biomolecule Sensing Applications CHEN-CHI CHIEN, ADRIAN BALAN, REBECCA ENGELKE, MARIJA DRNDIC, University of Pennsylvania — Solid-state membranes are finding use in many applications in nanoelectronics and nanomedicine, from single molecule sensors to water filtration, and yet many of their electronics applications are limited by the current noise and low bandwidth stemming from the relatively high capacitance (more than 10 pF) of the membrane chips. To address this problem, we devised an integrated fabrication process to grow and define circular silicon nitride membranes on glass chips that successfully lower the chip capacitance to below 1 pF. We use these devices to demonstrate low-noise, high-bandwidth DNA translocation measurements. We also make use of this versatile, low-capacitance platform to suspend other thin, two-dimensional membranes such as graphene.

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Date submitted: 05 Nov 2015 Electronic form version 1.4