Supporting Information For

Silicon Nanowires with High-k Hafnium Oxide Dielectrics for Sensitive Detection of Small Nucleic Acid Oligomers

Brian R. Dorvel[*12,4], *J. Bobby Reddy, Jr*[*1,2], *Jonghyun Go, Carlos Duarte Guevara*[1,2], *Eric Salm*[1,3], *Nima Jokilaakso, Muhammad Ashraful Alam*[4], *and Rashid Bashir*[1,2,3,^]

[1]Micro and Nanotechnology Lab, [2]Department of Electrical and Computer Engineering, [3]Department of Bioengineering, [4]Department of Biophysics and Computational Biology, University of Illinois at Urbana Champaign, Urbana, Illinois, 61801

[4]School of Electrical and Computer Engineering, Purdue University, West Lafayette, IN. 47906

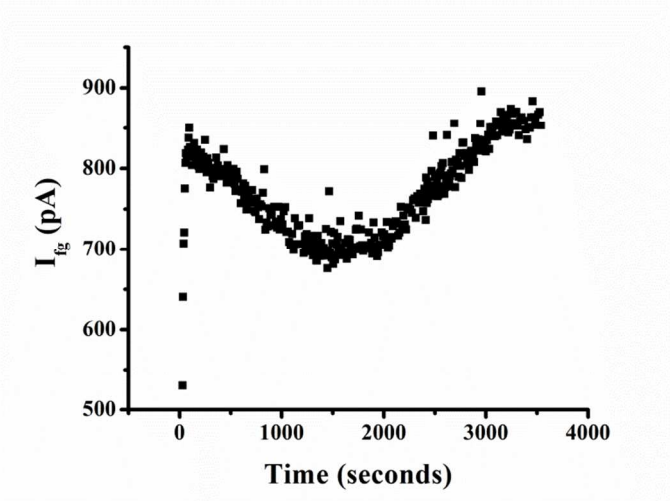

Figure S1.

The measured leakage current from the device to the fluid gate (I_{fg}) over time for a nanowire.

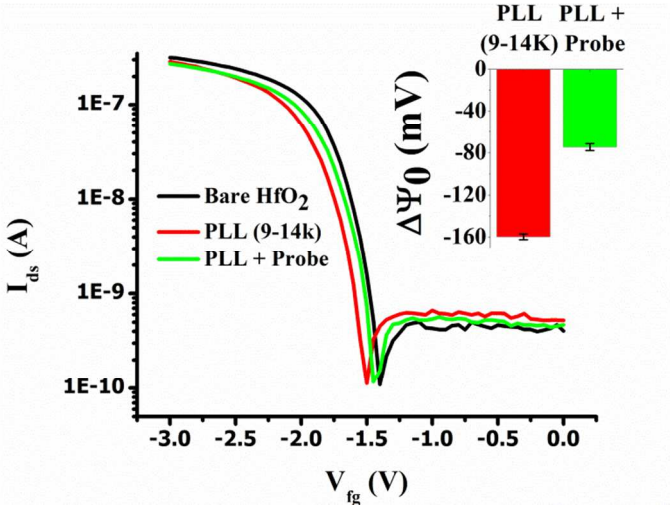

Figure S2.

Id-Vg transfer curves of the surface functionalization process with PLL (9-14K) and probe DNA**.** The changes in surface potential from the reference HfO_2 (inset) show a negative shift for the PLL deposition and a corresponding postive shift for the probe immobilization. The deposition of PLL shifts the threshold voltage to the left by ~160mV, relative to the HfO_2 reference. The probe DNA immobilization shifts the threshold voltage back to the right by ~90mV, relative to the PLL functionalization.

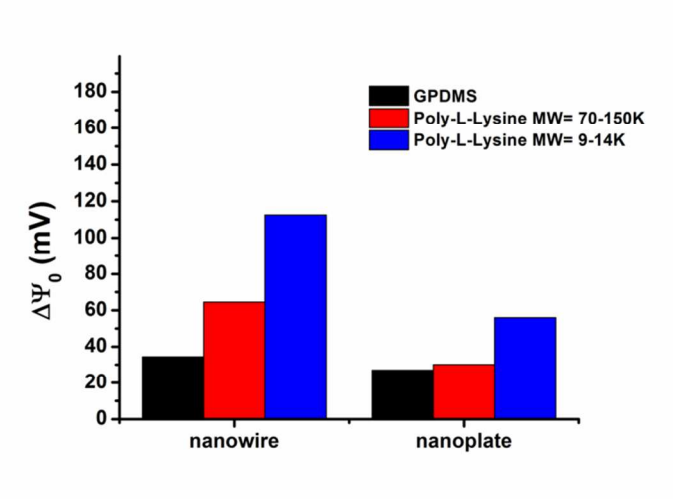

Figure S3.

The change in surface potential of probe DNA conjugation to nanowires (w=100nm) and nanoplates (w=2µm) for different surface functionalization procedures. Probe DNA was spotted in a 10uM concentration for each of the different surface chemistries for a direct comparison.

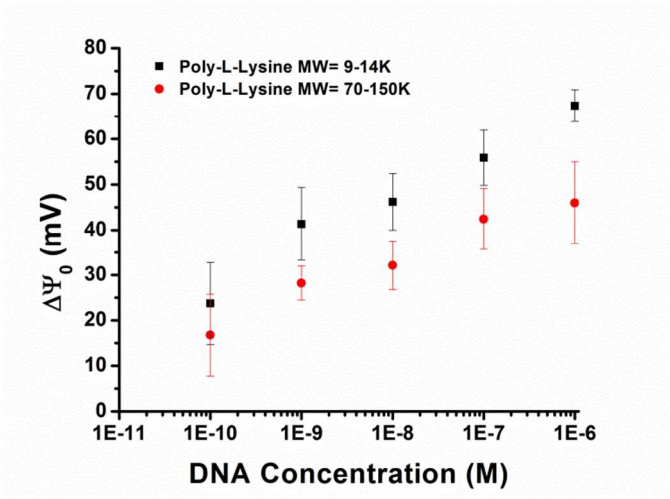

Figure S4.

The change in surface potential from I_d-V_g curves for miR-10b target hybridization to probe DNA on nanoplate (w=2µm) devices. The error bars represent the variance for n=3 devices, swept 5 times each. The procedure for measuring the devices and the target hybridization can be found in the methods section of the paper for device sensing.