Supporting Information for:

General strategy for biodetection in high ionic strength solutions using transistor-based nanoelectronic sensors

*Ning Gao, Wei Zhou, Xiaocheng Jiang, Guosong Hong, Tian-Ming Fu and Charles M. Lieber**

This file includes:

Supplementary Figures S1-S4

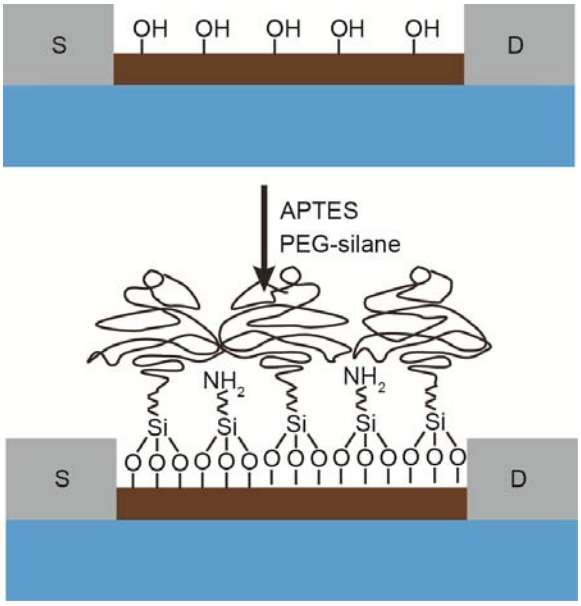

Figure S1. Schematic of nanowire surface modification with polymer. (top) Illustration of the silicon nanowire SiO_2 surface with hydroxyl group termination. (bottom) Schematic of co-modification strategy using a mixture of APTES and silane-PEG (triethoxysilane-PEG; MW = 10 kD). We used an APTES : silane-PEG (4 : 1) in these studies. Immediately prior to modification, the silicon nanowire device chip was cleaned with oxygen plasma (40 W for 60 sec), and then the chip was reacted with a silane/ethanol (95 : 5, EtOH : H_2O) solution to yield the modified nanowire surface. Full experimental details for modification can be found in reference-34 of main text.

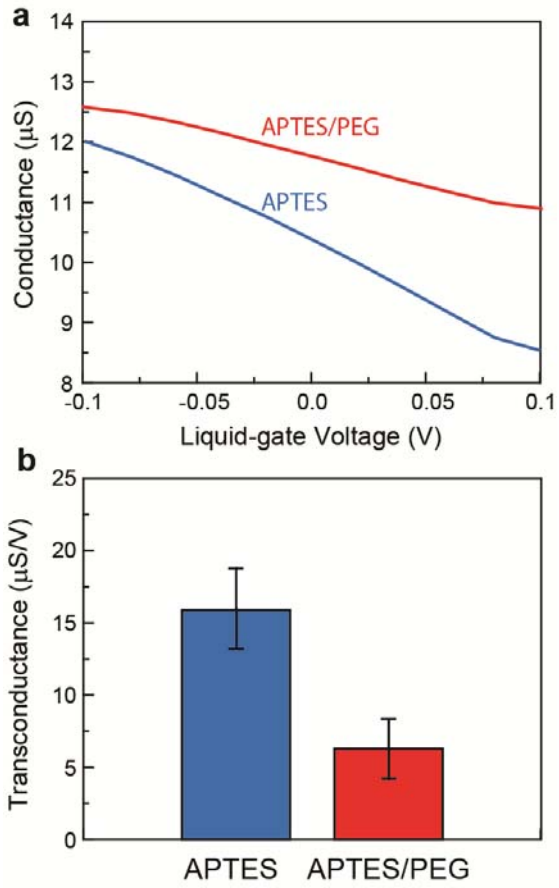

Figure S2. Electrical performance of Si nanowire FET devices with different surface modification. (a) The dependence of conductance on the liquid-gate voltage for a typical APTES device (blue) and a typical APTES/PEG device (red) under a source-drain voltage of 30 mV (10 mM PB). (b) Comparison of transconductance values for APTES devices and APTES/PEG devices from independent sensor chips, where APTES/PEG corresponds to modification with 4 : 1 APTES/silane-PEG as described in the text. The error bars for each experiment correspond to ± 1 standard deviation from data acquired simultaneously from three independent devices.

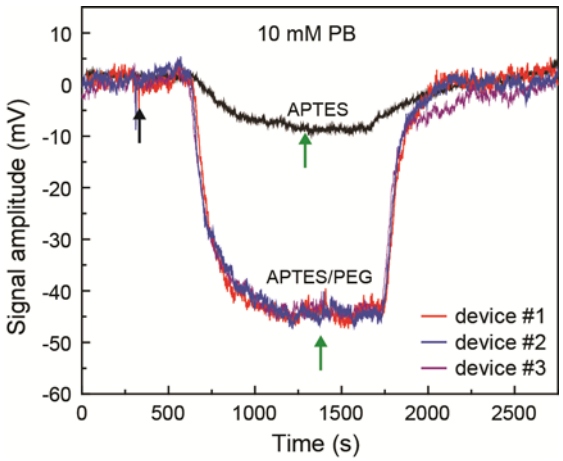

Figure S3. Comparison of PSA detection in 10 mM PB for devices with and without polymer modification. The time-dependent nanowire device responses are shown for nanowires modified with a 4:1 mixture of APTES : silane-PEG (devices #1 to #3) or pure APTES (black trace). The data for the three polymer modified devices were recorded simultaneously from the same chip, while that for the pure APTES device was recorded in a separate experiment. The PSA concentration in all experiments was 100 nM; the black arrow indicates the time that the PSA/10 mM PB solution was added to solution delivery line, and the green arrow shows the point at which the solution was changed to pure 10 mM PB. Other experimental details are provided in references 34 and 35 of the main text.

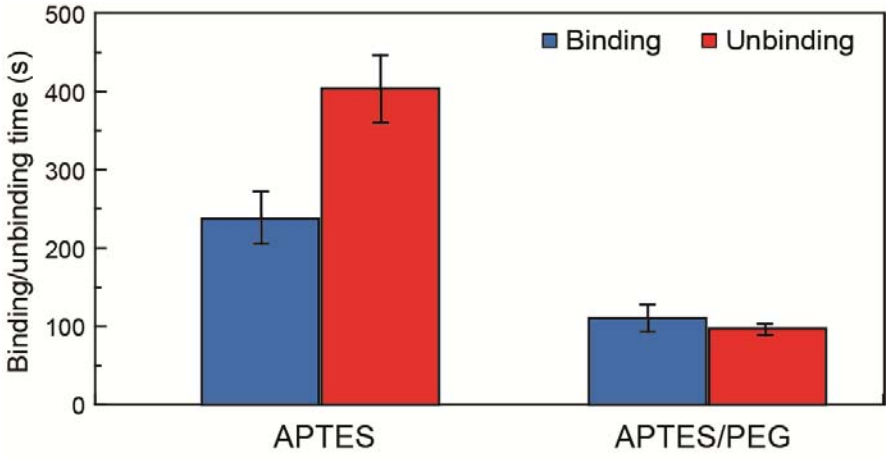

Figure S4. Comparison of binding and unbinding times between APTES devices and APTES/PEG devices from independent sensor chips in 10 mM PB solution. Error bars correspond to ± 1 standard deviation.