Supporting Information

for

Effect of channel length on the electrical response of carbon nanotube field-effect transistors to deoxyribonucleic acid hybridization

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Additional experimental data

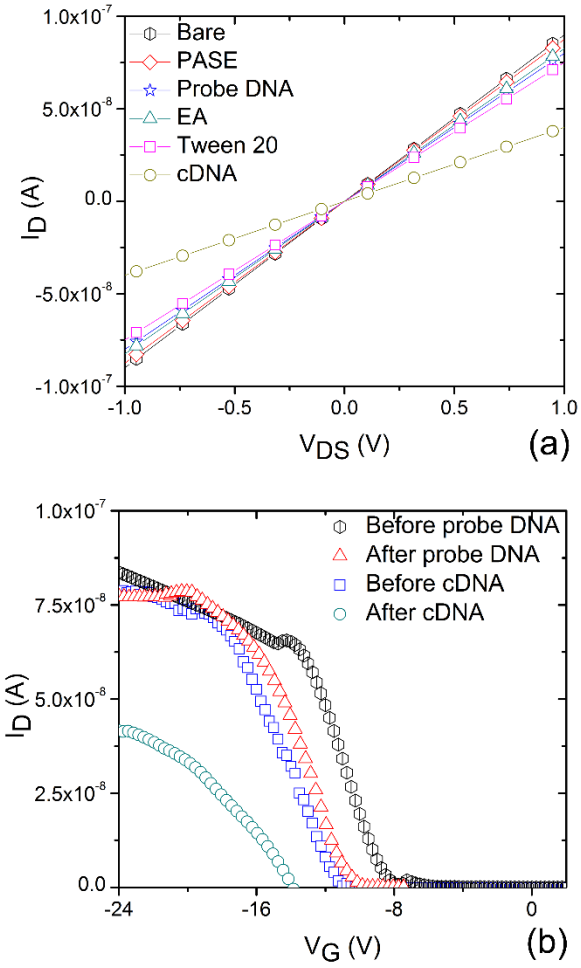

Figure S1: (a) I_D–V_{DS} and (b) I_D–V_G curves of SWCNT-based FETs showing the various functionalization steps with both channel and junction exposed to cDNA (L = 300 µm). The "before probe DNA" and "after probe DNA" I_D–V_G curves represent the PASE functionalization and probe DNA incubation steps, respectively. The "before cDNA" step corresponds to the incubation of probe DNA-immobilized FETs with EA and Tween 20. The "after cDNA" step represents the recording after incubation with cDNA.

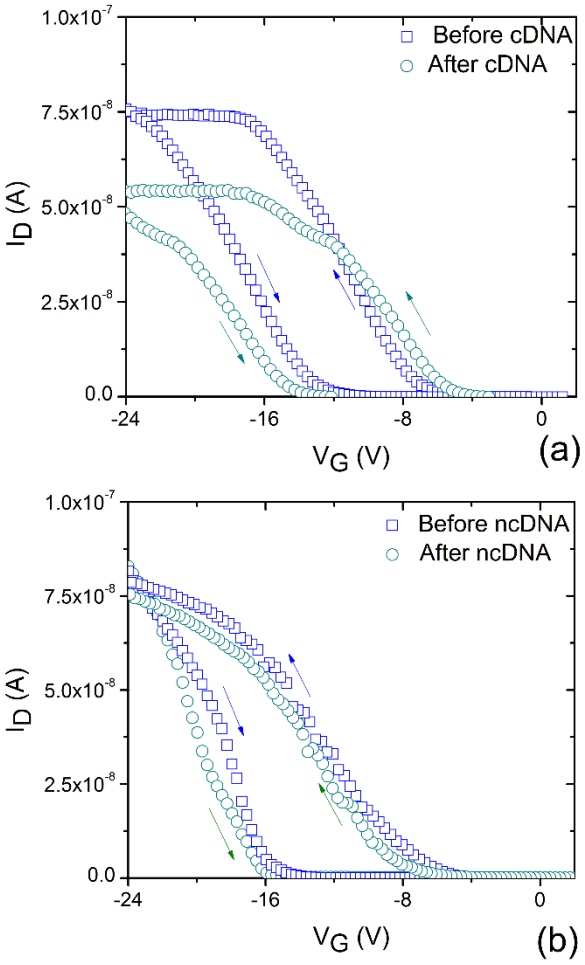

Figure S2: I_D–V_G plots of SWCNT-based FETs (L = 300 μm) with only the channel exposed to (a) cDNA and (b) ncDNA. The "before cDNA" step corresponds to the incubation of probe DNA-immobilized FETs with EA and Tween 20. The "after cDNA" step represents the recording after incubation with cDNA. The arrows indicate the direction of the gate voltage sweep.

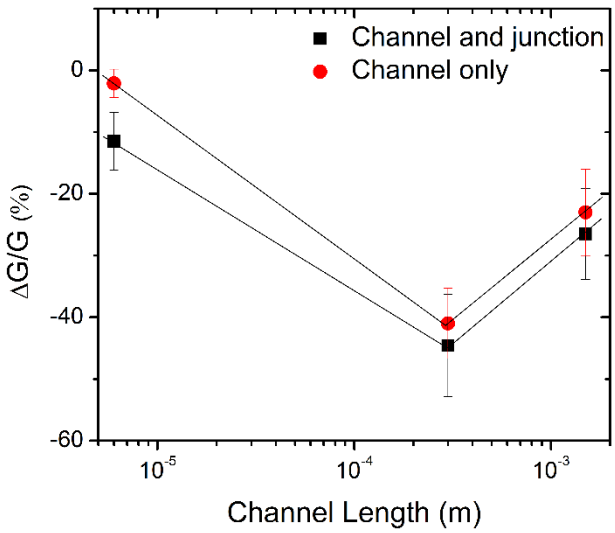

Figure S3: The variation in the conductance response for the devices with the channel and junction exposed ($\Delta G_{on}/G_{on}$) and devices with only the channel exposed ($\Delta G_{ch}/G_{ch}$) to cDNA, both as a function of L. $\Delta G_{ch}/G_{ch} \cong \Delta G_{on}/G_{on}$ for L = 300 µm and 1500 µm, which indicates the dominance of the change in channel resistance (ΔR_{ch}) after hybridization. $\Delta G_{on}/G_{on} > \Delta G_{ch}/G_{ch}$ for L = 6 µm, which indicates the additional contribution of the change in contact resistance (ΔR_c) to $\Delta G_{on}/G_{on}$ after hybridization. The solid lines are a guide to the eye.

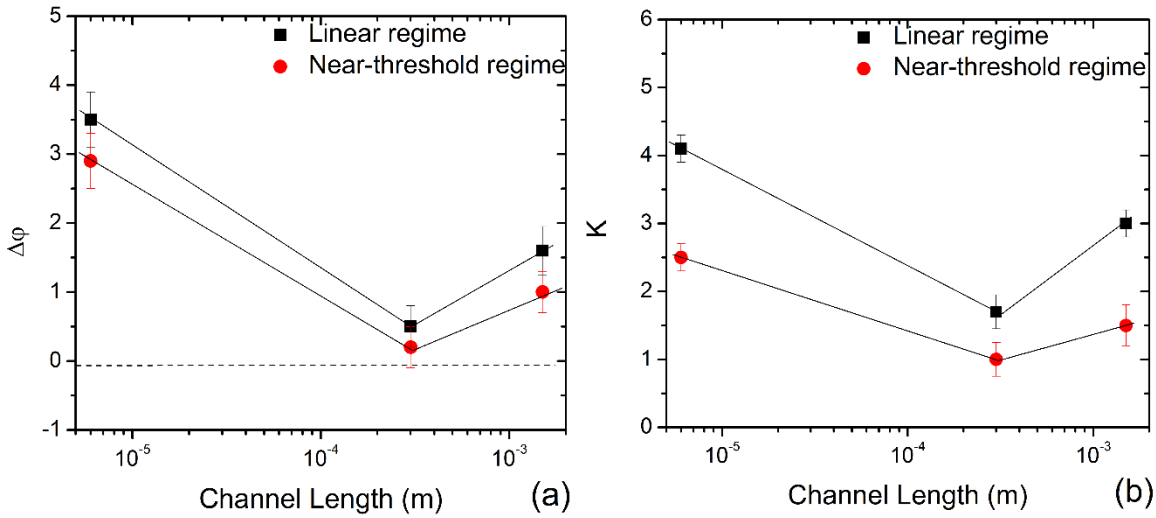

Figure S4: The variation in (a) $\Delta\varphi$ and (b) K with L in the linear and near-threshold regimes for the reverse sweep. The solid lines are a guide to the eye.