

An i-motif quadruplex DNA-based biosensor for distinguishing single- and multi-walled carbon nanotubes

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Supporting Figures

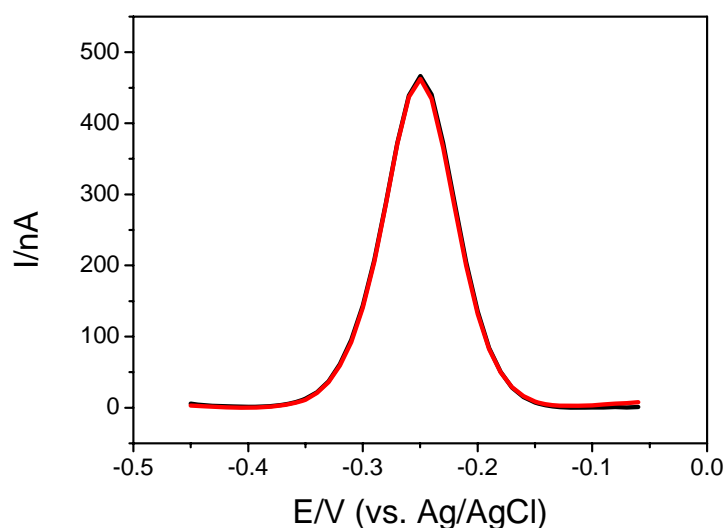


Figure S1. The alternating current (AC) voltammograms of the E-DNA sensor in the absence (black line) and in the presence of dA22 (1 μ M, red line). Experimental details were described in Methods.

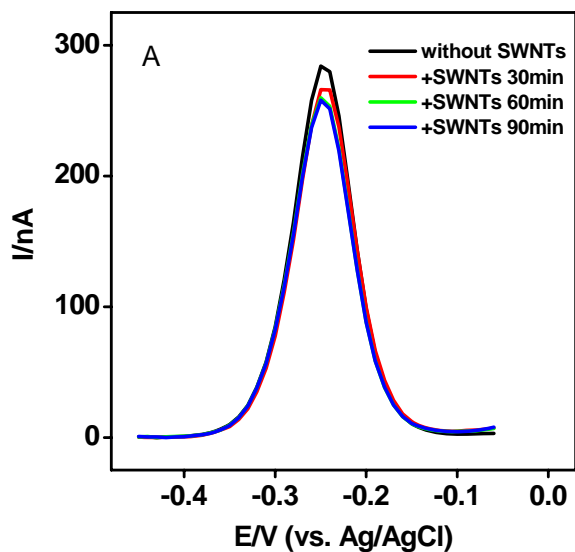


Figure S2. (A) The thiolated, MB-labeled i-motif DNA sensor responds robustly to 0.2 ppm SWNTs at different incubation time.

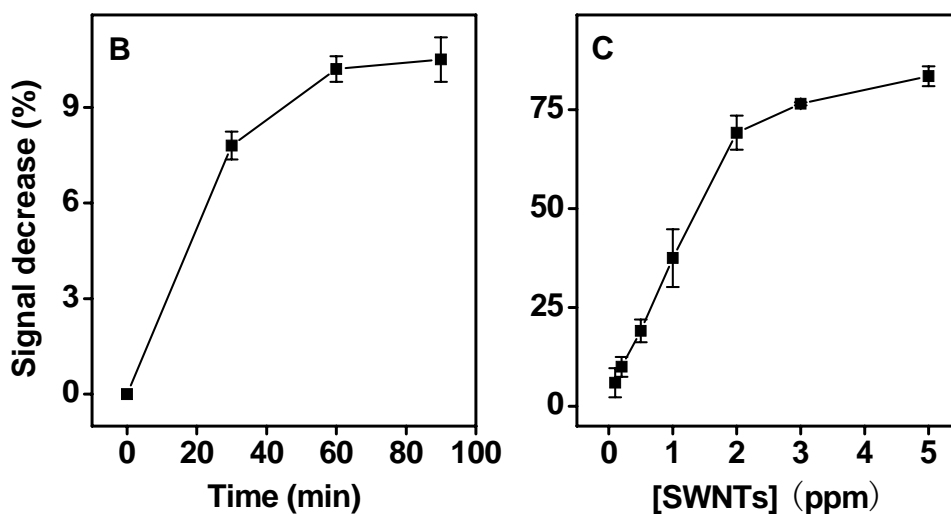


Figure S2. (B) Incubation time dependence. The signal response was measured after incubation in 0.2 ppm SWNTs solution with different incubation time. The signal decreased by 10.2% after 60 minutes. (C) SWNTs concentration dependence. The incubation time was fixed at 60 minutes.

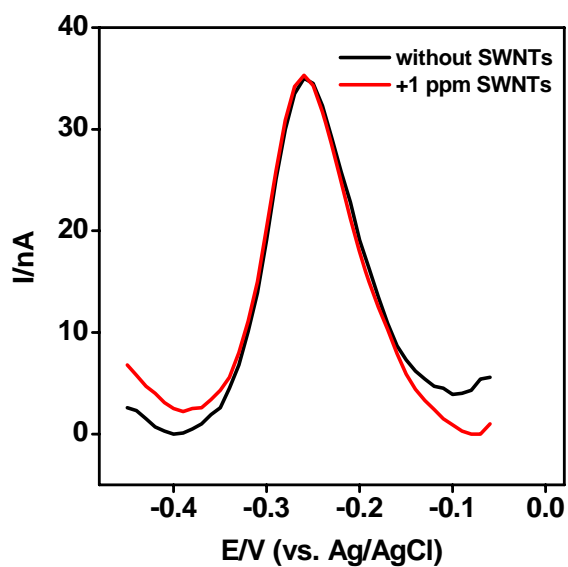


Figure S3. AC voltammograms of DNA Oligo 3-modified electrode with electrostatically adsorbed MB (incubated in 20 μ M MB solution for 30 min with stirring) in the absence (black line) or presence (red line) of SWNTs (1 ppm). As SWNTs did not quench the electroactivity of MB, the signals were not influenced by addition of SWNTs.

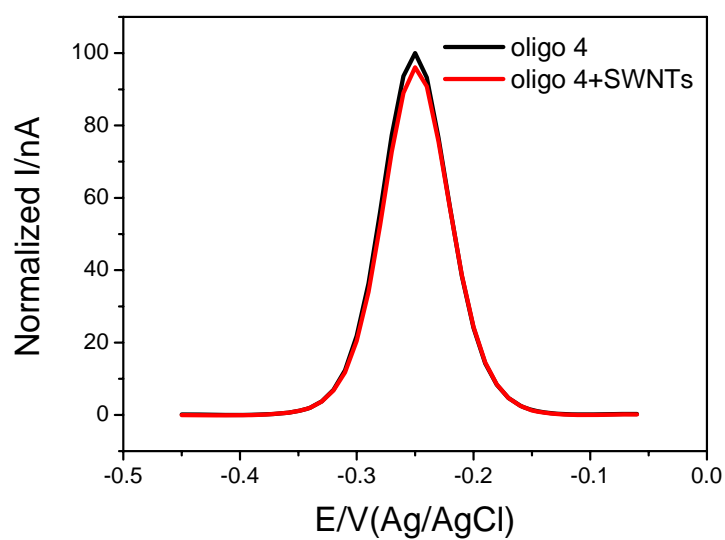


Figure S4. AC voltammograms of DNA Oligo4-modified electrode in the absence (black line) or presence (red line) of SWNTs (1 ppm). Experimental details were described in Methods.

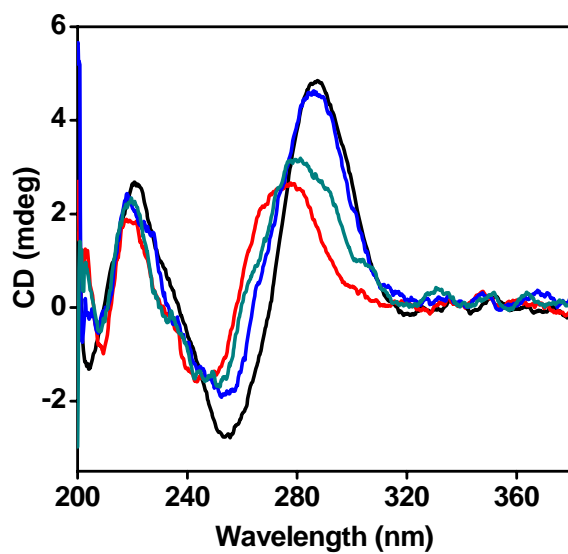


Figure S5. CD spectral of i-motif at pH 5.5 (black line), pH 7.0 (red line) and CD spectral of i-motif at pH 7.0 in the presence of SWNTs (10 ppm, blue line) and MWNTs (10 ppm, dark cyan line) in cacodylic buffer (0.1 mM cacodylic acid/sodium cacodylate/100 mM NaCl). DNA concentration used was 1 μ M in strand.

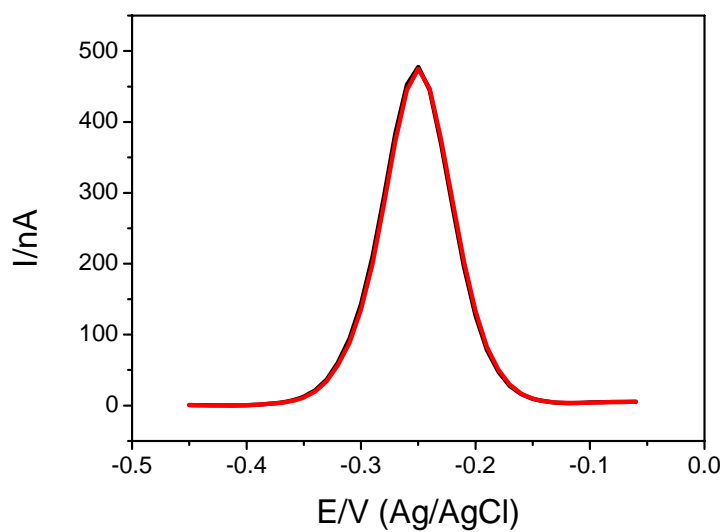


Figure S6. The alternating current (AC) voltammograms of the E-DNA sensor in the absence (black line) or presence of Au particle (1 ppm, red line). Experimental details were described in Methods.

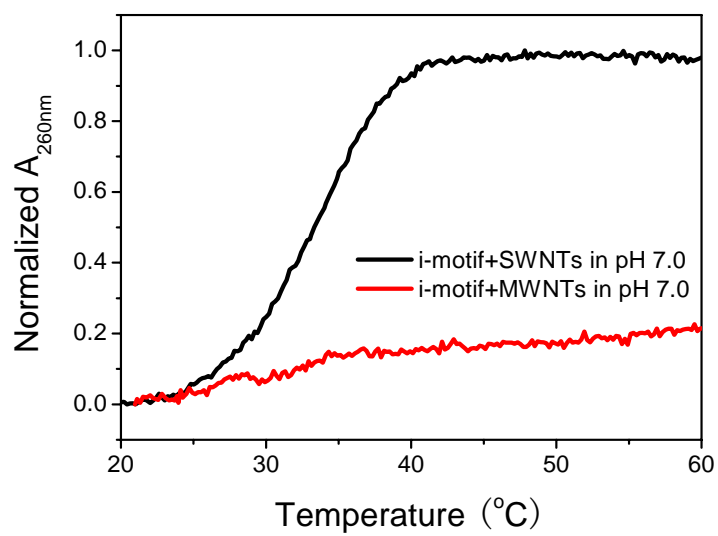


Figure S7. DNA UV meltings in the presence of 5 ppm SWNTs (black line) or MWNTs (red line) in pH 7.0 buffer. DNA concentration was 1 μ M in strand.

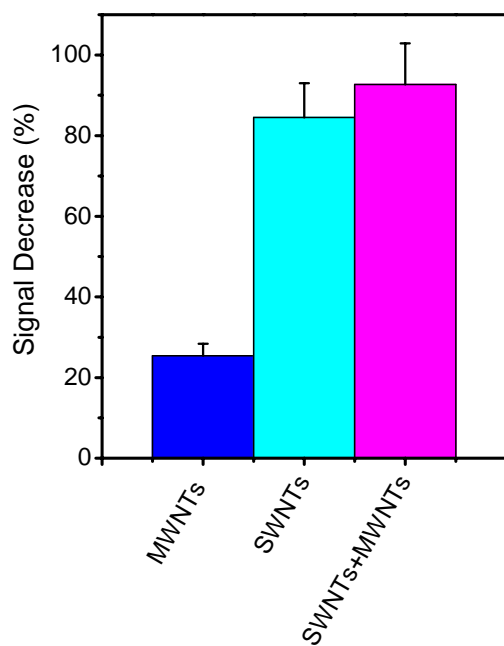


Figure S8. The SWNTs can be detected in 10 ppm mixture of SWNTs and MWNTs. Signal decrease for 10 ppm MWNTs alone (blue column) and 10 ppm SWNTs alone (cyan column) are shown for comparison with 10 ppm mixture of SWNTs and MWNTs (pink column).

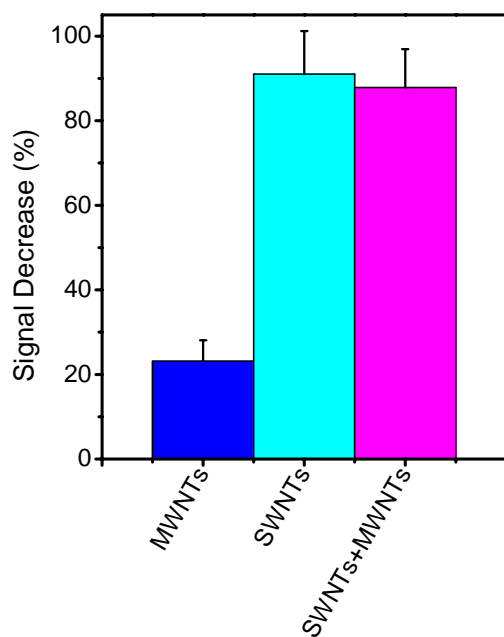


Figure S9. The biosensor can distinguish between SWNTs and MWNTs in cell extracts. SWNTs can be detected in the 10 ppm mixture of SWNTs and MWNTs in cell extracts. Signal decrease for 10 ppm MWNTs alone (blue column) and 10 ppm SWNTs alone (cyan column) in cell extracts are shown for comparison with 10 ppm mixture of SWNTs and MWNTs (pink column) in cell extracts.

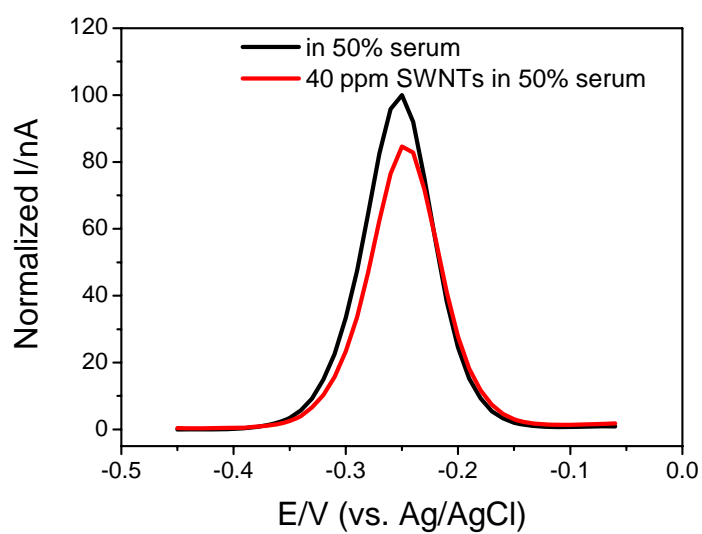


Figure S10. The alternating current (AC) voltammograms of the E-DNA sensor in the absence (black line) or presence of SWNTs (40 ppm, red line) in 50% fetal calf serum. Experimental details were described in Methods.

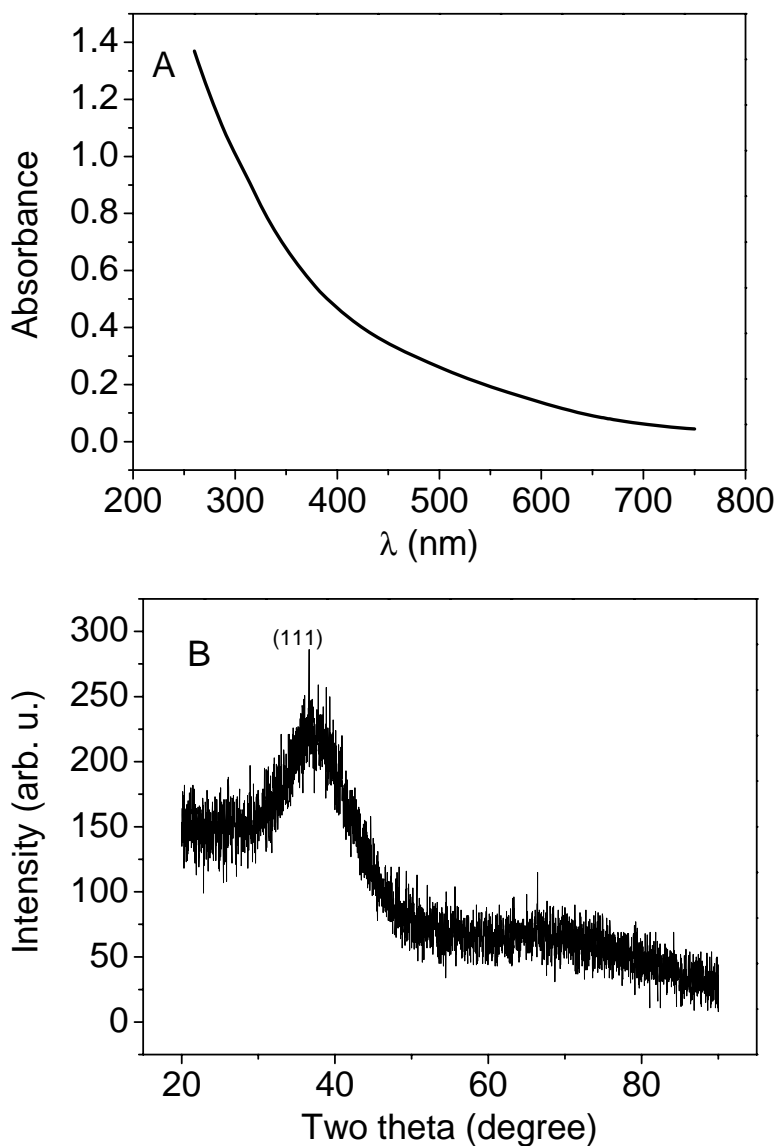


Figure S11. (A) UV-visible absorption spectrum of the as-prepared carboxylate-modified Au nanoparticles (50 ppm). Au nanoparticles were prepared as described by Chen and Kimura (Chen, S.; Kimura, K. Synthesis and characterization of carboxylate-modified gold nanoparticle powders dispersible in water. *Langmuir* **1999**, 15, 1075-1082). Experimental details see Methods. The spectrum was recorded on a Jasco V-550 spectrometer. Quartz cuvettes with 1-cm optic length were used. (B) XRD pattern of the as-prepared carboxylate-modified gold nanoparticles. XRD was performed on a Bruker-ANX D8 FOCUS diffractometer with Cu K α radiation ($\lambda=0.15418$ nm). The size of gold nanoparticles was estimated according to the broadening of the full width at half maximum of the (111) diffraction peak by Scherrer's equation.