

Supplemental information for:

HIV Detection via a Carbon Nanotube RNA Sensor

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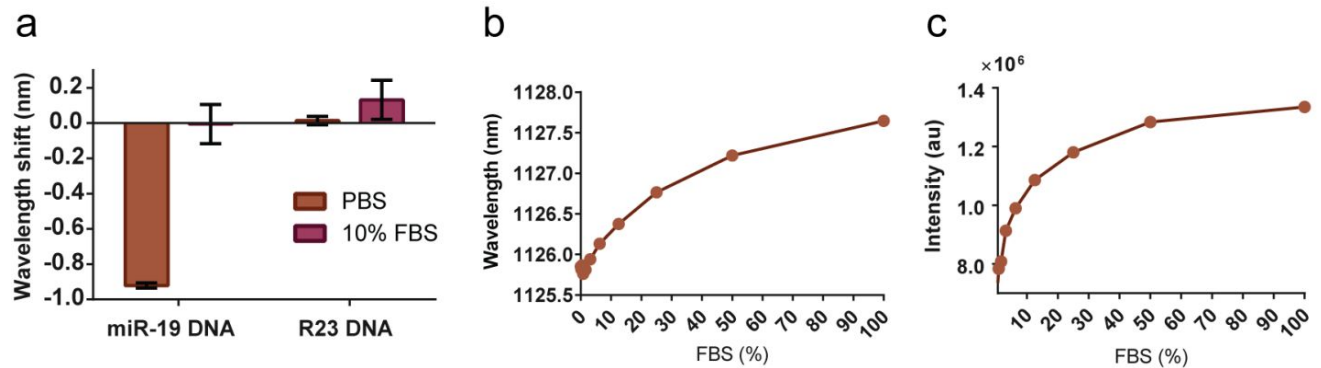


Figure S1: Impact of serum on GT₁₅miR19 nanotube sensor function. **a.** Wavelength shift of GT₁₅miR19 nanotube sensor after overnight incubation with 1 μ M target miR-19 DNA (orange) or control R23 DNA (purple) in either PBS or 10% FBS. **b.** Center wavelength of the (9,4) chirality as a function of added fetal bovine serum (FBS) incubated overnight, **c.** Intensity of the (9,4) chirality as a function of added fetal bovine serum (FBS) incubated overnight.

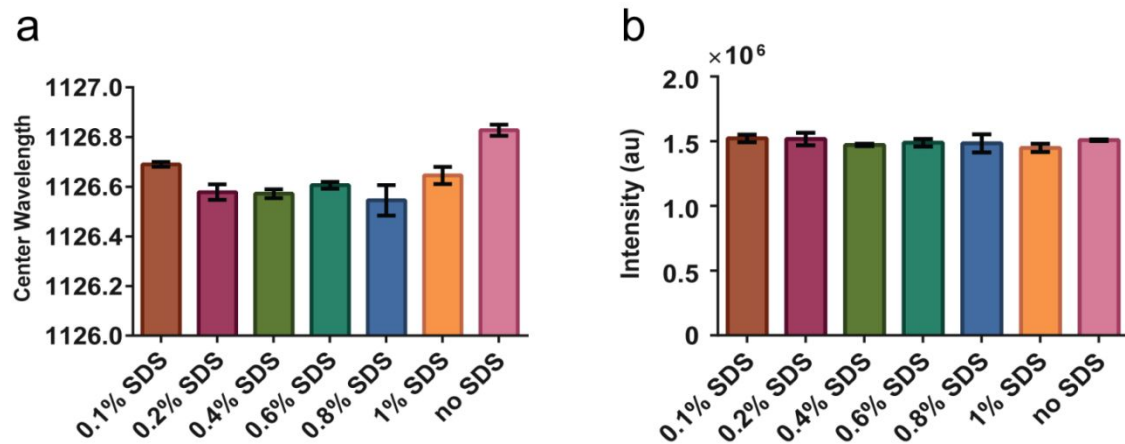


Figure S2: Baseline effects of SDS on the GT₁₅miR19 nanotube sensor. **a.** Center wavelength of GT₁₅miR19 nanotube sensor after overnight incubation with the indicated concentration of SDS, shown for the (9,4) nanotube chirality. **b.** Intensity of GT₁₅miR19 nanotube sensor after overnight incubation with the indicated concentration of SDS, shown for the (9,4) nanotube chirality. Error bars represent standard deviation of technical triplicates.

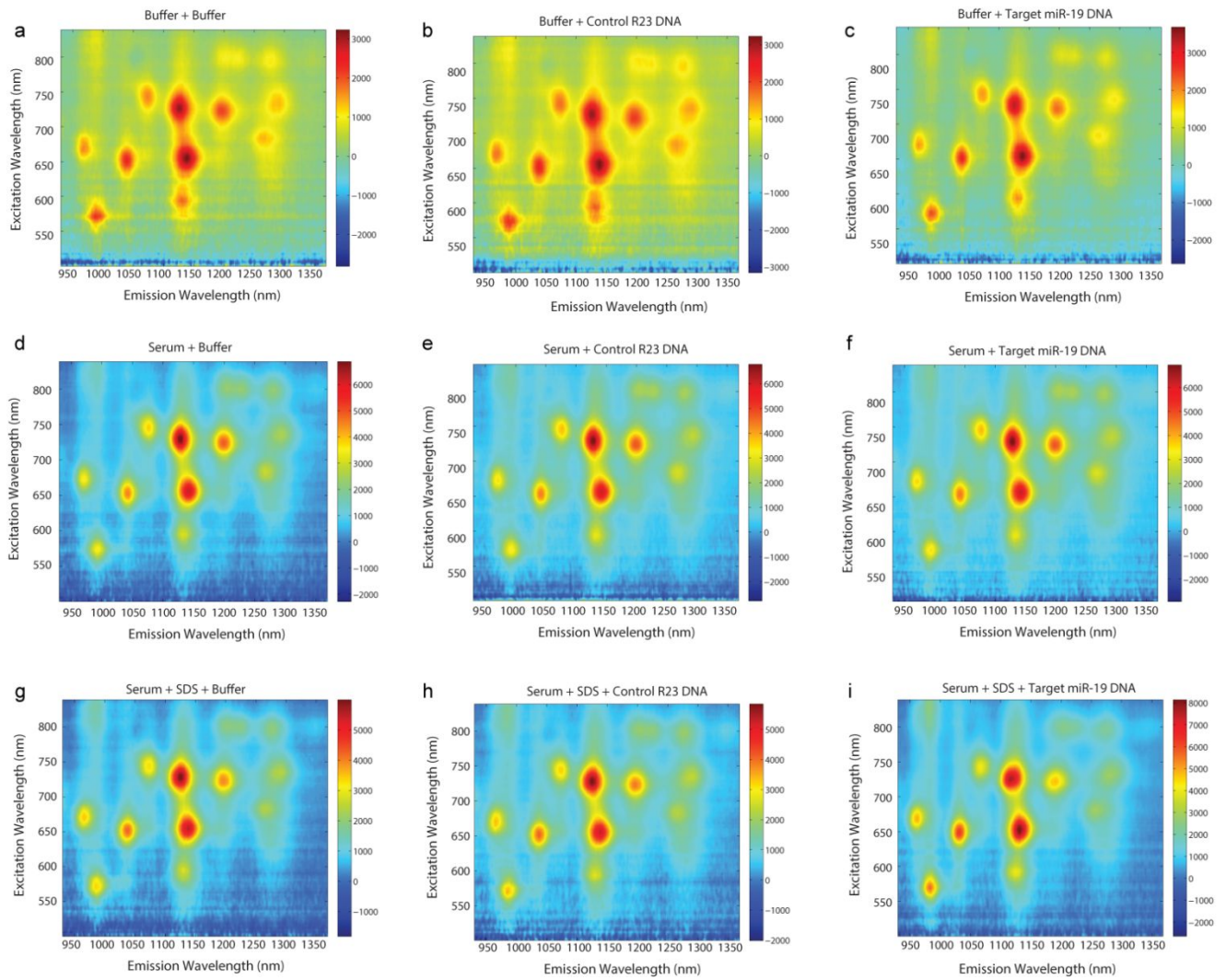


Figure S3: Modulation of the GT₁₅miR19 nanotube sensor response in the presence of serum with and without SDS. Photoluminescence excitation/emission (PLE) spectroscopy plots of the GT₁₅miR19 nanotube sensor incubated with **a.** PBS, **b.** PBS and control R23 DNA, **c.** PBS and target miR-19 DNA, **d.** FBS, **e.** FBS and control R23 DNA, **f.** FBS and target miR-19 DNA **g.** FBS and 1% SDS **h.** FBS, 1% SDS and control R23 DNA, and **i.** FBS, 1% SDS and target miR-19 DNA.

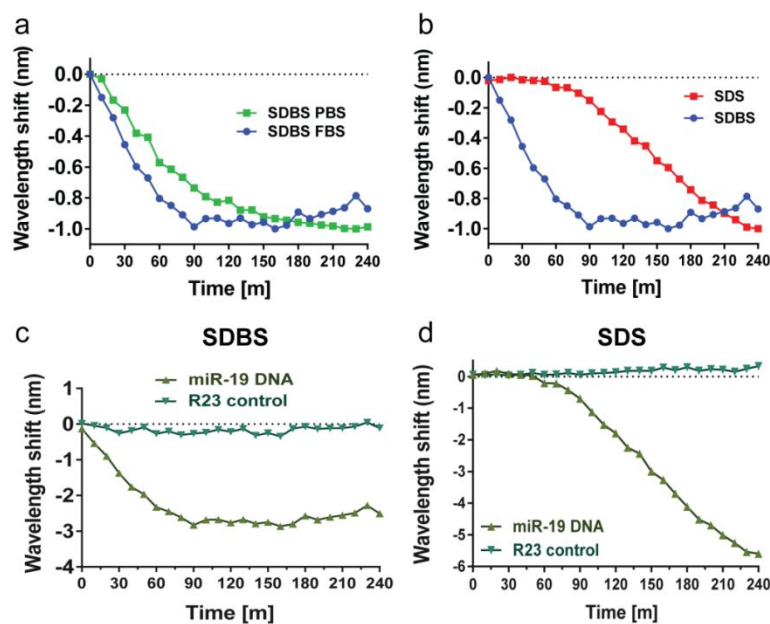


Figure S4: Kinetics of surfactant-mediated GT₁₅miR19 nanotube sensor response. **a.** Normalized wavelength shift of GT₁₅miR19 nanotube sensor upon introduction of 1 μ M target miR-19 DNA in 0.2% SDBS and PBS (green) or FBS (blue). **b.** Wavelength shift of GT₁₅miR19 nanotube sensor with 1 μ M miR-19 target DNA in serum with 0.2% SDBS (blue) or serum with 1% SDS (red). **c** and **d.** Dynamics of wavelength shift for GT₁₅miR19 in serum with 0.2% SDBS or 1% SDS treated with 1 μ M target or control DNA.

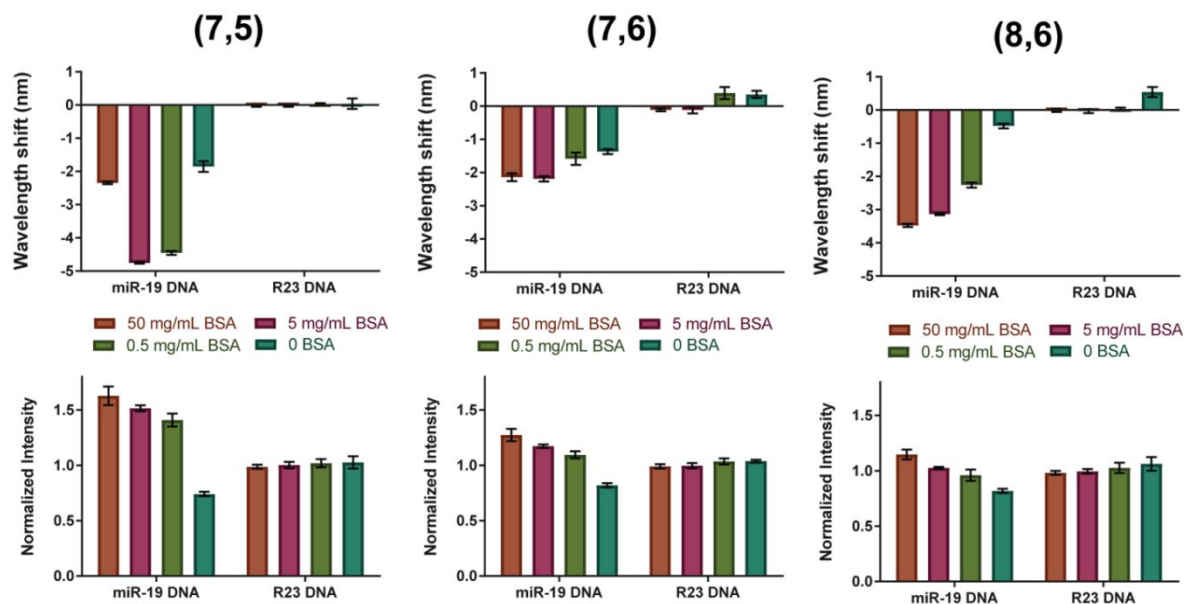


Figure S5: Chirality-specific behavior of the GT₁₅miR19 sensor response to hybridization mediated by BSA + SDS. Wavelength shift (top) and intensity change (bottom) of GT₁₅miR19 nanotube sensor for three additional chiralities after treatment with 1 μ M target miR-19 DNA or control R23 DNA in PBS with 1% SDS and the indicated concentration of bovine serum albumin (BSA).

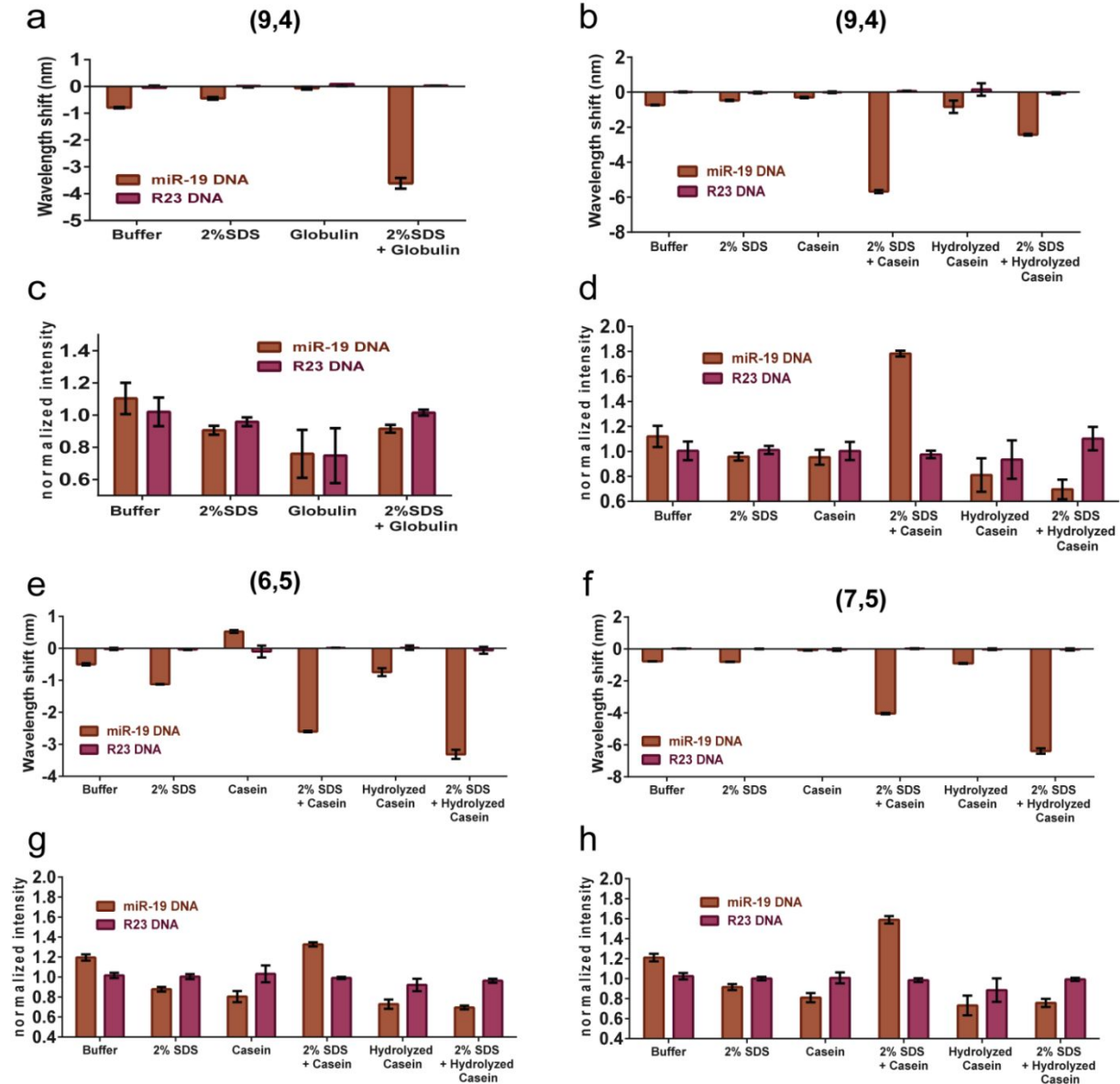


Figure S6: Effects of proteins and protein structure on GT₁₅miR19 nanotube sensor response. **a.** Wavelength shifting response of the GT₁₅miR19 nanotube sensor upon treatment with 1 μ M target miR-19 DNA or control R23 DNA in PBS buffer, 2% SDS, 35 mg/mL γ -globulins, and 2% SDS with 35 mg/mL overnight. **b.** Wavelength shift of GT₁₅miR19 nanotube sensor after treatment with 1 μ M target miR-19 DNA or control R23 DNA in PBS, 2% SDS, 35 mg/mL casein, 2% SDS with 35 mg/mL casein, 35 mg/mL hydrolyzed casein peptides, and 2% SDS with 35 mg/mL hydrolyzed casein peptides overnight. **c.** Intensity change corresponding to experiment in panel a. **d.** Intensity fold change corresponding to experiment in part b. Wavelength shift (**e** and **f**) and intensity change (**g** and **h**) of the GT₁₅miR19 nanotube sensor response, focusing on two additional nanotube chiralities after overnight incubation with 1 μ M target miR-19 DNA or control R23 DNA in PBS, 2% SDS, 35 mg/mL casein, 2% SDS plus 35 mg/mL casein, 35 mg/mL hydrolyzed casein, or 2% SDS plus 35 mg/mL hydrolyzed casein. Demonstrating chirality differences in response to peptide length.