Supporting Information for:

Detection of Cell Membrane Interactions with Lipid-functionalized Single-walled Carbon Nanotubes

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1. Optimization of Phosphatidylcholine-SWNT Suspension

Sonication conditions for phosphatidylcholine-SWNT were optimized with respect to sonication time, sonication power, and phosphatidylcholine concentration according to a central composite experimental design (Table S-1). Fitted parameters are provided in Tabel S-1 and were used with Equation S-1 (where *t* is time in seconds, *P* is sonication power in W, and *C* is phosphatidyl concentration in mg/mL) to evaluate response surfaces shown in Figure S-1. The model used the logarithm of concentration to test a larger range of concentrations.

Table S-1. Test Conditions for Phosphatidylcholine-SWNT Suspension Optimization

Sonication Time, min (t)	**Sonication Power, W (P)**	**Phosphatidylcholine concentration, mg/mL (C)**
80	2	20
60	18	10
60	10	10
60	10	5
80	18	20
80	18	5
60	10	20
60	10	10
60	2	10
40	18	5
40	2	20
80	2	5
40	18	20

40	2	5
80	10	10
60	10	10
40	10	10

Table S-2. Predicted Model Values

Effect	Coefficient	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	A_0	157.473	393.645	0.40	0.7030
t	A_1	3.200	4.066	0.79	0.4612
P	A_2	-52.216	10.165	-5.14	0.0021
log10(C)	A_3	1498.040	270.174	5.54	0.0015
t*t	A_4	-0.428	0.393	-1.09	0.3174
P*P	A_5	-2.482	2.455	-1.01	0.3510
log10(C)*log10(C)	A_6	3874.806	1734.080	2.23	0.0669
t*P	A_7	-1.788	0.568	-3.15	0.0199
t*log10(C)	A_8	6.211	15.103	0.41	0.6952
P*log10(C)	A_9	-76.656	37.758	-2.03	0.0886
t*P*log10(C)	A_{10}	-2.177	1.888	-1.15	0.2927

R-squared: 0.929
R-squared adjusted: 0.811
RMSE = 257.164
Mean: 1337.665

$$Signal = A_0 + A_1(t - 60\text{min}) + A_2(P - 10\text{W}) + A_3\,(\log_{10} C - 1) + A_4\,(t - 60\text{min})^2 + A_5(P - 10\text{W})^2 + A_6(\log_{10} C - 1)^2 + A_7(t - 60\text{min})(P - 10\text{W}) + A_8(t - 60\text{min})(\log_{10} C - 1) + A_9(P - 10\text{W})(\log_{10} C - 1) + A_{10}(t - 60\text{min})(P - 10\text{W})(\log_{10} C - 1) \quad \textbf{Eq S-1}$$

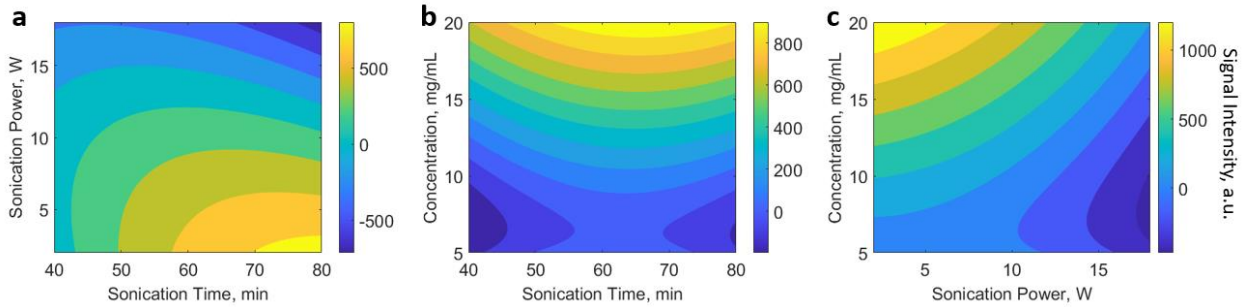

Figure S-1. Surface response cross-sections of modelled fluorescence intensity with respect to (a) sonication power and sonication time at a concentration of 10 mg/mL, (b) phosphatidylcholine concentration and sonication time at 10 W, and (c) phosphatidylcholine concentration and sonication power at 60 min.

2. Electrical Disruption of Lipopolysaccharide-SWNT

Lipopolysaccharide-SWNT were subject to electrical pulses mid-fluorescent scan by using a custom holder, depicted in Figure S-2a-b. The sample holder was manufactured by cutting a 5-mm wide slot partially into a 1-inch piece of transparent acrylic plastic with a CNC router and applying copper tape to the sides of this slot. These pieces of copper tape were then connected to the leads of a piezoelectric ignition element. Black masking tape was applied to the underside of this sample holder to prevent reflection of light from the copper tape.

Repeated application of charge to lipopolysaccharide-SWNT produced reversible quenching effects as seen in Figure S-2c. The duration of these pulses was 3-5 s, as shown in Figure S-2d.

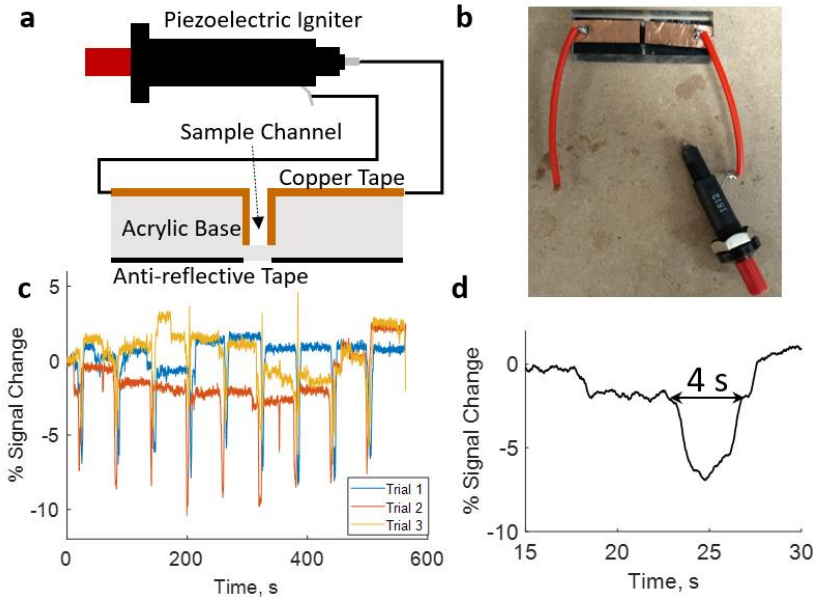

Figure S-2. (a) Diagram of custom sample holder. (b) Photograph of custom sample holder. (c) Sensor response traces from repeated electrical pulses at 60 s intervals. (d) Response trace at time of electrical pulse showing timescale of quenching effect.