

SUPPORTING INFORMATION

Simple and Robust Polymer-based Sensor for Rapid Cancer Detection using Serum

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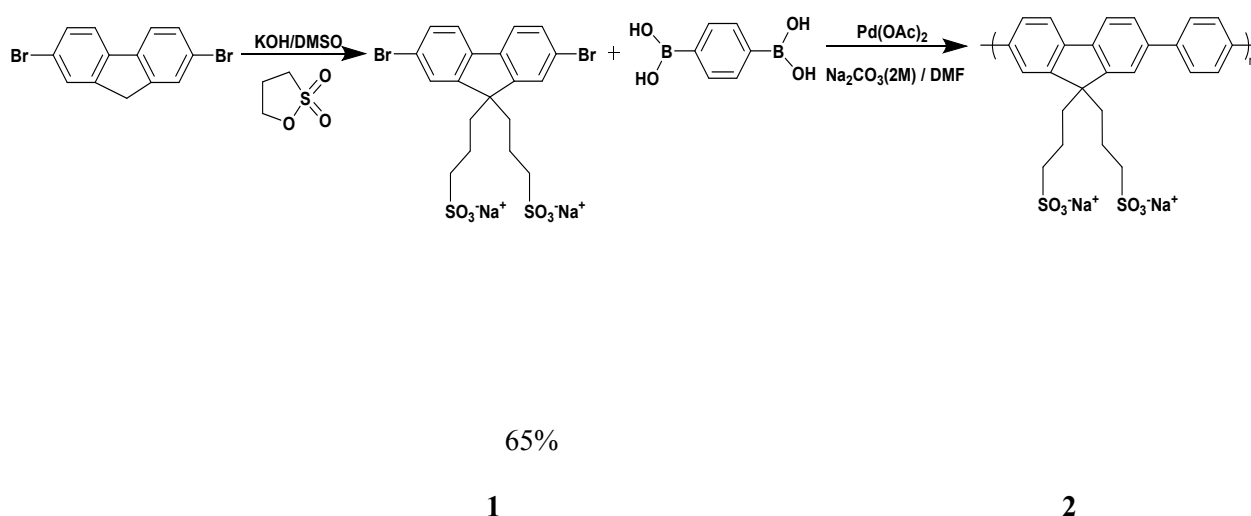
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Materials. All chemicals and solvents for synthesis were purchased from Sigma Aldrich unless otherwise stated. Calf serum was purchased from HyClone™ Calf Serum.

Synthesis of PPE1 and PPE2. The synthesis and characterizations of PPE1 and PPE2 were described in previous works.^{1,2}

Synthesis of PFS and characterizations. 2,7-Dibromofluorene (4 g, 12 mmol) and tetrabutylammonium bromide (80 mg) were added and to 50% wt aqueous solution of potassium hydroxide (8 mL) and DMSO (60 mL). A solution of 1,3-propane sultone, CAS 1120-71-4 Sigma (4 g, 29 mmol) in DMSO (20 mL) was slowly added the above mixture under nitrogen. Following mixture was then stirred at room temperature for 4 h and was precipitated using acetone to afford the crude product. The product was collected by filtration, washed with ethanol, recrystallized twice from ~80:20 acetone/H₂O, and dried under vacuum at 60 °C for 24 h to yield 2,7-dibromo 9,9-bis(3'-sulphatepropyl)fluorene (1) as white needle crystals (4.78 g, 65%).

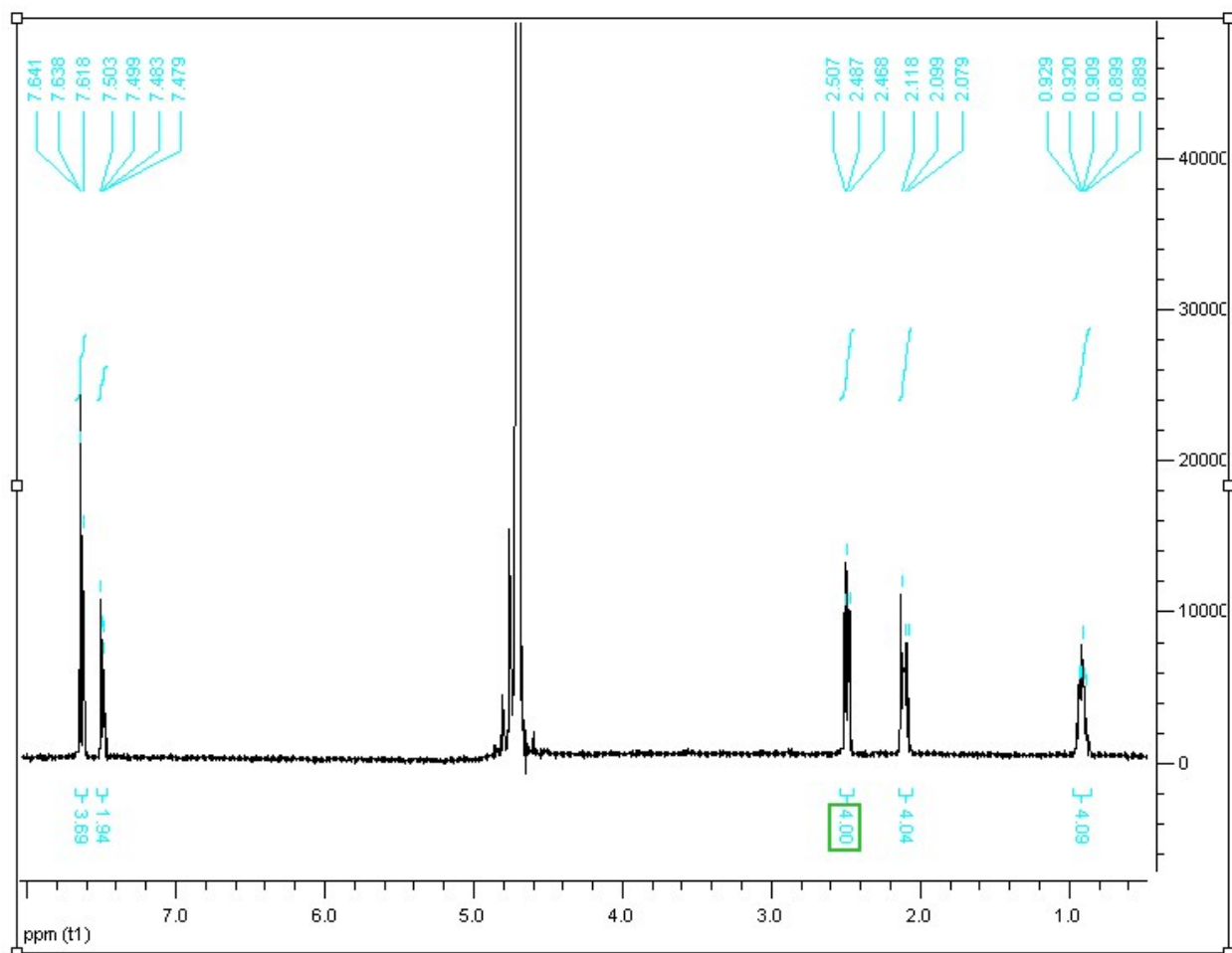
¹H-NMR (400 MHz, CD₃OD, δ ppm): 7.63 (d, 4H, J = 9.2Hz), 7.49 (dd, 2H, J = 8.0Hz, 8.0Hz), 2.49 (t, 4H, J = 7.6Hz), 2.10 (t, 4H, J = 8.0Hz), 0.91 (m, 4H).



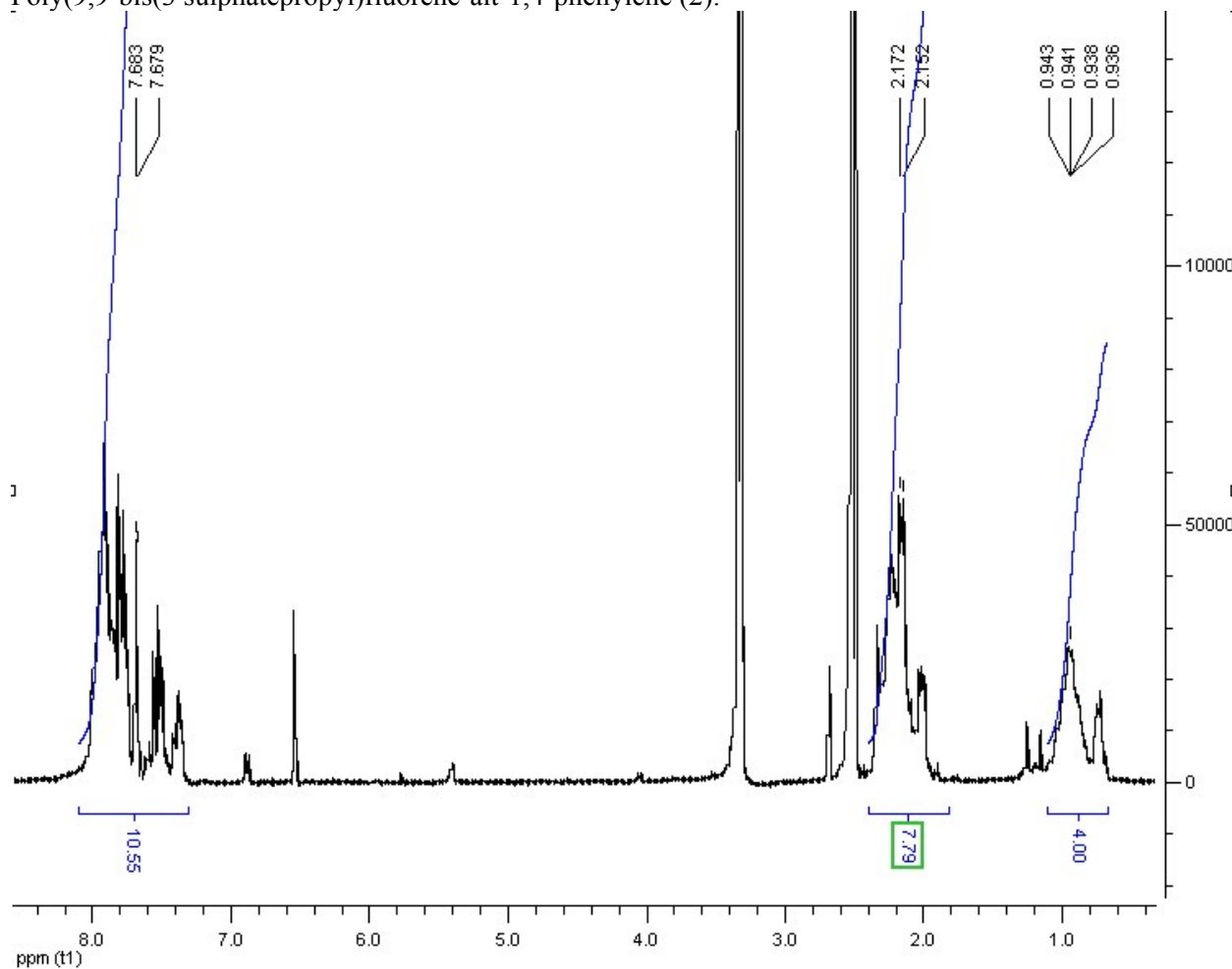
A mixture of 1 (0.5g, 0.74 mmol), Palladium(II) acetate, CAS 3375-31-3 Sigma (0.007 g, 0.03 mmol), benzene-1,4-bisboronic acid (0.123 g, 0.74 mmol), 5 mL of 2M K₂CO₃ and DMF (10 mL) were taken in a round bottom flask with a reflux condenser. The reaction mixture was degassed thrice to remove O₂ by freeze-thaw cycles followed by stirring at 60 °C for 18 h under inert atmosphere. This was followed by addition of Iodo-benzene (0.03 g, 0.147 mmol) to the reaction and stirring for further 3 h. The reaction mixture was cooled, poured into methanol and stirred for 30 min. The precipitate was collected by filtration, followed by washing with methanol. Soxhlet extraction of the above precipitate by acetone for 24 h gave the desired polymer Poly(9,9-bis(3 sulphatepropyl)fluorene-alt-1,4-phenylene (2) (0.32 g, 64%), which was further purified by dialysis using 10kD cutoff filter for 3 days to yield final polymer at 40% yield.

The M_n was estimated to be 5.4x10⁴ with PDI of 1.8. ¹H-NMR (400 MHz, DMSO, δ ppm): 7.68 (m, broad, 10H), 2.25 (m, broad, 8H), 0.95 (m, broad, 4H).

Poly(9,9-bis(3 sulphatepropyl)fluorene (1)



Poly(9,9-bis(3 sulphatepropyl)fluorene-alt-1,4-phenylene (2).



FRET optimization. A series of concentrations of PPE1 and PPE2 were mixed independently with a constant concentration of the donor PFS at 0.2 $\mu\text{g/ml}$ in 96 well plate. All fluorescent spectra were recorded at room temperature using Molecular Devices Spectramax M5 plate reader with an excitation wavelength of 356 nm. PPE1 and PPE2 concentrations were varied between 0.04 to 2 $\mu\text{g/ml}$ and 0.1 to 1.5 $\mu\text{g/ml}$, respectively. For the calf serum incubation study, each condition of each polymer pair was incubated with 10 μL of undiluted calf serum for 30 minutes. The optimized ratios of PPE1/PFS and PPE2/PFS were 1.5 and 5, respectively. To enhance the fluorescence intensity of PPE1 and PFS, we kept the same ratio for this pair but increased their concentrations to 0.75 and 0.5 $\mu\text{g/ml}$, respectively.

Animal models. Mice were maintained on standard mouse chow and housed in a specific pathogen-free barrier facility with ethics approval from the University of Calgary Animal Care Committee and in accordance with Canadian Council on Animal Care guidelines. Use of the non-small cell lung cancer model harboring p53R172H $\Delta\text{g}/+$ and K-rasLA1/+ transgenes has been described earlier.³ This model represents stage 1 lung cancer. Experimental Xenograft lung cancer model using H1299-EGFP-luc2 cells was previously described⁴ and it can be used to represent stage 4 lung cancer. Following necropsy, organs were fixed in 10% formalin for an average of 24 to 48 hours. Skeletal tissue was then selected and placed into

88% formic acid for decalcification for an average of 4-6 hours. All tissue was then subject to routine processing (8-hour protocol) where tissue is sequentially placed into formalin then a series of graded alcohols (70% to 100%) followed by xylene and then paraffin wax infiltration. Tissues were then paraffin-embedded prior to sectioning and hematoxylin and eosin (H&E) staining.

Mouse serum preparation. Blood was collected from hearts of mice using syringes and carefully transferred to 1.5 ml Eppendorf tube. These blood-contained tubes were kept at room temperature for 45-60 minutes to induce blood clotting. After that, samples were centrifuged at 13,000 rpm for 15 min at 4° C. After centrifugation, supernatant was carefully aliquot into new Eppendorf tubes for long-term storage at -80° C. Sterile PBS (pH 7.4) was added to dilute each serum sample in the amount of 200 μ L, in order to minimize serum lost after filtration. Each diluted serum sample was filtered using a sterile 4 mm diameter syringe filter purchased from Corning®, with 0.2 μ m pore RC membrane. The total serum protein concentration was determined by bicinchoninic acid assay (BCA) and normalized by diluting to the same concentration with PBS before sensing.

Sensing studies. Appropriate concentration of each polymer was mixed together in PBS (pH 7.4) based on previous optimizations. Each of the PFS-PPE complexes was loaded (200 μ L) into a black 96-well untreated plate (Costar), followed by the addition of 10 μ L of 210 μ g/ml protein solution in PBS or 5 mg/ml total serum protein concentration of each mouse. The mixture was incubated for 30 minutes before their fluorescence intensities were recorded at EX/EM (nm) of 356/420, 408/480, 356/480 for PFS-PPE1 pair, and 356/420, 418/482, 356/482 for PFS-PPE2 pair. The fluorescence intensities of the sensor only (without any analyte) is I_0 , while the intensities of the sensor with analytes after 30 min of incubation is I . Normalized fluorescence of each sample is I/I_0 .

Linear discriminant analysis. The raw data matrix was processed by classical linear discriminant analysis using SYSTAT software (version 11.0, SystatSoftware, Richmond, CA, USA). In LDA, all variables were used in the model (complete mode) and the tolerance was set as 0.001. The raw fluorescence response patterns were transformed to canonical patterns where the ratio of between-class variance to the within-class variance was maximized according to the preassigned grouping. To identify the unknown samples, the normalized fluorescence intensities from unknown cases were first converted to canonical scores using the discriminant functions established on the training cases. Then, the Mahalanobis distance, the distance of a case from the centroid of a training group in the multidimensional discriminant space, was calculated for the new cases. The new case was assigned to the group with the shortest Mahalanobis distance from the case. The code for unknown analysis can be obtained from the authors.

Receiver operating characteristic analysis (ROC). To evaluate how well LDA predicts the unknown samples, we ran ROC analysis. We used *lda* function in *MASS* package⁵ of R to train set 1 then use algorithm trained in set 1 to predict set 2. The ROC curve is created by plotting the true positive rate (TPR) against the false positive rate (FPR) at various threshold (cut-off level) settings using *ROCR* package. Cut-off level is the optimal threshold to maximize TPR while minimizing FPR to achieve the most effective diagnostic test. The accuracy of the test depends on how well the test separates the group being tested into those with and without cancer. Accuracy is measured by the area under the ROC curve, also known as AUC (the area under the curve). An area of 1 represents a perfect test; an area of less than 1 represents a less accurate test. AUC was obtained by the *auc* function in *pROC* package. Sensitivity and specificity were weighted equally in the prediction.

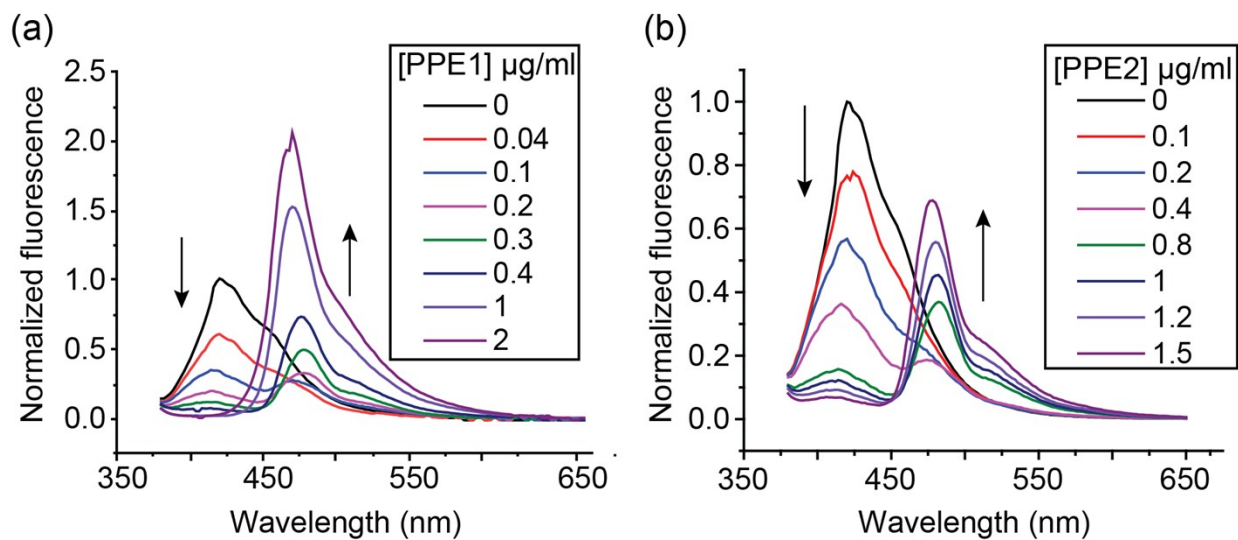


Figure S1. Emission spectra as a function of concentration of a) PPE1 for the PFS-PPE1 pair and b) PPE2 for the PFS-PPE2 pair. Spectra were recorded at an excitation of 356 nm in PBS at pH 7.4.

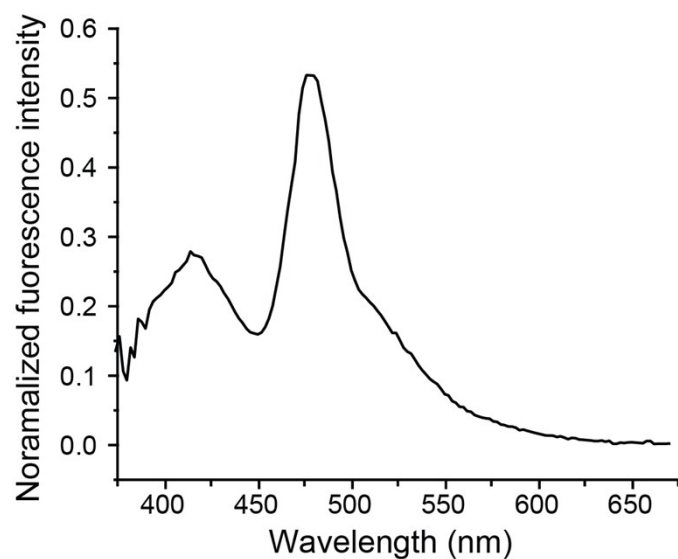


Figure S2. Emission spectra of PFS-PPE1 when PFS is 0.5 µg/mL and PPE1 is 0.75 µg/mL. Spectrum was recorded at an excitation of 356 nm in PBS at pH 7.4.

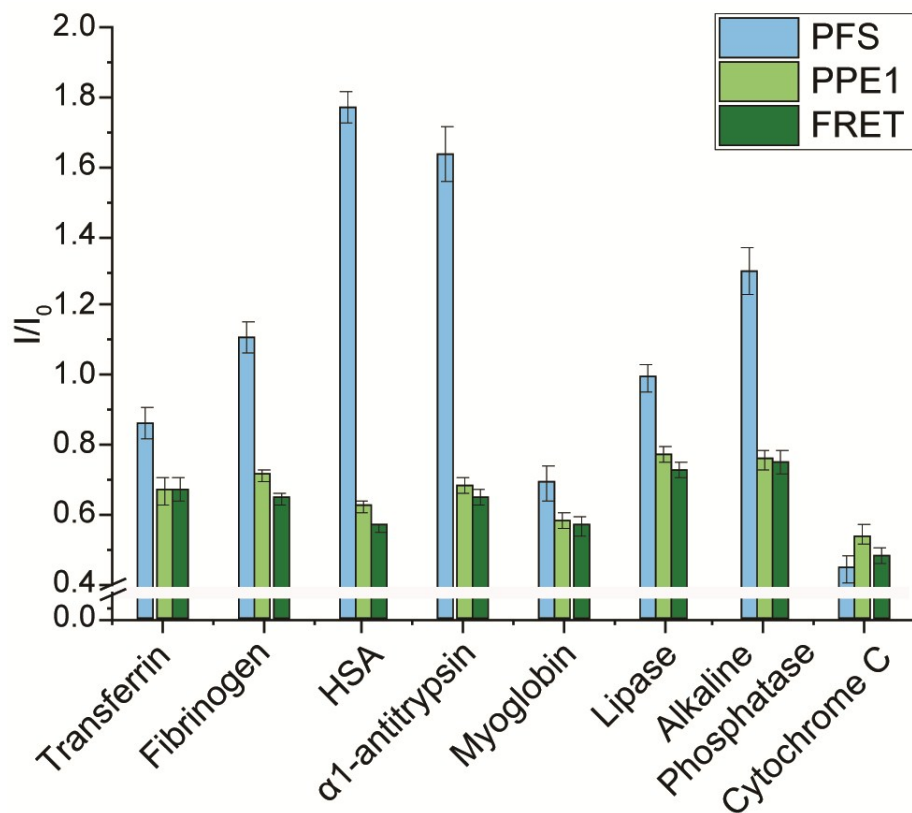


Figure S3. Fluorescence response from PFS-PPE1 sensor after eight protein incubation in PBS.

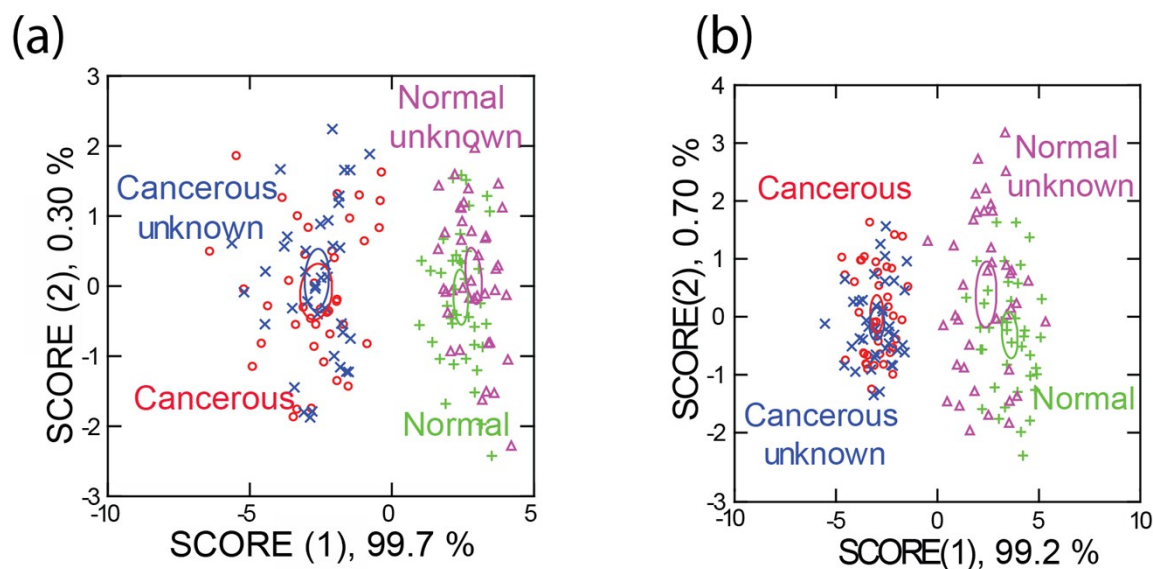


Figure S4. Unknown identification of serum samples from (a) experimental lung cancer model (stage 4) and (b) transgenic lung cancer model (stage 1) using PFS-PPE1 complex. The corrected unknown identification is 100% and 98.7% respectively.

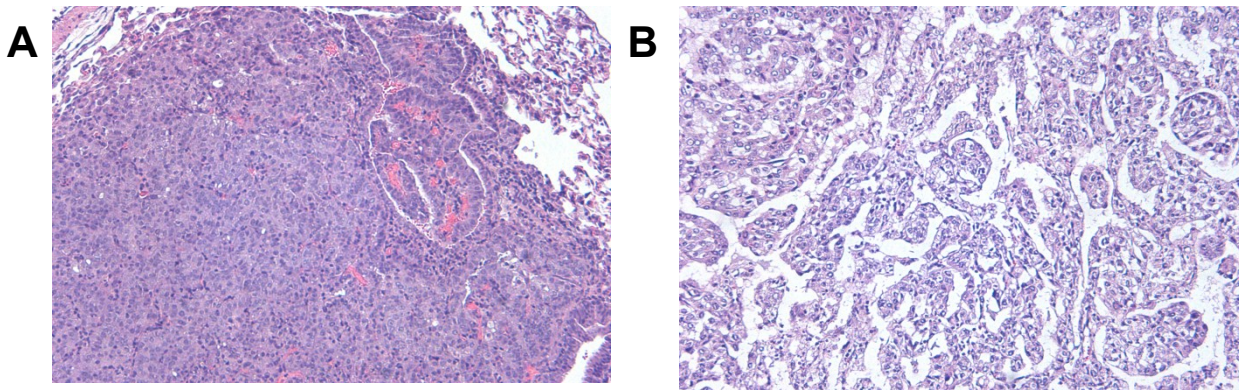


Figure S5. Transgenic lung cancer model. H&E staining of representative primary lung carcinoma in $p53^{R172H\Delta g/+}$ $K-ras^{LAI/+}$ mice. (A and B) Pulmonary (lung) adenocarcinoma. Scale bar = 100x A-B.

Table S1. Characteristics of eight proteins in PBS.

#	Proteins	Charge at pH 7.4	Isoelectric point	Molecular weight (kDa)
1	Transferrin	Neutral	6.1	80
2	Fibrinogen	-	5.5	340
3	Human Serum Albumin	-	5.2	69.4
4	α 1-antitrypsin	-	4.6	52
5	Myoglobin	Neutral	7.2	17
6	Lipase	-	5.6	58
7	Alkaline Phosphatase	-	5.7	140
8	Cytochrome C	+	10.7	12.3

Table S2. Characteristics of tumor mouse models.

#	Model type	Mouse strain	Cell line	Injection location	Tumor induction time (days)	# Controls	# Cancer-bearing mice
1	Transgenic lung cancer model	129/Sv $p53^{R172H\Delta g/+}$ $K-ras^{LAI/+}$ mice	N/A	N/A	100-300	5	5
2	Experimental lung cancer model	NIH-III (nu/nu ; $beige/beige$) mice	H1299	Intracardiac route	55-120	5	5

Table S3. Fluorescent responses obtained from 8 proteins in PBS using PFS-PPE1 sensor.

#	Sample ID	PFS	PPE1	FRET
1	Transferrin	0.9021	0.7083	0.6945
2	Transferrin	0.8976	0.7388	0.7248
3	Transferrin	0.8604	0.6773	0.6806
4	Transferrin	0.7924	0.6437	0.6447
5	Transferrin	0.8894	0.6441	0.6736
6	Transferrin	0.8205	0.6299	0.6374
7	Transferrin	0.8138	0.6467	0.6458
8	Transferrin	0.9090	0.6609	0.6816
9	Fibrinogen	1.1968	0.7470	0.6681
10	Fibrinogen	1.1048	0.7335	0.6591
11	Fibrinogen	1.1230	0.7175	0.6515
12	Fibrinogen	1.0929	0.7004	0.6277
13	Fibrinogen	1.1071	0.7228	0.6516
14	Fibrinogen	1.1399	0.7002	0.6251
15	Fibrinogen	1.0851	0.7018	0.6394
16	Fibrinogen	1.0418	0.6990	0.6337
17	Human Serum Albumin	1.8530	0.6351	0.5796
18	Human Serum Albumin	1.8001	0.6336	0.5688
19	Human Serum Albumin	1.8093	0.6459	0.5768
20	Human Serum Albumin	1.7628	0.6168	0.5550
21	Human Serum Albumin	1.7488	0.6119	0.5558
22	Human Serum Albumin	1.7540	0.6278	0.5678
23	Human Serum Albumin	1.7220	0.6013	0.5491
24	Human Serum Albumin	1.7146	0.5982	0.5570
25	α 1-antitrypsin	1.7499	0.6933	0.6597
26	α 1-antitrypsin	1.6233	0.6631	0.6304
27	α 1-antitrypsin	1.6401	0.6732	0.6477
28	α 1-antitrypsin	1.6160	0.6870	0.6571
29	α 1-antitrypsin	1.5680	0.6522	0.6257
30	α 1-antitrypsin	1.7089	0.7382	0.6848
31	α 1-antitrypsin	1.4907	0.6744	0.6445
32	α 1-antitrypsin	1.6891	0.6769	0.6377
33	Myoglobin	0.6603	0.5850	0.5758
34	Myoglobin	0.6638	0.5731	0.5631
35	Myoglobin	0.7369	0.6203	0.6069
36	Myoglobin	0.6445	0.5439	0.5312
37	Myoglobin	0.6470	0.5747	0.5509
38	Myoglobin	0.7649	0.6128	0.5913
39	Myoglobin	0.6586	0.5854	0.5692
40	Myoglobin	0.7263	0.5595	0.5474
41	Lipase	1.0406	0.7569	0.7189
42	Lipase	1.0197	0.7312	0.6880
43	Lipase	1.0526	0.7878	0.7412
44	Lipase	0.9737	0.7615	0.7089
45	Lipase	1.0017	0.7999	0.7543
46	Lipase	0.9590	0.8022	0.7548

47	Lipase	0.9227	0.7777	0.7349
48	Lipase	0.9727	0.7528	0.7144
49	Alkaline Phosphatase	1.2631	0.7332	0.7070
50	Alkaline Phosphatase	1.3532	0.7913	0.7737
51	Alkaline Phosphatase	1.3992	0.8061	0.7985
52	Alkaline Phosphatase	1.3318	0.7683	0.7585
53	Alkaline Phosphatase	1.3397	0.7726	0.7694
54	Alkaline Phosphatase	1.2483	0.7364	0.7251
55	Alkaline Phosphatase	1.2147	0.7538	0.7313
56	Alkaline Phosphatase	1.2546	0.7306	0.7116
57	Cytochrome C	0.4299	0.5703	0.4979
58	Cytochrome C	0.4527	0.5317	0.4850
59	Cytochrome C	0.4986	0.5312	0.4546
60	Cytochrome C	0.4877	0.5214	0.4822
61	Cytochrome C	0.4406	0.5934	0.5306
62	Cytochrome C	0.4403	0.5197	0.4769
63	Cytochrome C	0.3906	0.5236	0.4754
64	Cytochrome C	0.4049	0.5274	0.4737

Table S4. Identification of the blinded unknowns from 8 proteins in PBS using PFS-PPE1 sensor.

#	PFS	PPE1	FRET	True ID	Identified as	Correct identification
1	0.8454	0.6323	0.6201	Transferrin	Transferrin	Yes
2	0.8695	0.7386	0.7408	Transferrin	Transferrin	Yes
3	0.7964	0.6491	0.6518	Transferrin	Transferrin	Yes
4	0.7763	0.6817	0.6725	Transferrin	Transferrin	Yes
5	0.8920	0.6711	0.6502	Transferrin	Transferrin	Yes
6	0.8450	0.6777	0.6626	Transferrin	Transferrin	Yes
7	0.8746	0.7920	0.7785	Transferrin	Transferrin	Yes
8	0.9267	0.7137	0.7051	Transferrin	Transferrin	Yes
9	1.1369	0.7070	0.6395	Fibrinogen	Fibrinogen	Yes
10	1.1099	0.7069	0.6400	Fibrinogen	Fibrinogen	Yes
11	1.0865	0.7046	0.6367	Fibrinogen	Fibrinogen	Yes
12	1.1260	0.7327	0.6628	Fibrinogen	Fibrinogen	Yes
13	1.1922	0.7316	0.6485	Fibrinogen	Fibrinogen	Yes
14	1.1206	0.7012	0.6282	Fibrinogen	Fibrinogen	Yes
15	1.0745	0.6801	0.6114	Fibrinogen	Fibrinogen	Yes
16	1.0911	0.6933	0.6235	Fibrinogen	Fibrinogen	Yes
17	1.7292	0.6281	0.5644	Human Serum Albumin	Human Serum Albumin	Yes
18	1.7887	0.6314	0.5696	Human Serum Albumin	Human Serum Albumin	Yes
19	1.8108	0.6237	0.5600	Human Serum Albumin	Human Serum Albumin	Yes
20	1.7761	0.6480	0.5861	Human Serum Albumin	Human Serum Albumin	Yes
21	1.6951	0.6027	0.5490	Human Serum Albumin	Human Serum Albumin	Yes
22	1.7727	0.6277	0.5673	Human Serum Albumin	Human Serum Albumin	Yes

23	1.6694	0.5832	0.5252	Human Serum Albumin	Human Serum Albumin	Yes
24	1.6538	0.5886	0.5445	Human Serum Albumin	Human Serum Albumin	Yes
25	1.7191	0.7264	0.6867	α 1-antitrypsin	α 1-antitrypsin	Yes
26	1.5640	0.6695	0.6523	α 1-antitrypsin	α 1-antitrypsin	Yes
27	1.6341	0.7516	0.7185	α 1-antitrypsin	α 1-antitrypsin	Yes
28	1.4942	0.6914	0.6681	α 1-antitrypsin	α 1-antitrypsin	Yes
29	1.5323	0.7312	0.6828	α 1-antitrypsin	α 1-antitrypsin	Yes
30	1.4386	0.6498	0.6188	α 1-antitrypsin	α 1-antitrypsin	Yes
31	1.3817	0.6472	0.6117	α 1-antitrypsin	α 1-antitrypsin	Yes
32	1.4942	0.6437	0.6099	α 1-antitrypsin	α 1-antitrypsin	Yes
33	0.6951	0.5915	0.5735	Myoglobin	Myoglobin	Yes
34	0.6751	0.5840	0.5733	Myoglobin	Myoglobin	Yes
35	0.6830	0.5672	0.5616	Myoglobin	Myoglobin	Yes
36	0.6312	0.5622	0.5530	Myoglobin	Myoglobin	Yes
37	0.6368	0.5614	0.5523	Myoglobin	Myoglobin	Yes
38	0.6912	0.5801	0.5622	Myoglobin	Myoglobin	Yes
39	0.6187	0.5472	0.5481	Myoglobin	Myoglobin	Yes
40	0.6602	0.5644	0.5508	Myoglobin	Myoglobin	Yes
41	1.0026	0.7456	0.7080	Lipase	Lipase	Yes
42	1.0122	0.7739	0.7354	Lipase	Lipase	Yes
43	0.9857	0.7976	0.7546	Lipase	Lipase	Yes
44	0.9546	0.7949	0.7558	Lipase	Lipase	Yes
45	0.9107	0.7769	0.7242	Lipase	Lipase	Yes
46	0.9460	0.8108	0.7503	Lipase	Lipase	Yes
47	0.9213	0.7906	0.7526	Lipase	Lipase	Yes
48	0.9671	0.7761	0.7741	Lipase	Transferrin	No
49	1.2502	0.7770	0.7530	Alkaline Phosphatase	Alkaline Phosphatase	Yes
50	1.3511	0.8061	0.7741	Alkaline Phosphatase	Alkaline Phosphatase	Yes
51	1.4481	0.8268	0.8173	Alkaline Phosphatase	Alkaline Phosphatase	Yes
52	1.3221	0.7869	0.7617	Alkaline Phosphatase	Alkaline Phosphatase	Yes
53	1.3853	0.7913	0.7756	Alkaline Phosphatase	Alkaline Phosphatase	Yes
54	1.3408	0.7645	0.7741	Alkaline Phosphatase	Alkaline Phosphatase	Yes
55	1.3960	0.7937	0.7776	Alkaline Phosphatase	Alkaline Phosphatase	Yes
56	1.3342	0.7416	0.7193	Alkaline Phosphatase	Alkaline Phosphatase	Yes
57	0.4389	0.5595	0.5069	Cytochrome C	Cytochrome C	Yes
58	0.4691	0.5494	0.4931	Cytochrome C	Cytochrome C	Yes
59	0.4302	0.5254	0.4590	Cytochrome C	Cytochrome C	Yes
60	0.4458	0.5317	0.4822	Cytochrome C	Cytochrome C	Yes
61	0.3878	0.5342	0.4607	Cytochrome C	Cytochrome C	Yes
62	0.4305	0.5127	0.4366	Cytochrome C	Cytochrome C	Yes
63	0.4713	0.5905	0.5079	Cytochrome C	Cytochrome C	Yes

64	0.4113	0.5256	0.4657	Cytochrome C	Cytochrome C	Yes
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Table S5. Fluorescent responses obtained from 8 proteins in PBS using PFS-PPE2 sensor.

#	Sample ID	PFS	PPE2	FRET
1	Transferrin	0.5241	0.6237	0.5757
2	Transferrin	0.5333	0.5847	0.5614
3	Transferrin	0.5657	0.6593	0.6165
4	Transferrin	0.5032	0.5699	0.5410
5	Transferrin	0.5169	0.5939	0.5513
6	Transferrin	0.5657	0.6405	0.5858
7	Transferrin	0.4776	0.5561	0.5373
8	Transferrin	0.5404	0.6120	0.5700
9	Fibrinogen	0.7972	0.6989	0.6227
10	Fibrinogen	0.8286	0.7581	0.6605
11	Fibrinogen	0.9205	0.7219	0.6495
12	Fibrinogen	0.7983	0.6917	0.5966
13	Fibrinogen	0.8277	0.6815	0.6068
14	Fibrinogen	0.7978	0.6632	0.5801
15	Fibrinogen	0.8153	0.7011	0.6137
16	Fibrinogen	0.7874	0.6668	0.5822
17	Human Serum Albumin	1.1162	0.6112	0.5335
18	Human Serum Albumin	1.0669	0.5848	0.5183
19	Human Serum Albumin	1.0437	0.6034	0.5339
20	Human Serum Albumin	1.0407	0.5774	0.5155
21	Human Serum Albumin	1.0190	0.5691	0.5037
22	Human Serum Albumin	1.0327	0.5803	0.5097
23	Human Serum Albumin	1.0508	0.5677	0.5065
24	Human Serum Albumin	1.0302	0.5697	0.5028
25	α 1-antitrypsin	1.0768	0.6551	0.5760
26	α 1-antitrypsin	1.0679	0.6388	0.5682
27	α 1-antitrypsin	1.0702	0.6699	0.5908
28	α 1-antitrypsin	0.9962	0.6227	0.5666
29	α 1-antitrypsin	1.0026	0.6554	0.5751
30	α 1-antitrypsin	0.9430	0.6669	0.5803
31	α 1-antitrypsin	0.9587	0.6415	0.5470
32	α 1-antitrypsin	1.0708	0.6853	0.5988
33	Myoglobin	0.2761	0.5321	0.4951
34	Myoglobin	0.3690	0.5419	0.5061
35	Myoglobin	0.2955	0.5151	0.4917
36	Myoglobin	0.2927	0.5284	0.4724
37	Myoglobin	0.2784	0.5350	0.4851
38	Myoglobin	0.2867	0.5277	0.4734
39	Myoglobin	0.3198	0.5078	0.4678
40	Myoglobin	0.3998	0.5254	0.4847
41	Lipase	0.7648	0.8161	0.6565
42	Lipase	0.6974	0.7072	0.6231
43	Lipase	0.6702	0.7603	0.6883
44	Lipase	0.6846	0.7907	0.6786

45	Lipase	0.7120	0.7610	0.6622
46	Lipase	0.6094	0.7644	0.6817
47	Lipase	0.6213	0.7446	0.6546
48	Lipase	0.6192	0.7621	0.6672
49	Alkaline Phosphatase	0.9172	0.7804	0.7191
50	Alkaline Phosphatase	0.9413	0.7936	0.7254
51	Alkaline Phosphatase	0.9116	0.8031	0.7324
52	Alkaline Phosphatase	0.8981	0.7589	0.7038
53	Alkaline Phosphatase	0.9306	0.7764	0.7158
54	Alkaline Phosphatase	0.9011	0.7759	0.7090
55	Alkaline Phosphatase	0.9195	0.7613	0.7156
56	Alkaline Phosphatase	0.9208	0.7817	0.7073
57	Cytochrome C	0.3132	0.4750	0.4269
58	Cytochrome C	0.2136	0.4877	0.4366
59	Cytochrome C	0.2342	0.4996	0.4353
60	Cytochrome C	0.2186	0.4877	0.4270
61	Cytochrome C	0.2029	0.4788	0.4194
62	Cytochrome C	0.2087	0.4874	0.4201
63	Cytochrome C	0.2126	0.4717	0.4152
64	Cytochrome C	0.2193	0.4660	0.4046

Table S6. Identification of the blinded unknowns from 8 proteins in PBS using PFS-PPE2 sensor.

#	PFS	PPE2	FRET	True ID	Identified as	Correct identification
1	0.5745	0.6076	0.5726	Transferrin	Transferrin	Yes
2	0.5044	0.6453	0.5832	Transferrin	Transferrin	Yes
3	0.4876	0.5858	0.5530	Transferrin	Transferrin	Yes
4	0.5285	0.5697	0.5587	Transferrin	Transferrin	Yes
5	0.5908	0.6969	0.6605	Transferrin	Lipase	No
6	0.7921	0.8338	0.7762	Transferrin	Alkaline Phosphatase	No
7	0.4915	0.5702	0.5535	Transferrin	Transferrin	Yes
8	0.5677	0.7940	0.7086	Transferrin	Lipase	No
9	0.7799	0.6628	0.5962	Fibrinogen	Fibrinogen	Yes
10	0.8289	0.6788	0.6226	Fibrinogen	Fibrinogen	Yes
11	0.8827	0.7173	0.6484	Fibrinogen	Fibrinogen	Yes
12	0.7937	0.6817	0.6009	Fibrinogen	Fibrinogen	Yes
13	0.8313	0.6682	0.6171	Fibrinogen	Fibrinogen	Yes
14	0.8212	0.6781	0.6007	Fibrinogen	Fibrinogen	Yes
15	0.8295	0.7221	0.6301	Fibrinogen	Fibrinogen	Yes
16	0.7620	0.6366	0.5780	Fibrinogen	Fibrinogen	Yes
17	1.0946	0.6282	0.5645	Human Serum Albumin	Human Serum Albumin	Yes
18	1.0716	0.5820	0.5217	Human Serum Albumin	Human Serum Albumin	Yes
19	1.0658	0.5666	0.5352	Human Serum Albumin	Human Serum Albumin	Yes
20	1.0213	0.5699	0.5025	Human Serum Albumin	Human Serum Albumin	Yes
21	1.1406	0.6553	0.5896	Human Serum Albumin	α 1-antitrypsin	No

22	1.0400	0.5626	0.5206	Human Serum Albumin	Human Serum Albumin	Yes
23	1.0167	0.5605	0.5018	Human Serum Albumin	Human Serum Albumin	Yes
24	1.0033	0.5582	0.5039	Human Serum Albumin	Human Serum Albumin	Yes
25	1.0456	0.6747	0.6081	α 1-antitrypsin	α 1-antitrypsin	Yes
26	1.0378	0.6571	0.5909	α 1-antitrypsin	α 1-antitrypsin	Yes
27	1.0408	0.6597	0.6049	α 1-antitrypsin	α 1-antitrypsin	Yes
28	0.9922	0.6500	0.5749	α 1-antitrypsin	α 1-antitrypsin	Yes
29	0.9530	0.6934	0.6239	α 1-antitrypsin	Fibrinogen	No
30	0.9900	0.7720	0.6846	α 1-antitrypsin	Alkaline Phosphatase	No
31	0.9140	0.6347	0.5661	α 1-antitrypsin	α 1-antitrypsin	Yes
32	0.9182	0.6404	0.5734	α 1-antitrypsin	α 1-antitrypsin	Yes
33	0.2720	0.5271	0.4918	Myoglobin	Myoglobin	Yes
34	0.2920	0.5376	0.5031	Myoglobin	Myoglobin	Yes
35	0.3159	0.5415	0.4890	Myoglobin	Myoglobin	Yes
36	0.2897	0.5298	0.4762	Myoglobin	Myoglobin	Yes
37	0.2939	0.5104	0.4706	Myoglobin	Myoglobin	Yes
38	0.3203	0.5470	0.5054	Myoglobin	Myoglobin	Yes
39	0.3207	0.5006	0.4601	Myoglobin	Myoglobin	Yes
40	0.4911	0.5502	0.4785	Myoglobin	Myoglobin	Yes
41	0.6755	0.7398	0.6587	Lipase	Lipase	Yes
42	0.6813	0.7451	0.6589	Lipase	Lipase	Yes
43	0.6807	0.7872	0.6911	Lipase	Lipase	Yes
44	0.6794	0.7903	0.6805	Lipase	Lipase	Yes
45	0.6422	0.8116	0.7106	Lipase	Lipase	Yes
46	0.6485	0.8252	0.7269	Lipase	Lipase	Yes
47	0.5584	0.9977	0.6776	Lipase	Lipase	Yes
48	0.6197	0.7562	0.6630	Lipase	Transferrin	Yes
49	0.8721	0.7608	0.7053	Alkaline Phosphatase	Alkaline Phosphatase	Yes
50	0.9368	0.8005	0.7527	Alkaline Phosphatase	Alkaline Phosphatase	Yes
51	0.9305	0.7815	0.7362	Alkaline Phosphatase	Alkaline Phosphatase	Yes
52	0.9301	0.7905	0.7291	Alkaline Phosphatase	Alkaline Phosphatase	Yes
53	0.8953	0.7925	0.7211	Alkaline Phosphatase	Alkaline Phosphatase	Yes
54	0.8981	0.7538	0.7181	Alkaline Phosphatase	Alkaline Phosphatase	Yes
55	0.9577	0.7553	0.6996	Alkaline Phosphatase	Alkaline Phosphatase	Yes
56	0.9293	0.7670	0.7112	Alkaline Phosphatase	Alkaline Phosphatase	Yes
57	0.3941	0.4822	0.4390	Cytochrome C	Myoglobin	No
58	0.2095	0.4775	0.4324	Cytochrome C	Cytochrome C	Yes
59	0.2249	0.4977	0.4297	Cytochrome C	Cytochrome C	Yes
60	0.2052	0.4702	0.4187	Cytochrome C	Cytochrome C	Yes
61	0.1995	0.4933	0.4226	Cytochrome C	Cytochrome C	Yes

62	0.2066	0.4974	0.4208	Cytochrome C	Cytochrome C	Yes
63	0.2079	0.4599	0.4049	Cytochrome C	Cytochrome C	Yes
64	0.2246	0.4751	0.4125	Cytochrome C	Cytochrome C	Yes

Table S7. Fluorescent responses obtained from different concentrations of normal and cancerous mouse serum of transgenic lung model using PFS-PPE1 sensor.

#	Sample ID	PFS	PPE1	FRET
1	Cancerous 1mg/ml	4.5102	0.6913	0.6515
2	Cancerous 1mg/ml	4.4750	0.6980	0.6519
3	Cancerous 1mg/ml	4.4977	0.6802	0.6413
4	Cancerous 1mg/ml	4.2100	0.6986	0.6506
5	Cancerous 1mg/ml	4.5877	0.6678	0.6250
6	Cancerous 1mg/ml	4.4425	0.6635	0.6266
7	Cancerous 1mg/ml	4.1351	0.6649	0.6174
8	Cancerous 1mg/ml	4.3998	0.5702	0.5455
9	Control 1mg/ml	5.7985	0.6707	0.6227
10	Control 1mg/ml	5.4608	0.6964	0.6490
11	Control 1mg/ml	5.3317	0.6992	0.6498
12	Control 1mg/ml	5.2492	0.6742	0.6339
13	Control 1mg/ml	5.4961	0.6855	0.6363
14	Control 1mg/ml	5.2462	0.6759	0.6290
15	Control 1mg/ml	5.1953	0.6710	0.6211
16	Control 1mg/ml	5.2572	0.6081	0.5750
17	Cancerous 5mg/ml	7.2700	0.7650	0.6644
18	Cancerous 5mg/ml	7.3320	0.7635	0.6634
19	Cancerous 5mg/ml	7.3308	0.7368	0.6457
20	Cancerous 5mg/ml	7.0432	0.7410	0.6507
21	Cancerous 5mg/ml	7.0158	0.7159	0.6272
22	Cancerous 5mg/ml	6.9180	0.7167	0.6268
23	Cancerous 5mg/ml	7.0933	0.6965	0.6117
24	Cancerous 5mg/ml	6.8972	0.6899	0.6037
25	Control 5mg/ml	8.6816	0.7406	0.6549
26	Control 5mg/ml	8.6680	0.7515	0.6631
27	Control 5mg/ml	8.9174	0.7511	0.6561
28	Control 5mg/ml	8.3522	0.7348	0.6386
29	Control 5mg/ml	8.4176	0.7330	0.6374
30	Control 5mg/ml	8.2908	0.7177	0.6264
31	Control 5mg/ml	8.3333	0.7090	0.6221
32	Control 5mg/ml	8.3223	0.6994	0.6165
33	Cancerous 10mg/ml	9.0372	0.7943	0.6773
34	Cancerous 10mg/ml	9.2855	0.7891	0.6860
35	Cancerous 10mg/ml	9.0921	0.7884	0.6746
36	Cancerous 10mg/ml	8.9689	0.7769	0.6642
37	Cancerous 10mg/ml	8.5911	0.7578	0.6468
38	Cancerous 10mg/ml	8.5122	0.7477	0.6393
39	Cancerous 10mg/ml	8.7232	0.7542	0.6450
40	Cancerous 10mg/ml	8.6444	0.7374	0.6303
41	Control 10mg/ml	10.5117	0.7709	0.6744

42	Control 10mg/ml	10.5638	0.7814	0.6782
43	Control 10mg/ml	10.6303	0.7853	0.6792
44	Control 10mg/ml	10.3810	0.7650	0.6621
45	Control 10mg/ml	10.3217	0.7579	0.6536
46	Control 10mg/ml	10.0415	0.7615	0.6539
47	Control 10mg/ml	9.8823	0.7413	0.6490
48	Control 10mg/ml	9.8800	0.7138	0.6193
49	Cancerous 20mg/ml	10.8897	0.8322	0.7034
50	Cancerous 20mg/ml	10.7987	0.8418	0.7146
51	Cancerous 20mg/ml	10.5959	0.8305	0.6900
52	Cancerous 20mg/ml	10.6077	0.8316	0.6975
53	Cancerous 20mg/ml	10.3405	0.8024	0.6762
54	Cancerous 20mg/ml	10.2156	0.8132	0.6791
55	Cancerous 20mg/ml	10.4157	0.7991	0.6653
56	Cancerous 20mg/ml	10.3470	0.7729	0.6558
57	Control 20mg/ml	11.5951	0.7936	0.6924
58	Control 20mg/ml	12.1010	0.8022	0.7026
59	Control 20mg/ml	11.6161	0.7759	0.6724
60	Control 20mg/ml	11.4414	0.7851	0.6889
61	Control 20mg/ml	11.3069	0.7671	0.6675
62	Control 20mg/ml	11.3366	0.7767	0.6725
63	Control 20mg/ml	11.3001	0.7647	0.6681
64	Control 20mg/ml	11.0834	0.7207	0.6399

Table S8. Identification of the blinded unknowns from different concentrations of normal and cancerous mouse serum of transgenic lung model using PFS-PPE1 sensor.

#	PFS	PPE1	FRET	True ID	Identified as	Correct identification
1	4.3854	0.6599	0.6194	Cancerous 1mg/ml	Cancerous 1mg/ml	Yes
2	4.2656	0.6996	0.6462	Cancerous 1mg/ml	Cancerous 1mg/ml	Yes
3	4.1912	0.6997	0.6557	Cancerous 1mg/ml	Cancerous 1mg/ml	Yes
4	4.2441	0.6874	0.6457	Cancerous 1mg/ml	Cancerous 1mg/ml	Yes
5	4.2375	0.6662	0.6248	Cancerous 1mg/ml	Cancerous 1mg/ml	Yes
6	4.5221	0.6417	0.5993	Cancerous 1mg/ml	Cancerous 1mg/ml	Yes
7	4.1973	0.6641	0.6235	Cancerous 1mg/ml	Cancerous 1mg/ml	Yes
8	4.5145	0.6382	0.5893	Cancerous 1mg/ml	Control 1mg/ml	No
9	5.3871	0.6714	0.6251	Control 1mg/ml	Control 1mg/ml	Yes
10	5.1701	0.6919	0.6315	Control 1mg/ml	Control 1mg/ml	Yes
11	5.2327	0.6977	0.6438	Control 1mg/ml	Control 1mg/ml	Yes

12	5.1061	0.6809	0.6252	Control 1mg/ml	Control 1mg/ml	Yes
13	5.0747	0.6705	0.6217	Control 1mg/ml	Control 1mg/ml	Yes
14	5.1560	0.6581	0.6131	Control 1mg/ml	Control 1mg/ml	Yes
15	5.1269	0.6577	0.6085	Control 1mg/ml	Control 1mg/ml	Yes
16	5.2236	0.6365	0.5973	Control 1mg/ml	Control 1mg/ml	Yes
17	7.3523	0.7485	0.6475	Cancerous 5mg/ml	Cancerous 5mg/ml	Yes
18	7.1799	0.7392	0.6300	Cancerous 5mg/ml	Cancerous 5mg/ml	Yes
19	7.0995	0.7391	0.6396	Cancerous 5mg/ml	Cancerous 5mg/ml	Yes
20	7.1375	0.7287	0.6340	Cancerous 5mg/ml	Cancerous 5mg/ml	Yes
21	7.0448	0.7061	0.6074	Cancerous 5mg/ml	Cancerous 5mg/ml	Yes
22	6.8809	0.6900	0.6020	Cancerous 5mg/ml	Cancerous 5mg/ml	Yes
23	6.9502	0.6912	0.5990	Cancerous 5mg/ml	Cancerous 5mg/ml	Yes
24	6.7821	0.6872	0.5932	Cancerous 5mg/ml	Cancerous 5mg/ml	Yes
25	8.3439	0.7452	0.6445	Control 5mg/ml	Control 5mg/ml	Yes
26	8.1658	0.7212	0.6281	Control 5mg/ml	Control 5mg/ml	Yes
27	8.2679	0.7355	0.6399	Control 5mg/ml	Control 5mg/ml	Yes
28	8.1488	0.7268	0.6307	Control 5mg/ml	Control 5mg/ml	Yes
29	8.1058	0.7086	0.6162	Control 5mg/ml	Control 5mg/ml	Yes
30	8.0372	0.7049	0.6148	Control 5mg/ml	Control 5mg/ml	Yes
31	7.8728	0.6896	0.5966	Control 5mg/ml	Control 5mg/ml	Yes
32	7.7990	0.6861	0.5887	Control 5mg/ml	Control 5mg/ml	Yes
33	8.8051	0.7810	0.6674	Cancerous 10mg/ml	Cancerous 10mg/ml	Yes
34	8.8256	0.7749	0.6584	Cancerous 10mg/ml	Cancerous 10mg/ml	Yes
35	8.5445	0.7677	0.6494	Cancerous 10mg/ml	Cancerous 10mg/ml	Yes
36	8.5324	0.7509	0.6420	Cancerous 10mg/ml	Cancerous 10mg/ml	Yes
37	8.3556	0.7400	0.6309	Cancerous 10mg/ml	Cancerous 10mg/ml	Yes
38	8.2562	0.7270	0.6197	Cancerous 10mg/ml	Cancerous 10mg/ml	Yes
39	8.2390	0.7336	0.6191	Cancerous	Cancerous	Yes

				10mg/ml	10mg/ml	
40	8.2281	0.7066	0.6004	Cancerous 10mg/ml	Cancerous 10mg/ml	Yes
41	10.0837	0.7673	0.6658	Control 10mg/ml	Control 10mg/ml	Yes
42	9.9277	0.7513	0.6524	Control 10mg/ml	Control 10mg/ml	Yes
43	9.7407	0.7659	0.6611	Control 10mg/ml	Control 10mg/ml	Yes
44	9.9238	0.7422	0.6444	Control 10mg/ml	Control 10mg/ml	Yes
45	9.5966	0.7321	0.6289	Control 10mg/ml	Control 10mg/ml	Yes
46	9.4134	0.7287	0.6276	Control 10mg/ml	Control 10mg/ml	Yes
47	9.3209	0.7281	0.6222	Control 10mg/ml	Cancerous 10mg/ml	No
48	9.2522	0.7067	0.6086	Control 10mg/ml	Control 10mg/ml	Yes
49	10.3510	0.8165	0.6753	Cancerous 20mg/ml	Cancerous 20mg/ml	Yes
50	10.1638	0.8234	0.6812	Cancerous 20mg/ml	Cancerous 20mg/ml	Yes
51	9.9331	0.8168	0.6759	Cancerous 20mg/ml	Cancerous 20mg/ml	Yes
52	9.9306	0.7987	0.6550	Cancerous 20mg/ml	Cancerous 20mg/ml	Yes
53	9.7727	0.7901	0.6503	Cancerous 20mg/ml	Cancerous 20mg/ml	Yes
54	9.5465	0.7705	0.6333	Cancerous 20mg/ml	Cancerous 20mg/ml	Yes
55	9.8393	0.7852	0.6487	Cancerous 20mg/ml	Cancerous 20mg/ml	Yes
56	9.7864	0.7672	0.6348	Cancerous 20mg/ml	Cancerous 20mg/ml	Yes
57	10.8695	0.7753	0.6703	Control 20mg/ml	Control 10mg/ml	No
58	11.1050	0.7803	0.6751	Control 20mg/ml	Control 20mg/ml	Yes
59	11.0601	0.7753	0.6715	Control 20mg/ml	Control 20mg/ml	Yes
60	10.8145	0.7545	0.6533	Control 20mg/ml	Control 20mg/ml	Yes
61	10.5980	0.7566	0.6480	Control 20mg/ml	Control 10mg/ml	No
62	10.4708	0.7527	0.6471	Control 20mg/ml	Control 10mg/ml	No
63	10.5838	0.7436	0.6415	Control 20mg/ml	Control 10mg/ml	No
64	10.4372	0.7354	0.6347	Control 20mg/ml	Control 10mg/ml	No

Table S9. Fluorescent responses obtained from different concentrations of normal and cancerous mouse serum of transgenic lung model using PFS-PPE2 sensor.

#	Sample ID	PFS	PPE1	FRET
1	Cancerous 1mg/ml	3.2936	0.5505	0.5530
2	Cancerous 1mg/ml	3.1927	0.5385	0.5410
3	Cancerous 1mg/ml	3.3469	0.5419	0.5410
4	Cancerous 1mg/ml	3.1327	0.5390	0.5300
5	Cancerous 1mg/ml	3.0741	0.5121	0.5145
6	Cancerous 1mg/ml	3.1362	0.5166	0.5113
7	Cancerous 1mg/ml	3.0503	0.5219	0.5143
8	Cancerous 1mg/ml	3.1256	0.5238	0.5084
9	Control 1mg/ml	4.0552	0.5634	0.5607
10	Control 1mg/ml	4.6826	0.5323	0.5586
11	Control 1mg/ml	4.0054	0.5348	0.5496
12	Control 1mg/ml	3.7307	0.5394	0.5394
13	Control 1mg/ml	3.7315	0.5355	0.5387
14	Control 1mg/ml	3.6722	0.5286	0.5307
15	Control 1mg/ml	3.6267	0.5308	0.5264
16	Control 1mg/ml	3.6397	0.5325	0.5241
17	Cancerous 5mg/ml	5.2738	0.5978	0.5940
18	Cancerous 5mg/ml	5.0283	0.5860	0.5788
19	Cancerous 5mg/ml	4.9964	0.5917	0.5938
20	Cancerous 5mg/ml	4.9582	0.5741	0.5653
21	Cancerous 5mg/ml	4.8478	0.5929	0.5803
22	Cancerous 5mg/ml	4.7459	0.5671	0.5577
23	Cancerous 5mg/ml	4.6417	0.5713	0.5544
24	Cancerous 5mg/ml	4.9375	0.5920	0.5837
25	Control 5mg/ml	5.9655	0.5943	0.5959
26	Control 5mg/ml	5.6713	0.5808	0.5700
27	Control 5mg/ml	5.6959	0.5860	0.5760
28	Control 5mg/ml	5.3900	0.5765	0.5670
29	Control 5mg/ml	5.5432	0.5761	0.5723
30	Control 5mg/ml	5.6301	0.5725	0.5720
31	Control 5mg/ml	5.5589	0.5738	0.5619
32	Control 5mg/ml	5.5972	0.5791	0.5722
33	Cancerous 10mg/ml	5.9241	0.6355	0.6164
34	Cancerous 10mg/ml	5.8673	0.6212	0.6017
35	Cancerous 10mg/ml	5.9303	0.6068	0.5897
36	Cancerous 10mg/ml	6.0079	0.6235	0.6095
37	Cancerous 10mg/ml	5.9276	0.6156	0.5960
38	Cancerous 10mg/ml	5.6499	0.5996	0.5857
39	Cancerous 10mg/ml	5.6449	0.6260	0.6105
40	Cancerous 10mg/ml	5.7008	0.6321	0.6084
41	Control 10mg/ml	7.0758	0.6098	0.6191
42	Control 10mg/ml	6.9402	0.6173	0.6079
43	Control 10mg/ml	6.8399	0.6040	0.6062
44	Control 10mg/ml	6.9129	0.6094	0.6088
45	Control 10mg/ml	6.7863	0.5982	0.6042
46	Control 10mg/ml	6.6608	0.6045	0.5907
47	Control 10mg/ml	6.5155	0.6002	0.5964

48	Control 10mg/ml	6.6640	0.6147	0.6092
49	Cancerous 20mg/ml	7.3161	0.6431	0.6247
50	Cancerous 20mg/ml	7.3265	0.6499	0.6355
51	Cancerous 20mg/ml	7.0019	0.6539	0.6291
52	Cancerous 20mg/ml	6.9891	0.6460	0.6236
53	Cancerous 20mg/ml	7.1553	0.6517	0.6268
54	Cancerous 20mg/ml	6.7655	0.6331	0.6199
55	Cancerous 20mg/ml	6.9394	0.6416	0.6142
56	Cancerous 20mg/ml	6.9523	0.6523	0.6189
57	Control 20mg/ml	7.9271	0.6447	0.6514
58	Control 20mg/ml	8.0213	0.6343	0.6438
59	Control 20mg/ml	7.8697	0.6338	0.6411
60	Control 20mg/ml	7.8301	0.6477	0.6499
61	Control 20mg/ml	7.6778	0.6289	0.6382
62	Control 20mg/ml	7.6420	0.6350	0.6286
63	Control 20mg/ml	7.4972	0.6237	0.6227
64	Control 20mg/ml	7.4889	0.6124	0.6161

Table S10. Identification of the blinded unknowns from different concentrations of normal and cancerous mouse serum of transgenic lung model using PFS-PPE2 sensor.

#	PFS	PPE1	FRET	True ID	Identified as	Correct identification
1	2.2959	0.5385	0.5473	Cancerous 1mg/ml	Cancerous 1mg/ml	Yes
2	2.2865	0.5525	0.5443	Cancerous 1mg/ml	Cancerous 1mg/ml	Yes
3	2.2708	0.5616	0.5580	Cancerous 1mg/ml	Cancerous 1mg/ml	Yes
4	2.2015	0.5534	0.5427	Cancerous 1mg/ml	Cancerous 1mg/ml	Yes
5	2.4720	0.5386	0.5287	Cancerous 1mg/ml	Cancerous 1mg/ml	Yes
6	2.5746	0.5719	0.5645	Cancerous 1mg/ml	Cancerous 1mg/ml	Yes
7	2.3834	0.5407	0.5323	Cancerous 1mg/ml	Cancerous 1mg/ml	Yes
8	2.4611	0.5182	0.5244	Cancerous 1mg/ml	Cancerous 1mg/ml	Yes
9	2.6636	0.5450	0.5501	Control 1mg/ml	Cancerous 1mg/ml	No
10	2.5820	0.5747	0.5571	Control 1mg/ml	Cancerous 1mg/ml	No
11	2.5207	0.5772	0.5834	Control 1mg/ml	Cancerous 1mg/ml	No
12	2.5097	0.5381	0.5426	Control 1mg/ml	Cancerous 1mg/ml	No
13	2.5880	0.5283	0.5340	Control 1mg/ml	Cancerous 1mg/ml	No
14	2.5357	0.5309	0.5295	Control 1mg/ml	Cancerous 1mg/ml	No
15	2.5652	0.5197	0.5225	Control 1mg/ml	Cancerous 1mg/ml	No

16	2.5614	0.5102	0.5134	Control 1mg/ml	Cancerous 1mg/ml	No
17	3.3872	0.5795	0.5646	Cancerous 5mg/ml	Cancerous 1mg/ml	No
18	3.4192	0.5789	0.5812	Cancerous 5mg/ml	Cancerous 1mg/ml	No
19	3.3734	0.5842	0.5655	Cancerous 5mg/ml	Cancerous 1mg/ml	No
20	3.3260	0.5693	0.5619	Cancerous 5mg/ml	Cancerous 1mg/ml	No
21	3.3576	0.5665	0.5628	Cancerous 5mg/ml	Cancerous 1mg/ml	No
22	3.1698	0.5506	0.5433	Cancerous 5mg/ml	Cancerous 1mg/ml	No
23	3.5413	0.5419	0.5427	Cancerous 5mg/ml	Cancerous 1mg/ml	No
24	3.3301	0.5422	0.5360	Cancerous 5mg/ml	Cancerous 1mg/ml	No
25	3.9082	0.5942	0.5842	Control 5mg/ml	Control 1mg/ml	No
26	3.8882	0.5935	0.5951	Control 5mg/ml	Cancerous 1mg/ml	No
27	3.9374	0.5968	0.6113	Control 5mg/ml	Cancerous 1mg/ml	No
28	3.6518	0.5639	0.5578	Control 5mg/ml	Cancerous 1mg/ml	No
29	3.8243	0.5803	0.5764	Control 5mg/ml	Control 1mg/ml	No
30	3.7946	0.5677	0.5653	Control 5mg/ml	Control 1mg/ml	No
31	3.7949	0.5780	0.5732	Control 5mg/ml	Control 1mg/ml	No
32	3.7558	0.5451	0.5510	Control 5mg/ml	Control 1mg/ml	No
33	3.9977	0.6277	0.6099	Cancerous 10mg/ml	Cancerous 5mg/ml	No
34	4.0642	0.6361	0.6128	Cancerous 10mg/ml	Cancerous 5mg/ml	No
35	3.8818	0.6272	0.6062	Cancerous 10mg/ml	Cancerous 1mg/ml	No
36	3.8396	0.6046	0.5931	Cancerous 10mg/ml	Cancerous 1mg/ml	No
37	3.9416	0.5944	0.5883	Cancerous 10mg/ml	Control 1mg/ml	No
38	3.7281	0.5832	0.5782	Cancerous 10mg/ml	Cancerous 1mg/ml	No
39	3.9798	0.6013	0.5872	Cancerous 10mg/ml	Control 1mg/ml	No
40	3.9651	0.5861	0.5694	Cancerous 10mg/ml	Control 1mg/ml	No
41	4.5504	0.6073	0.6180	Control 10mg/ml	Control 1mg/ml	No
42	4.5356	0.6344	0.6220	Control 10mg/ml	Cancerous 5mg/ml	No
43	4.5449	0.6219	0.6229	Control	Cancerous	No

				10mg/ml	5mg/ml	
44	4.5278	0.6051	0.6111	Control 10mg/ml	Control 1mg/ml	No
45	4.7324	0.6008	0.5996	Control 10mg/ml	Cancerous 5mg/ml	No
46	4.4561	0.6012	0.6000	Control 10mg/ml	Cancerous 5mg/ml	No
47	4.4317	0.5905	0.5879	Control 10mg/ml	Cancerous 5mg/ml	No
48	4.3406	0.5772	0.5736	Control 10mg/ml	Control 1mg/ml	No
49	4.7347	0.6493	0.6371	Cancerous 20mg/ml	Cancerous 5mg/ml	No
50	4.8249	0.6645	0.6537	Cancerous 20mg/ml	Cancerous 5mg/ml	No
51	4.9163	0.6824	0.6584	Cancerous 20mg/ml	Cancerous 5mg/ml	No
52	4.6702	0.6556	0.6229	Cancerous 20mg/ml	Cancerous 5mg/ml	No
53	4.6299	0.6404	0.6214	Cancerous 20mg/ml	Cancerous 5mg/ml	No
54	4.6652	0.6453	0.6190	Cancerous 20mg/ml	Cancerous 5mg/ml	No
55	4.5049	0.6351	0.6080	Cancerous 20mg/ml	Cancerous 5mg/ml	No
56	4.4234	0.5965	0.5768	Cancerous 20mg/ml	Cancerous 5mg/ml	No
57	5.2642	0.6452	0.6592	Control 20mg/ml	Cancerous 5mg/ml	No
58	5.2004	0.6343	0.6493	Control 20mg/ml	Cancerous 5mg/ml	No
59	5.1551	0.6313	0.6488	Control 20mg/ml	Cancerous 5mg/ml	No
60	4.9678	0.6170	0.6166	Control 20mg/ml	Cancerous 5mg/ml	No
61	5.0301	0.6150	0.6235	Control 20mg/ml	Cancerous 5mg/ml	No
62	4.9475	0.6229	0.6216	Control 20mg/ml	Cancerous 5mg/ml	No
63	5.0173	0.6043	0.6048	Control 20mg/ml	Cancerous 5mg/ml	No
64	4.7715	0.5914	0.5999	Control 20mg/ml	Cancerous 5mg/ml	No

Table S11. Fluorescent responses obtained from 5 mg/ml total protein concentration of five normal and five cancerous mouse serum of transgenic lung model (stage 1) using PFS-PPE1 sensor.

#	Sample ID	PFS	PPE1	FRET
1	M1-Normal	8.0273	0.7253	0.6422
2	M1-Normal	8.3352	0.7313	0.6433
3	M1-Normal	8.1271	0.7336	0.6499
4	M1-Normal	7.7993	0.6996	0.6108
5	M1-Normal	8.0734	0.6827	0.6057

6	M1-Normal	7.9482	0.6944	0.6168
7	M1-Normal	7.7727	0.6995	0.6226
8	M1-Normal	7.9412	0.6826	0.6033
9	M2-Normal	8.7375	0.7714	0.6810
10	M2-Normal	8.9035	0.7628	0.6773
11	M2-Normal	8.6279	0.7522	0.6665
12	M2-Normal	8.5598	0.7428	0.6587
13	M2-Normal	8.2624	0.7242	0.6343
14	M2-Normal	8.3255	0.7289	0.6473
15	M2-Normal	8.4375	0.7274	0.6440
16	M2-Normal	8.4315	0.7158	0.6366
17	M3-Normal	8.9241	0.7553	0.6677
18	M3-Normal	8.5448	0.7123	0.6313
19	M3-Normal	8.4588	0.7189	0.6380
20	M3-Normal	8.0845	0.7021	0.6165
21	M3-Normal	8.2500	0.6942	0.6143
22	M3-Normal	8.3605	0.7114	0.6264
23	M3-Normal	8.3688	0.7011	0.6223
24	M3-Normal	7.8924	0.6783	0.5982
25	M4-Normal	8.7305	0.7465	0.6609
26	M4-Normal	8.5955	0.7445	0.6533
27	M4-Normal	8.4798	0.7364	0.6504
28	M4-Normal	8.6530	0.7394	0.6381
29	M4-Normal	8.3152	0.7031	0.6176
30	M4-Normal	8.1496	0.7127	0.6299
31	M4-Normal	8.2520	0.7055	0.6183
32	M4-Normal	8.3156	0.7207	0.6298
33	M5-Normal	8.4595	0.7534	0.6769
34	M5-Normal	8.3458	0.7481	0.6595
35	M5-Normal	8.1716	0.7478	0.6644
36	M5-Normal	8.2637	0.7430	0.6566
37	M5-Normal	8.3278	0.7238	0.6428
38	M5-Normal	8.0485	0.7232	0.6425
39	M5-Normal	7.9385	0.7091	0.6244
40	M5-Normal	8.2284	0.7256	0.6501
41	M6-Cancerous	7.3772	0.7876	0.7044
42	M6-Cancerous	7.6263	0.7869	0.7068
43	M6-Cancerous	7.5617	0.7906	0.7042
44	M6-Cancerous	7.3508	0.7650	0.6790
45	M6-Cancerous	7.5591	0.7628	0.6825
46	M6-Cancerous	7.0463	0.7353	0.6587
47	M6-Cancerous	7.1228	0.7523	0.6621
48	M6-Cancerous	7.1330	0.7451	0.6698
49	M7-Cancerous	7.6122	0.7816	0.7089
50	M7-Cancerous	7.6484	0.7880	0.6989
51	M7-Cancerous	7.6296	0.7811	0.6961
52	M7-Cancerous	7.3717	0.7520	0.6767
53	M7-Cancerous	7.3675	0.7567	0.6807

54	M7-Cancerous	7.2894	0.7445	0.6697
55	M7-Cancerous	7.1524	0.7531	0.6698
56	M7-Cancerous	7.2294	0.7453	0.6623
57	M8-Cancerous	7.8987	0.7963	0.7020
58	M8-Cancerous	7.9810	0.7888	0.7016
59	M8-Cancerous	7.7373	0.7813	0.6925
60	M8-Cancerous	7.7619	0.7715	0.6813
61	M8-Cancerous	7.5538	0.7739	0.6825
62	M8-Cancerous	7.4100	0.7443	0.6680
63	M8-Cancerous	7.5789	0.7572	0.6728
64	M8-Cancerous	7.5454	0.7593	0.6774
65	M9-Cancerous	7.4147	0.7827	0.6994
66	M9-Cancerous	7.4527	0.7930	0.7123
67	M9-Cancerous	7.3143	0.7682	0.6884
68	M9-Cancerous	7.1619	0.7503	0.6731
69	M9-Cancerous	7.1569	0.7514	0.6733
70	M9-Cancerous	7.1553	0.7415	0.6708
71	M9-Cancerous	7.1123	0.7440	0.6669
72	M9-Cancerous	6.9563	0.7583	0.6733
73	M10-Cancerous	7.6472	0.7643	0.6966
74	M10-Cancerous	7.8859	0.7898	0.7214
75	M10-Cancerous	7.7815	0.7714	0.7000
76	M10-Cancerous	7.4236	0.7563	0.6824
77	M10-Cancerous	7.5260	0.7385	0.6740
78	M10-Cancerous	7.3664	0.7430	0.6670
79	M10-Cancerous	7.2639	0.7371	0.6574
80	M10-Cancerous	7.3532	0.7470	0.6757

Table S12. Identification of the blinded unknowns from 5 mg/ml total protein concentration of five normal and five cancerous mouse serum of transgenic lung model (stage 1) using PFS-PPE1 sensor.

#	PFS	PPE1	FRET	True ID	Identified as	Correct identification
1	8.3317	0.7701	0.6862	M1-Normal	Normal	Yes
2	8.1884	0.7568	0.6681	M1-Normal	Normal	Yes
3	8.0241	0.7409	0.6625	M1-Normal	Normal	Yes
4	7.9677	0.7296	0.6471	M1-Normal	Normal	Yes
5	7.5858	0.7120	0.6272	M1-Normal	Normal	Yes
6	7.8113	0.6925	0.6203	M1-Normal	Normal	Yes
7	7.5934	0.6924	0.6195	M1-Normal	Normal	Yes
8	7.7969	0.7090	0.6305	M1-Normal	Normal	Yes
9	8.9109	0.7989	0.7086	M2-Normal	Normal	Yes
10	8.6968	0.7794	0.6881	M2-Normal	Normal	Yes
11	9.2398	0.8015	0.7105	M2-Normal	Normal	Yes
12	8.5520	0.7511	0.6714	M2-Normal	Normal	Yes
13	8.5932	0.7760	0.6892	M2-Normal	Normal	Yes
14	8.5753	0.7636	0.6736	M2-Normal	Normal	Yes
15	8.7263	0.7866	0.6969	M2-Normal	Normal	Yes

16	8.4793	0.7391	0.6460	M2-Normal	Normal	Yes
17	8.6161	0.7513	0.6643	M3-Normal	Normal	Yes
18	8.6097	0.7467	0.6606	M3-Normal	Normal	Yes
19	8.4838	0.7483	0.6701	M3-Normal	Normal	Yes
20	8.7168	0.7075	0.6400	M3-Normal	Normal	Yes
21	8.2786	0.7347	0.6477	M3-Normal	Normal	Yes
22	7.9185	0.6856	0.6114	M3-Normal	Normal	Yes
23	8.0658	0.6999	0.6155	M3-Normal	Normal	Yes
24	8.0100	0.6965	0.6175	M3-Normal	Normal	Yes
25	9.0672	0.7859	0.6973	M4-Normal	Normal	Yes
26	8.7300	0.7821	0.6835	M4-Normal	Normal	Yes
27	8.8183	0.7873	0.6955	M4-Normal	Normal	Yes
28	8.6919	0.7417	0.6519	M4-Normal	Normal	Yes
29	8.5950	0.7536	0.6582	M4-Normal	Normal	Yes
30	8.3316	0.7402	0.6433	M4-Normal	Normal	Yes
31	8.4285	0.7366	0.6468	M4-Normal	Normal	Yes
32	8.0993	0.7172	0.6243	M4-Normal	Normal	Yes
33	8.1788	0.7757	0.6961	M5-Normal	Cancerous	No
34	8.8465	0.7698	0.6936	M5-Normal	Normal	Yes
35	8.6846	0.7731	0.6933	M5-Normal	Normal	Yes
36	8.0130	0.7407	0.6594	M5-Normal	Normal	Yes
37	7.8903	0.7401	0.6625	M5-Normal	Normal	Yes
38	7.5601	0.7096	0.6355	M5-Normal	Normal	Yes
39	7.8137	0.7201	0.6460	M5-Normal	Normal	Yes
40	7.7983	0.7257	0.6390	M5-Normal	Normal	Yes
41	7.4780	0.7652	0.6871	M6-Cancerous	Cancerous	Yes
42	7.3533	0.7747	0.6915	M6-Cancerous	Cancerous	Yes
43	7.3370	0.7622	0.6847	M6-Cancerous	Cancerous	Yes
44	7.0681	0.7270	0.6592	M6-Cancerous	Cancerous	Yes
45	7.2882	0.7431	0.6595	M6-Cancerous	Cancerous	Yes
46	7.4228	0.7436	0.6657	M6-Cancerous	Cancerous	Yes
47	7.1043	0.7307	0.6569	M6-Cancerous	Cancerous	Yes
48	6.9881	0.7493	0.6681	M6-Cancerous	Cancerous	Yes
49	7.5183	0.7614	0.6850	M7-Cancerous	Cancerous	Yes
50	7.7548	0.7862	0.6998	M7-Cancerous	Cancerous	Yes
51	7.6099	0.7787	0.6981	M7-Cancerous	Cancerous	Yes
52	7.3263	0.7365	0.6636	M7-Cancerous	Cancerous	Yes
53	7.3616	0.7571	0.6791	M7-Cancerous	Cancerous	Yes
54	7.4654	0.7671	0.6805	M7-Cancerous	Cancerous	Yes
55	7.2153	0.7567	0.6785	M7-Cancerous	Cancerous	Yes
56	7.2098	0.7480	0.6685	M7-Cancerous	Cancerous	Yes
57	7.8795	0.7806	0.6912	M8-Cancerous	Cancerous	Yes
58	7.9396	0.7914	0.7127	M8-Cancerous	Cancerous	Yes
59	7.7182	0.7724	0.6899	M8-Cancerous	Cancerous	Yes
60	7.4748	0.7395	0.6637	M8-Cancerous	Cancerous	Yes
61	7.4428	0.7508	0.6628	M8-Cancerous	Cancerous	Yes
62	7.3110	0.7525	0.6670	M8-Cancerous	Cancerous	Yes
63	7.4098	0.7454	0.6717	M8-Cancerous	Cancerous	Yes

64	7.4614	0.7572	0.6749	M8-Cancerous	Cancerous	Yes
65	7.4107	0.7704	0.6929	M9-Cancerous	Cancerous	Yes
66	7.3539	0.7867	0.7032	M9-Cancerous	Cancerous	Yes
67	7.3468	0.7698	0.6960	M9-Cancerous	Cancerous	Yes
68	7.1368	0.7428	0.6661	M9-Cancerous	Cancerous	Yes
69	7.1598	0.7639	0.6770	M9-Cancerous	Cancerous	Yes
70	7.0086	0.7725	0.6943	M9-Cancerous	Cancerous	Yes
71	7.0797	0.7602	0.6777	M9-Cancerous	Cancerous	Yes
72	6.9225	0.7566	0.6723	M9-Cancerous	Cancerous	Yes
73	7.8216	0.7550	0.6889	M10-Cancerous	Cancerous	Yes
74	7.8264	0.7844	0.7088	M10-Cancerous	Cancerous	Yes
75	7.7420	0.7597	0.6992	M10-Cancerous	Cancerous	Yes
76	7.4915	0.7455	0.6780	M10-Cancerous	Cancerous	Yes
77	7.4991	0.7460	0.6739	M10-Cancerous	Cancerous	Yes
78	7.3530	0.7535	0.6772	M10-Cancerous	Cancerous	Yes
79	7.3258	0.7590	0.6819	M10-Cancerous	Cancerous	Yes
80	7.2939	0.7392	0.6740	M10-Cancerous	Cancerous	Yes

Table S13. Fluorescent responses obtained from 5 mg/ml total protein concentration of five normal and five cancerous mouse serum of experimental lung model (stage 4) using PFS-PPE1 sensor.

#	Sample ID	PFS	PPE1	FRET
1	M1-Normal	8.5537	0.6677	0.5962
2	M1-Normal	8.3282	0.6682	0.5985
3	M1-Normal	8.6669	0.6748	0.6124
4	M1-Normal	8.3621	0.6543	0.5900
5	M1-Normal	8.2975	0.6517	0.5853
6	M1-Normal	8.2191	0.6470	0.5802
7	M1-Normal	8.1844	0.6545	0.5774
8	M1-Normal	8.1992	0.6315	0.5700
9	M2-Normal	9.3529	0.7181	0.6292
10	M2-Normal	9.3604	0.7300	0.6369
11	M2-Normal	9.0127	0.6997	0.6154
12	M2-Normal	9.0765	0.7080	0.6144
13	M2-Normal	8.9042	0.6849	0.6020
14	M2-Normal	8.8373	0.6898	0.5953
15	M2-Normal	8.9133	0.6981	0.6040
16	M2-Normal	8.7562	0.6730	0.5792
17	M3-Normal	8.9275	0.7163	0.6257
18	M3-Normal	8.7581	0.7028	0.6183
19	M3-Normal	8.8240	0.6981	0.6134
20	M3-Normal	8.8354	0.6846	0.6076
21	M3-Normal	8.5960	0.6719	0.5899
22	M3-Normal	8.3215	0.6625	0.5787
23	M3-Normal	8.4338	0.6754	0.5919
24	M3-Normal	8.4354	0.6743	0.5911
25	M4-Normal	8.9890	0.6957	0.6179
26	M4-Normal	9.3274	0.7210	0.6406

27	M4-Normal	8.9497	0.7036	0.6197
28	M4-Normal	8.9821	0.7040	0.6119
29	M4-Normal	8.7273	0.6797	0.6007
30	M4-Normal	8.5919	0.6898	0.6027
31	M4-Normal	8.6707	0.6799	0.5971
32	M4-Normal	8.6049	0.6684	0.5837
33	M5-Normal	8.9877	0.7108	0.6240
34	M5-Normal	9.0816	0.7183	0.6259
35	M5-Normal	8.9942	0.6982	0.6135
36	M5-Normal	8.8895	0.6831	0.6069
37	M5-Normal	8.5719	0.6731	0.5913
38	M5-Normal	8.4560	0.6695	0.5833
39	M5-Normal	8.5831	0.6781	0.5962
40	M5-Normal	8.4375	0.6491	0.5675
41	M6-Cancerous	8.0154	0.7070	0.6189
42	M6-Cancerous	7.9643	0.7093	0.6233
43	M6-Cancerous	7.8853	0.7161	0.6174
44	M6-Cancerous	7.9011	0.6941	0.6064
45	M6-Cancerous	7.5974	0.6661	0.5897
46	M6-Cancerous	7.5524	0.6787	0.5892
47	M6-Cancerous	7.4506	0.6733	0.5894
48	M6-Cancerous	7.5831	0.6810	0.5977
49	M7-Cancerous	7.8787	0.7414	0.6760
50	M7-Cancerous	7.7294	0.7234	0.6508
51	M7-Cancerous	7.9322	0.7223	0.6588
52	M7-Cancerous	7.7026	0.7003	0.6334
53	M7-Cancerous	7.7479	0.7087	0.6399
54	M7-Cancerous	7.5779	0.6904	0.6196
55	M7-Cancerous	7.7055	0.6915	0.6271
56	M7-Cancerous	7.5403	0.6832	0.6241
57	M8-Cancerous	8.6513	0.7355	0.6450
58	M8-Cancerous	8.3887	0.7278	0.6371
59	M8-Cancerous	8.5111	0.7433	0.6493
60	M8-Cancerous	8.3970	0.7222	0.6286
61	M8-Cancerous	8.1696	0.7088	0.6151
62	M8-Cancerous	7.8973	0.6857	0.5939
63	M8-Cancerous	8.1674	0.7080	0.6137
64	M8-Cancerous	8.1702	0.7127	0.6229
65	M9-Cancerous	7.5192	0.7218	0.6551
66	M9-Cancerous	7.3663	0.7211	0.6452
67	M9-Cancerous	7.2437	0.7096	0.6416
68	M9-Cancerous	7.1945	0.6917	0.6234
69	M9-Cancerous	7.0872	0.6703	0.6163
70	M9-Cancerous	7.0960	0.6668	0.6123
71	M9-Cancerous	7.1433	0.6695	0.6149
72	M9-Cancerous	7.1186	0.6746	0.6155
73	M10-Cancerous	7.7634	0.7052	0.6244
74	M10-Cancerous	7.9038	0.7132	0.6411

75	M10-Cancerous	7.7745	0.7024	0.6279
76	M10-Cancerous	7.4023	0.6870	0.6121
77	M10-Cancerous	7.6719	0.6828	0.6111
78	M10-Cancerous	7.4619	0.6640	0.5958
79	M10-Cancerous	7.4378	0.6666	0.5951
80	M10-Cancerous	7.4092	0.6519	0.5772

Table S14. Identification of the blinded unknowns from 5 mg/ml total protein concentration of five normal and five cancerous mouse serum of experimental (stage 4) lung model using PFS-PPE1 sensor.

#	PFS	PPE1	FRET	True ID	Identified as	Correct identification
1	8.5163	0.7028	0.6259	M1-Normal	Normal	Yes
2	8.4571	0.6813	0.6085	M1-Normal	Normal	Yes
3	8.1897	0.6552	0.5999	M1-Normal	Normal	Yes
4	8.4050	0.6777	0.6055	M1-Normal	Normal	Yes
5	8.3398	0.6673	0.5998	M1-Normal	Normal	Yes
6	8.0952	0.6558	0.5814	M1-Normal	Normal	Yes
7	7.9275	0.6419	0.5727	M1-Normal	Normal	Yes
8	7.9902	0.6234	0.5600	M1-Normal	Normal	Yes
9	9.1351	0.7170	0.6258	M2-Normal	Normal	Yes
10	9.2393	0.7181	0.6326	M2-Normal	Normal	Yes
11	8.6288	0.6845	0.5982	M2-Normal	Normal	Yes
12	9.0509	0.7172	0.6253	M2-Normal	Normal	Yes
13	9.1092	0.7158	0.6225	M2-Normal	Normal	Yes
14	8.7375	0.6817	0.5915	M2-Normal	Normal	Yes
15	8.6271	0.6844	0.5917	M2-Normal	Normal	Yes
16	8.6014	0.6677	0.5848	M2-Normal	Normal	Yes
17	8.7592	0.6995	0.6215	M3-Normal	Normal	Yes
18	8.5595	0.6929	0.6144	M3-Normal	Normal	Yes
19	8.1345	0.6705	0.5941	M3-Normal	Normal	Yes
20	8.4680	0.6883	0.6065	M3-Normal	Normal	Yes
21	8.5145	0.6716	0.5975	M3-Normal	Normal	Yes
22	8.1767	0.6449	0.5748	M3-Normal	Normal	Yes
23	8.1367	0.6637	0.5888	M3-Normal	Normal	Yes
24	8.1404	0.6495	0.5735	M3-Normal	Normal	Yes
25	8.8862	0.7076	0.6265	M4-Normal	Normal	Yes
26	8.7308	0.6958	0.6141	M4-Normal	Normal	Yes
27	8.4463	0.6754	0.5996	M4-Normal	Normal	Yes
28	8.7279	0.6926	0.6115	M4-Normal	Normal	Yes
29	8.8106	0.6896	0.6089	M4-Normal	Normal	Yes
30	8.3444	0.6640	0.5791	M4-Normal	Normal	Yes
31	8.4909	0.6695	0.5913	M4-Normal	Normal	Yes
32	8.4035	0.6523	0.5735	M4-Normal	Normal	Yes
33	9.0291	0.7076	0.6186	M5-Normal	Normal	Yes
34	8.6506	0.6830	0.6014	M5-Normal	Normal	Yes
35	8.5888	0.6689	0.5928	M5-Normal	Normal	Yes
36	9.1611	0.7088	0.6226	M5-Normal	Normal	Yes
37	8.5303	0.6787	0.5974	M5-Normal	Normal	Yes

38	8.3219	0.6615	0.5789	M5-Normal	Normal	Yes
39	8.4040	0.6613	0.5866	M5-Normal	Normal	Yes
40	8.3008	0.6528	0.5808	M5-Normal	Normal	Yes
41	7.8361	0.7100	0.6218	M6-Cancerous	Cancerous	Yes
42	7.8674	0.6919	0.6064	M6-Cancerous	Cancerous	Yes
43	7.7642	0.7064	0.6106	M6-Cancerous	Cancerous	Yes
44	7.6370	0.6852	0.5944	M6-Cancerous	Cancerous	Yes
45	7.4179	0.6793	0.5924	M6-Cancerous	Cancerous	Yes
46	7.3765	0.6645	0.5808	M6-Cancerous	Cancerous	Yes
47	7.5359	0.6697	0.5875	M6-Cancerous	Cancerous	Yes
48	7.6065	0.6830	0.5994	M6-Cancerous	Cancerous	Yes
49	8.0575	0.7424	0.6755	M7-Cancerous	Cancerous	Yes
50	7.9020	0.7180	0.6593	M7-Cancerous	Cancerous	Yes
51	7.7754	0.7098	0.6492	M7-Cancerous	Cancerous	Yes
52	7.5770	0.6972	0.6333	M7-Cancerous	Cancerous	Yes
53	7.6941	0.7046	0.6404	M7-Cancerous	Cancerous	Yes
54	7.4558	0.6787	0.6211	M7-Cancerous	Cancerous	Yes
55	7.8469	0.6925	0.6325	M7-Cancerous	Cancerous	Yes
56	7.5507	0.6847	0.6322	M7-Cancerous	Cancerous	Yes
57	8.6864	0.7362	0.6516	M8-Cancerous	Cancerous	Yes
58	8.5119	0.7212	0.6366	M8-Cancerous	Cancerous	Yes
59	8.2514	0.7239	0.6379	M8-Cancerous	Cancerous	Yes
60	8.3107	0.7005	0.6122	M8-Cancerous	Cancerous	Yes
61	8.1421	0.6955	0.6079	M8-Cancerous	Cancerous	Yes
62	8.3108	0.7081	0.6143	M8-Cancerous	Cancerous	Yes
63	7.8615	0.6903	0.6020	M8-Cancerous	Cancerous	Yes
64	8.1470	0.7026	0.6120	M8-Cancerous	Cancerous	Yes
65	7.2796	0.7367	0.6714	M9-Cancerous	Cancerous	Yes
66	7.3324	0.7237	0.6628	M9-Cancerous	Cancerous	Yes
67	7.1535	0.6983	0.6392	M9-Cancerous	Cancerous	Yes
68	7.3592	0.7078	0.6434	M9-Cancerous	Cancerous	Yes
69	6.9613	0.6867	0.6276	M9-Cancerous	Cancerous	Yes
70	6.9753	0.6651	0.6094	M9-Cancerous	Cancerous	Yes
71	7.0476	0.6696	0.6143	M9-Cancerous	Cancerous	Yes
72	7.1991	0.6785	0.6282	M9-Cancerous	Cancerous	Yes
73	7.7439	0.7375	0.6459	M10-Cancerous	Cancerous	Yes
74	7.6959	0.6847	0.6145	M10-Cancerous	Cancerous	Yes
75	7.7789	0.6943	0.6220	M10-Cancerous	Cancerous	Yes
76	7.4966	0.6894	0.6160	M10-Cancerous	Cancerous	Yes
77	7.3363	0.6792	0.6049	M10-Cancerous	Cancerous	Yes
78	7.5062	0.6721	0.5974	M10-Cancerous	Cancerous	Yes
79	7.3423	0.6649	0.5941	M10-Cancerous	Cancerous	Yes
80	7.3182	0.6645	0.5888	M10-Cancerous	Cancerous	Yes

Reference

- (1) Han, J. S.; Bender, M.; Hahn, S.; Seehafer, K.; Bunz, U. H. F. *Chem. Eur. J.* **2016**, *22*, 3230-3233.
- (2) Han, J. S.; Wang, B. H.; Bender, M.; Seehafer, K.; Bunz, U. H. F. *ACS Appl. Mater. Interfaces* **2016**, *8*, 20415-20421.
- (3) Downey, C. M.; Aghaei, M.; Schwendener, R. A.; Jirik, F. R. *Plos One* **2014**, *9*, e99988.

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- (4) Singla, A. K.; Downey, C. M.; Bebb, G. D.; Jirik, F. R. *Oncoscience* **2015**, 2, 263-271.
- (5) Venables, W. N. & Ripley, B. D. (2002). *Modern Applied Statistics with S*. Fourth Edition. Springer, New York. ISBN 0-387-95457-0.