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Anticancer Activity Expressed by a Library of 2,9-Diazaperopyrenium Dications

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SUPPORTING INFORMATION

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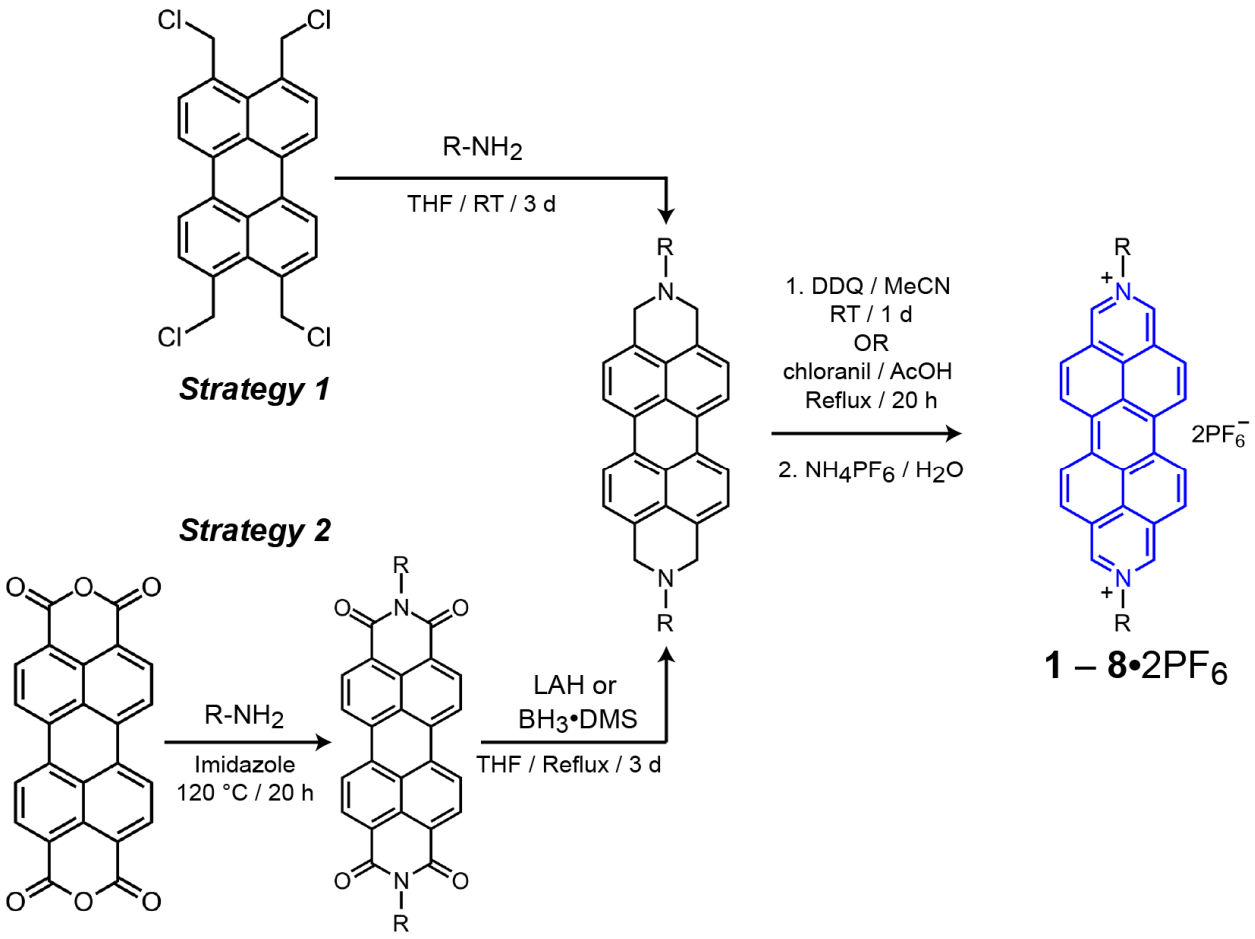
S1. Experimental Procedures

Materials and General Methods: All reagents were purchased from commercial suppliers and used without further purification. 3,4,9,10-Tetrakis(chloromethyl)perylene,[1] *N,N'*-bis(2-[2-hydroxyethoxy]ethyl)perylene-3,4:9,10-tetracarboxylic acid bisimide,[2] *N,N'*-bis(2,6-diisopropylphenyl)perylene-3,4:9:10-bis(dicarboximide)[3] (**9**), $\mathbf{1}^{2+4}$, and $\mathbf{4}^{2+4}$ were all prepared according to literature procedures. All compounds were purified by preparative RP-HPLC (Shimadzu LC-8A), using a C18 column (Waters, XBridge Prep C18 5μm OBD, 19 × 100 mm). The eluants used were MeCN and H_2O, both mixed with 0.1 % (v/v) trifluoroacetic acid (TFA). All compounds were characterized as their hexafluorophosphate salts. The detector was set to λ = 254 nm. Nuclear magnetic resonance (NMR) spectra were recorded at 298 K on a Bruker Avance III 500 spectrometer, with working frequencies of 499.373 and 125.579 MHz for ^{1}H and ^{13}C nuclei, respectively. All ^{13}C NMR spectra were recorded with the simultaneous decoupling of ^{1}H nuclei. Chemical shifts are reported in ppm relative to the signals corresponding to the residual non-deuterated solvents (1.94 and 4.33 ppm for CHD_2CN and CHD_2NO_2, respectively for ^{1}H, 118.26 and 62.8 ppm for CD_3CN and CD_3NO_2, respectively for ^{13}C). Electrospray Ionization (ESI) mass spectra were obtained on an Agilent 6210 LC-TOF high resolution mass spectrometer. In order to ensure solubility of all dications in aqueous media for biological studies, the hexafluorophosphate counterions were replaced by chloride anions by precipitating the dichloride salt from an MeCN solution of the hexafluorophosphate salt after addition of *n*-butyl ammonium chloride, and subsequent washing with an excess of MeCN to remove any remaining *n*-butyl ammonium chloride and/or hexafluorophosphate.



Scheme S1: Possible routes towards the synthesis of **1 – 8**•$2PF_6$

2•$2PF_6$: ***Strategy 1***. 3,4,9,10-Tetrakis(chloromethyl)perylene (100 mg, 0.22 mmol) was added to neat ethylamine (20 mL) and the solution was stirred at room temperature for 24 h under N_2. Et_2O (200 mL) was added in order to precipitate the crude product. The solution was filtered and the residue was washed with Et_2O (3 × 20 mL) and dried to give a dark red solid (69 mg, 74%). This crude material (69 mg, 0.17 mmol) was then added to MeCN (50 mL), followed by addition of DDQ (372 mg, 1.4 mmol) and this solution was then stirred under reflux in an O_2 atmosphere for 16 h, before being cooled to room temperature. A 32% HCl solution (5 mL) was added to

precipitate the chloride salt of the crude product. The solution was filtered and the residue was dissolved in a 50/50 mixture of $(Me)_2CO/H_2O$, to which excess of aqueous NH_4PF_6 was added to precipitate the bis(hexafluorophosphate) salt. The solution was filtered and the residue was washed with H_2O (3 × 20 mL) and dried to give the product **2**•$2PF_6$ as an orange solid (108 mg, 88%). ***Strategy 2***. Perylene-3,4,9,10-tetracarboxylic dianhydride (1g, 2.5 mmol), imidazole (7.5 g) and a catalytic amount of zinc acetate were heated to 120 °C with stirring under an N_2 atmosphere. Upon melting of the imidazole, ethylamine (2M in THF, 5 mL) was added and the mixture was left to stir for 16 h. The crude product was treated with MeOH (30 mL) and 6M HCl solution (10 mL) and the mixture filtered. The residue was washed with MeOH (2 x 30 mL) and Et_2O (2 x 30 mL) and dried under vacuum. The residue (1.2 g) was then added to a mixture of $LiAlH_4$ (1.3 g, 34 mmol) in anhydrous THF (250 mL), which was heated and stirred under N_2 for 16 h. The solution was cooled to 0 °C and the reaction was quenched with H_2O (1.5 mL), 15 % NaOH solution (1.5 mL) and H_2O (5 mL). The mixture was evaporated to dryness and the residue was subjected to Soxhlet extraction ($CHCl_3$) for three days, yielding a crude solid (0.5 g) after evaporation of $CHCl_3$. This solid was then added to a mixture of glacial acetic acid (100 mL) and chloranil (1.2 g, 4.9 mmol) which was heated under reflux for 4 h. Upon cooling to room temperature, the mixture was poured into H_2O (500 mL) and filtered. Excess of aqueous NH_4PF_6 was then added to the filtrate to precipitate the bis(hexafluorophosphate) salt, which was washed with H_2O (3 × 20 mL) and dried to give **2**•$2PF_6$ as an orange solid (170 mg, 10%). ^{1}H NMR (CD_3NO_2, 500 MHz, 298 K): δ = 9.96 (s, 4H), 9.93 (d, ^3J = 9.4 Hz, 4H), 9.01 (d, ^3J = 9.3 Hz, 4H), 5.34 (q, ^3J = 7.4 Hz, 4H), 2.04 (t, ^3J = 7.4 Hz, 6H) ppm. ^{13}C NMR (CD_3NO_2, 125 MHz, 298 K): δ = 139.4, 131.0, 130.6, 130.1, 129.9, 128.0, 123.2, 60.3, 17.6 ppm. ESI-MS: calcd for $[M - PF_6]^+$, m/z = 531.1425, found: m/z = 531.1406.

3•2PF$_6$: 3,4,9,10-Tetrakis(chloromethyl)perylene (100 mg, 0.22 mmol) was added to neat isopropylamine (20 mL) and the solution was stirred at room temperature for 24 h under N_2. Et_2O (200 mL) was added in order to precipitate the crude product. The solution was filtered and the residue was washed with Et_2O (3 × 20 mL) and dried to give a brown solid (71 mg). This crude material (60 mg) was then added to MeCN (50 mL), followed by addition of DDQ (250 mg, 1.1 mmol) and the solution was then stirred at room temperature for 16 h. A 32% aqueous HCl solution (5 mL) and Et_2O (100 mL) were added to precipitate the dichloride salt of the crude product. The solution was filtered and the residue was dissolved in a 50/50 mixture of $(Me)_2CO/H_2O$, to which an excess of aqueous NH_4PF_6 was added in order to precipitate the bis(hexafluorophosphate) salt. The solution was filtered and the residue was washed with H_2O (3 × 20 mL) and dried to give **3**•2PF$_6$ as a brown/orange solid (21 mg, 14%). ^{1}H NMR (CD_3CN, 500 MHz, 298 K): δ = 9.91 (s, 4H), 9.84 (d, ^3J = 9.2 Hz, 4H), 8.92 (d, ^3J = 9.2 Hz, 4H), 5.50 (sep, ^3J = 6.8 Hz, 2H), 1.98 (d, ^3J = 6.7 Hz, 12H) ppm. ^{13}C NMR (CD_3CN, 125 MHz, 298 K): δ = 137.8, 130.5, 129.8, 129.4, 129.4, 127.5, 122.6, 67.4, 23.8 ppm. ESI-MS: calcd for $[M - PF_6]^+$, m/z = 559.1738, found: m/z = 559.1742.

5•2PF$_6$: *N,N*'-Bis(2-[2-hydroxyethoxy]ethyl)-perylene-3,4,9,10-tetracarboxylic acid bisimide (2.5 g, 4.4 mmol) was added to anhydrous THF (200 mL), followed by slow addition of BH_3-DMS (2M in THF, 50 mL) and the solution was stirred under reflux for 5 days under N_2. After cooling the solution to room temperature, the solution was quenched by the slow addition of MeOH (200 mL). Conc. HCl (6M, 100 mL) was added and the solution was stirred under reflux for 3 h. Upon cooling the solution to room temperature, the solvent was removed under vacuum and the residue was suspended in a saturated K_2CO_3 solution until the pH reached 10. The

suspension was then filtered and the residue was washed with H_2O (3 × 50 mL) and dried to give a brown solid (1.4 g, 62%). This crude material (1.2 g) was then added to a MeCN/CH_2Cl_2 50:50 mixture (200 mL), followed by addition of DDQ (4.4 g, 19.4 mmol) and this solution was then stirred at RT for 3 days. A 32% aqueous HCl solution (5 mL) and Et_2O (100 mL) were added in order to precipitate the dichloride salt of the crude product. The solution was filtered and the residue was dissolved in H_2O (50 mL), to which excess of aqueous NH_4PF_6 was added so as to precipitate the bis(hexafluorophosphate) salt. The solution was filtered and the residue was washed with H_2O (3 × 20 mL) and dried to give **5**•2PF_6 as a brown/orange solid (0.47 g, 13%). ^{1}H NMR (CD_3CN, 500 MHz, 298 K): δ = 9.72 (s, 4H), 8.41 (br s, 4H), 8.18 (d, ^3J = 9.0 Hz, 4H), 5.31 (t, ^3J = 4.8 Hz, 4H), 4.35 (t, ^3J = 4.8 Hz, 4H), 3.78 (s, 8H) ppm. ^{13}C NMR (CD_3CN, 125 MHz, 298 K): δ = 140.1, 128.9, 128.1, 127.9, 127.8, 127.0, 120.6, 73.6, 69.9, 63.6, 61.8 ppm. ESI-MS: calcd for $[M - PF_6]^+$, m/z = 651.1847, found: m/z = 651.1848.

6•2PF_6: 3,4,9,10-Tetrakis(chloromethyl)perylene (100 mg, 0.22 mmol) was added to anhydrous THF (20 mL), followed by addition of *p*-toluidine (4.8 g) and the solution was stirred at 60°C for 16 h under N_2. After cooling the solution to room temperature, Et_2O (200 mL) was added to precipitate the crude product. The solution was filtered and the residue was washed with Et_2O (3 × 20 mL) and dried to give a brown solid (110 mg, 95%). This crude material (100 mg, 0.19 mmol) was then added to a MeCN/CH_2Cl_2 50:50 mixture (50 mL), followed by addition of DDQ (530 mg, 2.3 mmol) and this solution was then heated to 40°C for 3 days. Upon cooling the solution to room temperature, a 32% aqueous HCl solution (5 mL) and Et_2O (100 mL) were added to precipitate the dichloride salt of the crude product. The solution was filtered and the residue was dissolved in a 50/50 mixture of $(Me)_2CO/H_2O$, to which an excess of aqueous

NH_4PF_6 was added to precipitate the bis(hexafluorophosphate) salt. The solution was filtered and the residue was washed with H_2O (3 × 20 mL) and dried to give **6•2PF$_6$** as a brown/orange solid (20 mg, 13%). ^{1}H NMR (CD_3CN, 500 MHz, 298 K): δ = 10.07 (s, 4H), 9.78 (d, ^3J = 9.3 Hz, 4H), 8.94 (d, ^3J = 9.3 Hz, 4H), 7.97 (d, ^3J = 8.4 Hz, 4H), 7.73 (d, ^3J = 8.4 Hz, 4H), 2.61 (s, 6H) ppm. ^{13}C NMR (CD_3CN, 125 MHz, 298 K): δ = 143.6, 142.3, 139.4, 132.2, 130.2, 130.1, 129.8, 129.2, 127.7, 125.9, 122.6, 21.3 ppm. ESI-MS: calcd for $[M - 2PF_6]^{2+}$, m/z = 255.1048, found: m/z = 255.1051.

7•2PF$_6$: 3,4,9,10-Tetrakis(chloromethyl)perylene (145 mg, 0.32 mmol) was added to neat *m*-toluidine (20 mL) and the solution was stirred at 60°C for 24 h under N_2. After cooling the solution to room temperature, Et_2O (200 mL) was added to precipitate the crude product. The solution was filtered and the residue was washed with Et_2O (3 × 20 mL) and dried to give a brown solid (165 mg, quant). This crude material (150 mg, 0.29 mmol) was added to a MeCN/CH_2Cl_2 50:50 mixture (50 mL), followed by addition of DDQ (250 mg, 1.1 mmol) and this solution was heated to 60°C for 16 h. Upon cooling the solution to room temperature, a 32% aqueous HCl solution (5 mL) and Et_2O (100 mL) were added to precipitate the dichloride salt of the crude product. The solution was filtered and the residue was dissolved in a 50/50 mixture of $(Me)_2CO/H_2O$, to which an excess of aqueous NH_4PF_6 was added to precipitate the bis(hexafluorophosphate) salt. The solution was filtered and the residue was washed with H_2O (3 × 20 mL) and dried to give **7•**2PF_6 a brown/orange solid (23 mg, 10%). ^{1}H NMR (CD_3CN, 500 MHz, 298 K): δ = 10.09 (s, 4H), 9.89 (d, ^3J = 9.3 Hz, 4H), 8.99 (d, ^3J = 9.3 Hz, 4H), 7.93 (s, 2H), 7.89 (d, ^3J = 7.8 Hz, 2H), 7.79 (t, ^3J = 7.8 Hz, 4H), 7.73 (d, ^3J = 7.8 Hz, 2H), 2.63 (s, 6H) ppm. ^{13}C NMR (CD_3CN, 125 MHz, 298 K): δ = 144.6, 142.5, 139.4, 133.3, 131.5, 130.4, 130.2,

129.9, 129.3, 127.7, 126.6, 123.2, 122.7, 21.4 ppm. ESI-MS: calcd for $[M - 2PF_6]^{2+}$, m/z = 255.1048, found: m/z = 255.1053.

8•2PF$_6$: 3,4,9,10-Tetrakis(chloromethyl)perylene (100 mg, 0.22 mmol) was added to neat 2,6-diisopropylaniline (20 mL) and the solution was stirred at 100°C for 24 h under N_2. After cooling the solution to room temperature, Et_2O (200 mL) was added to precipitate the crude product. The solution was filtered and the residue was washed with Et_2O (3 × 20 mL) and dried to give a brown solid (115 mg, 78%). This crude material (91 mg, 0.14 mmol) was added to MeCN (50 mL), followed by addition of DDQ (250 mg, 1.1 mmol) and this solution was then heated under reflux for 16 h. Upon cooling the solution to room temperature, a 32% aqueous HCl solution (5 mL) and Et_2O (100 mL) were added to precipitate the dichloride salt of the crude product. The solution was filtered and the residue was dissolved in a 50/50 mixture of $(CH_3)_2CO/H_2O$, to which excess of aqueous NH_4PF_6 was added to precipitate the bis(hexafluorophosphate) salt. The solution was filtered and the residue was washed with H_2O (3 × 20 mL) and dried to give **8**•2PF$_6$ as a brown/orange solid (80 mg, 61%). ^{1}H NMR (CD_3CN, 500 MHz, 298 K): δ = 10.06 (d, ^3J = 9.2 Hz, 4H), 9.93 (s, 4H), 9.03 (d, ^3J = 9.2 Hz, 4H), 7.83 (t, ^3J = 7.9 Hz, 2H), 7.65 (d, ^3J = 7.9 Hz, 4H), 2.12 (sep, ^3J = 6.7 Hz, 4H), 1.20 (d, ^3J = 6.7 Hz, 24H) ppm. ^{13}C NMR (CD_3CN, 125 MHz, 298 K): δ = 145.0, 140.4, 140.3, 133.4, 131.4, 130.6, 130.3, 129.8, 128.1, 126.0, 122.9, 29.3, 24.2 ppm. ESI-MS: calcd for $[M - 2PF_6]^{2+}$, m/z = 325.1830, found: m/z = 325.1839.

A•2PF$_6$: The crude material (70 mg) produced from the reaction between 3,4,9,10-tetrakis(chloromethyl)perylene and isopropylamine, was acidified addition of conc HCl (6M, 50 mL) and the suspension was filtered to remove insoluble impurities. Excess of NH_4PF_6 was added to the filtrate to precipitate the crude product as a bis(hexafluorophosphate) salt.

Purification by RP-HPLC, followed by conversion back to the bis(hexafluorophosphate) salt using aqueous NH_4PF_6, gave **A•2PF$_6$** as a yellow solid (27 mg, 17%). ^{1}H NMR (CD_3CN, 500 MHz, 298 K): δ = 8.21 (d, ^3J = 7.6 Hz, 4H), 7.44 (d, ^3J = 7.6 Hz, 4H), 4.68 (s, 8H), 3.83 (sep, ^3J = 6.7 Hz, 2H), 1.51 (d, ^3J = 6.7 Hz, 12H) ppm. ^{13}C NMR (CD_3CN, 125 MHz, 298 K): δ = 131.6, 128.2, 128, 126.9, 126.2, 121.9, 59.8, 52.0, 17.4 ppm. ESI-MS: calcd for $[(M - PF_6) - HPF_6]^+$, m/z = 419.2487, found: m/z = 419.2491.

B•2PF$_6$: The crude material (1.2 g) produced from the reduction of *N,N*'-bis(2-[2-hydroxyethoxy]ethyl)-perylene-3,4,9,10-tetracarboxylic acid bisimide, was acidified by addition of conc HCl (6M, 50 mL), and the suspension was filtered to remove insoluble impurities. An excess of aqueous NH_4PF_6 was added to the filtrate to precipitate the crude product as the bis(hexafluorophosphate) salt. Purification by RP-HPLC, followed by conversion back to the bis(hexafluorophosphate) salt using NH_4PF_6 gave **B**•2PF_6 as a yellow solid (0.53 g, 15%). ^{1}H NMR (CD_3CN, 500 MHz, 298 K): δ = 8.34 (d, ^3J = 7.8 Hz, 4H), 7.51 (d, ^3J = 7.8 Hz, 4H), 4.79 (s, 8H), 3.96 – 3.87 (m, 4H), 3.68 – 3.60 (m, 8H), 3.53 – 3.46 (m, 4H) ppm. ^{13}C NMR (CD_3CN, 125 MHz, 298 K): δ = 131.8, 128.3, 127.9, 126.6, 125.9, 122.1, 72.9, 64.5, 61.8, 55.4, 55.0 ppm. ESI-MS: calcd for $[(M - PF_6) - HPF_6]^+$, m/z = 511.2591, found: m/z = 511.2599.

S2. ^{1}H and ^{13}C NMR Spectroscopy

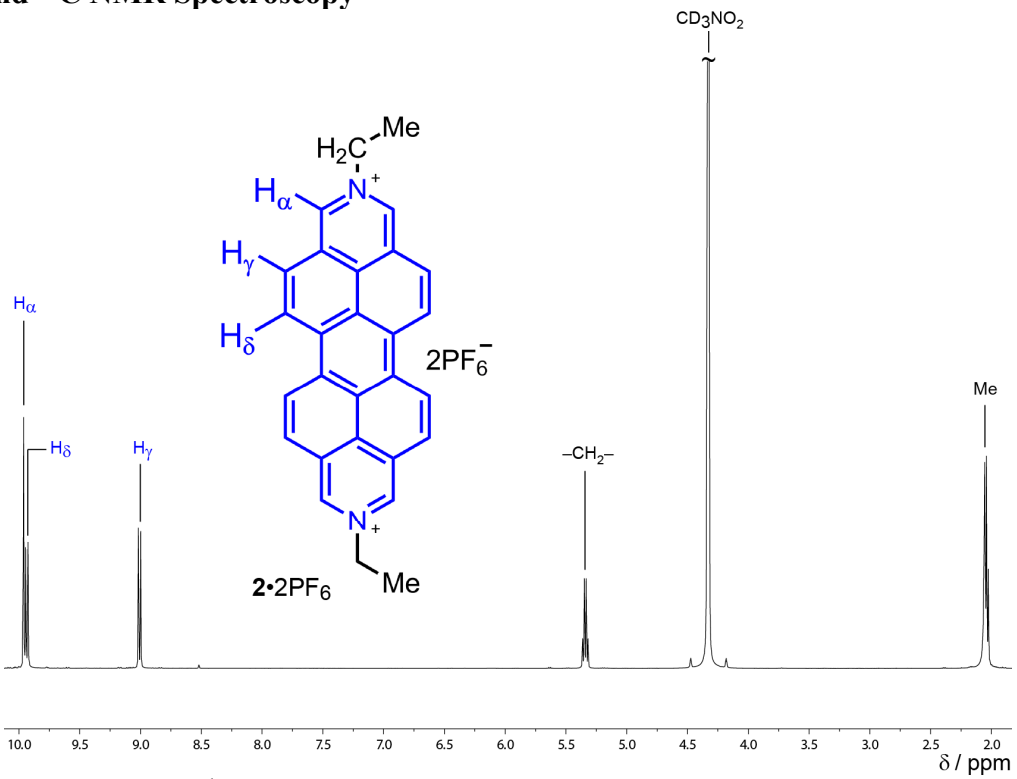


Figure S1. ^{1}H NMR Spectrum (500 MHz, CD_3NO_2, 298 K) of **2**•$2PF_6$

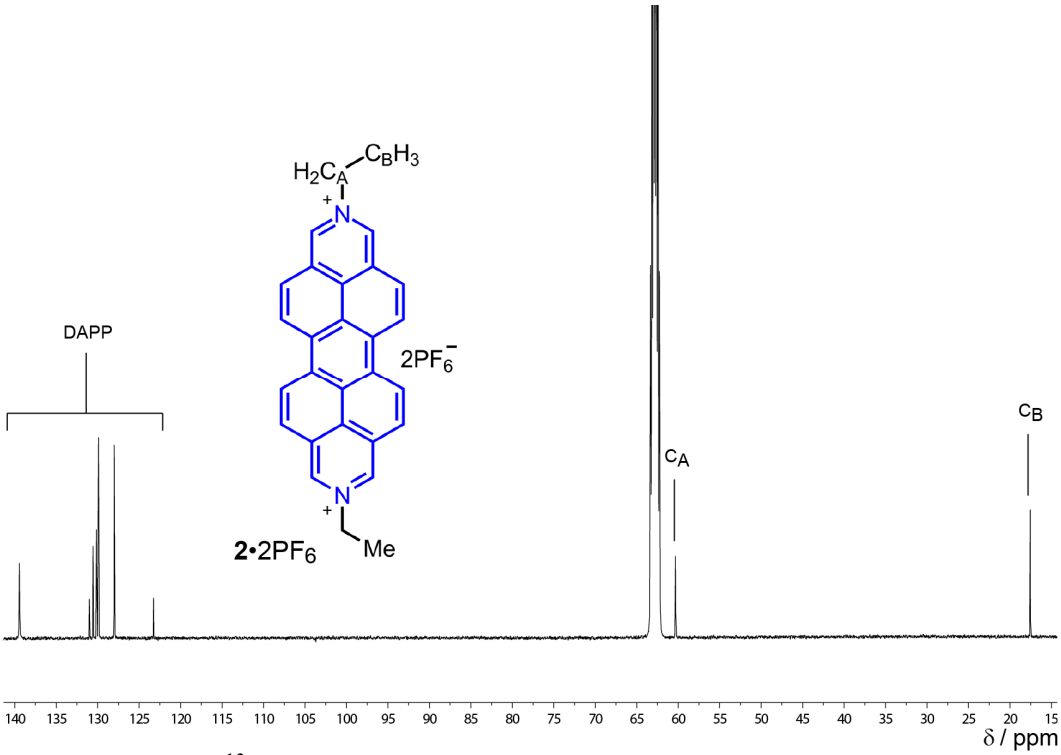


Figure S2. ^{13}C NMR Spectrum (125 MHz, CD_3NO_2, 298 K) of **2**•$2PF_6$

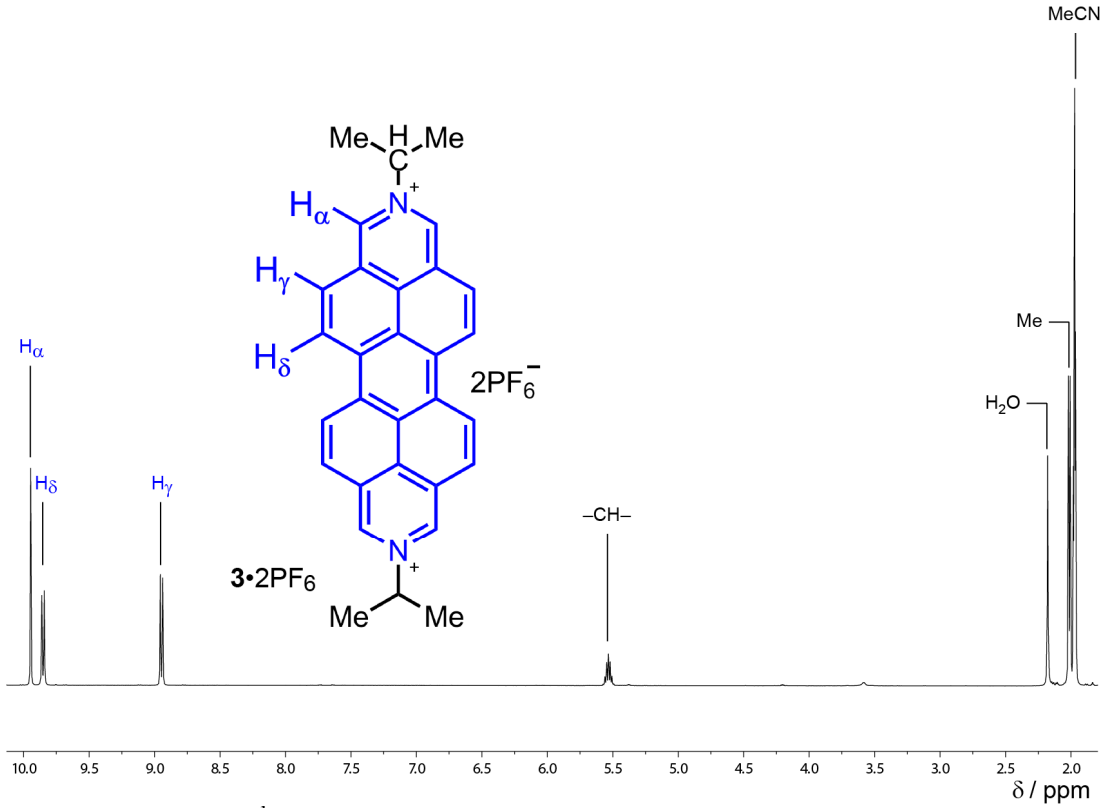


Figure S3. ^{1}H NMR Spectrum (500 MHz, CD_3CN, 298 K) of **3**•$2PF_6$

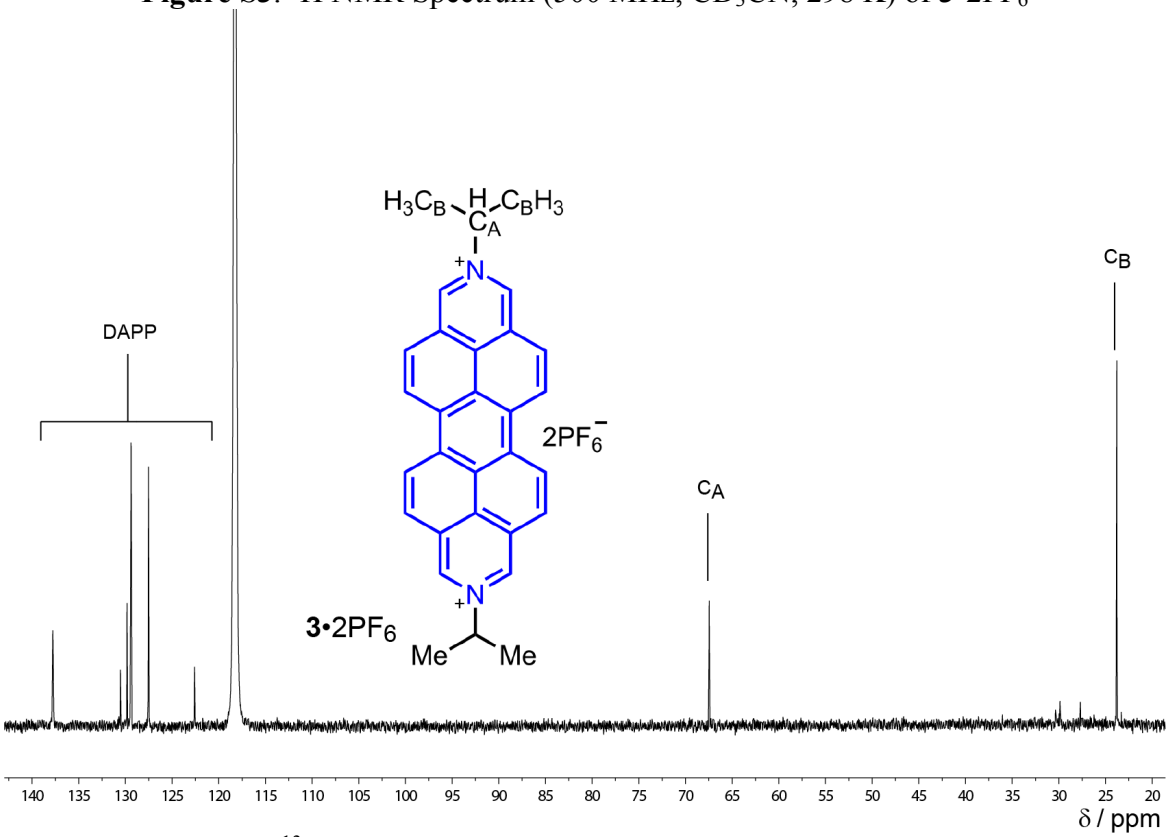


Figure S4.^{13}C NMR Spectrum (125 MHz, CD_3CN, 298 K) of **3**•$2PF_6$

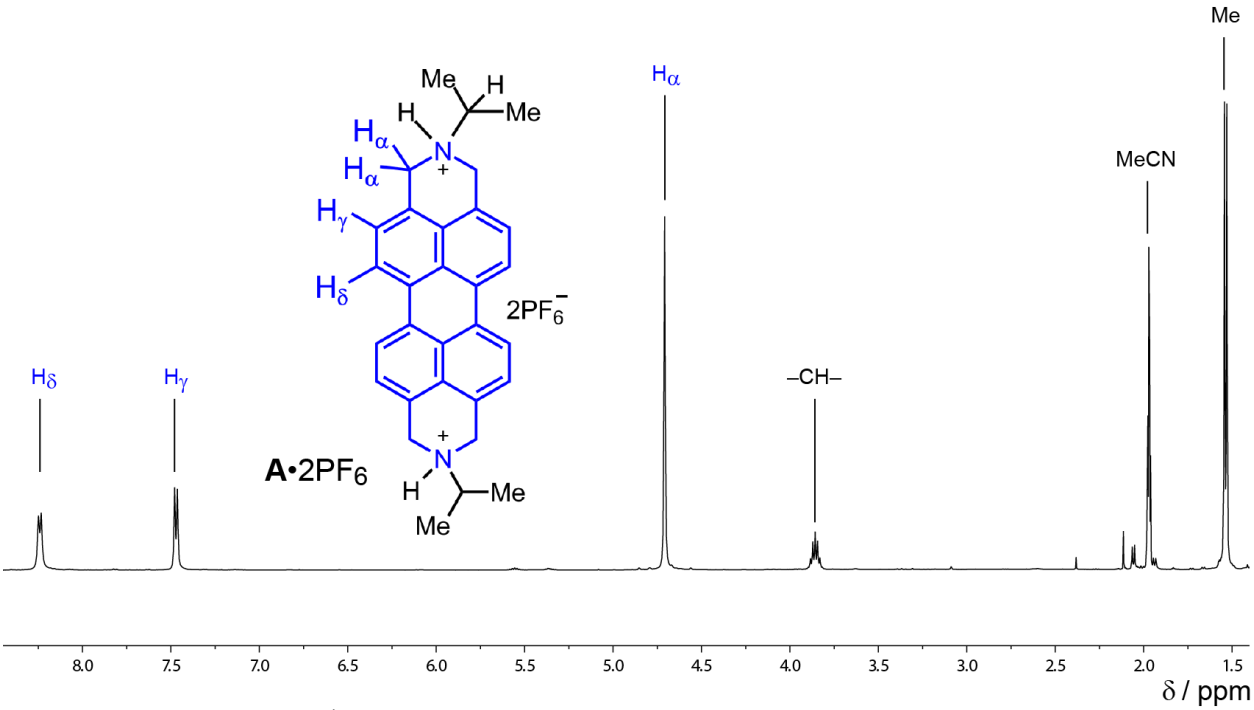


Figure S5. ^{1}H NMR Spectrum (500 MHz, CD_3CN, 298 K) of **A**•$2PF_6$

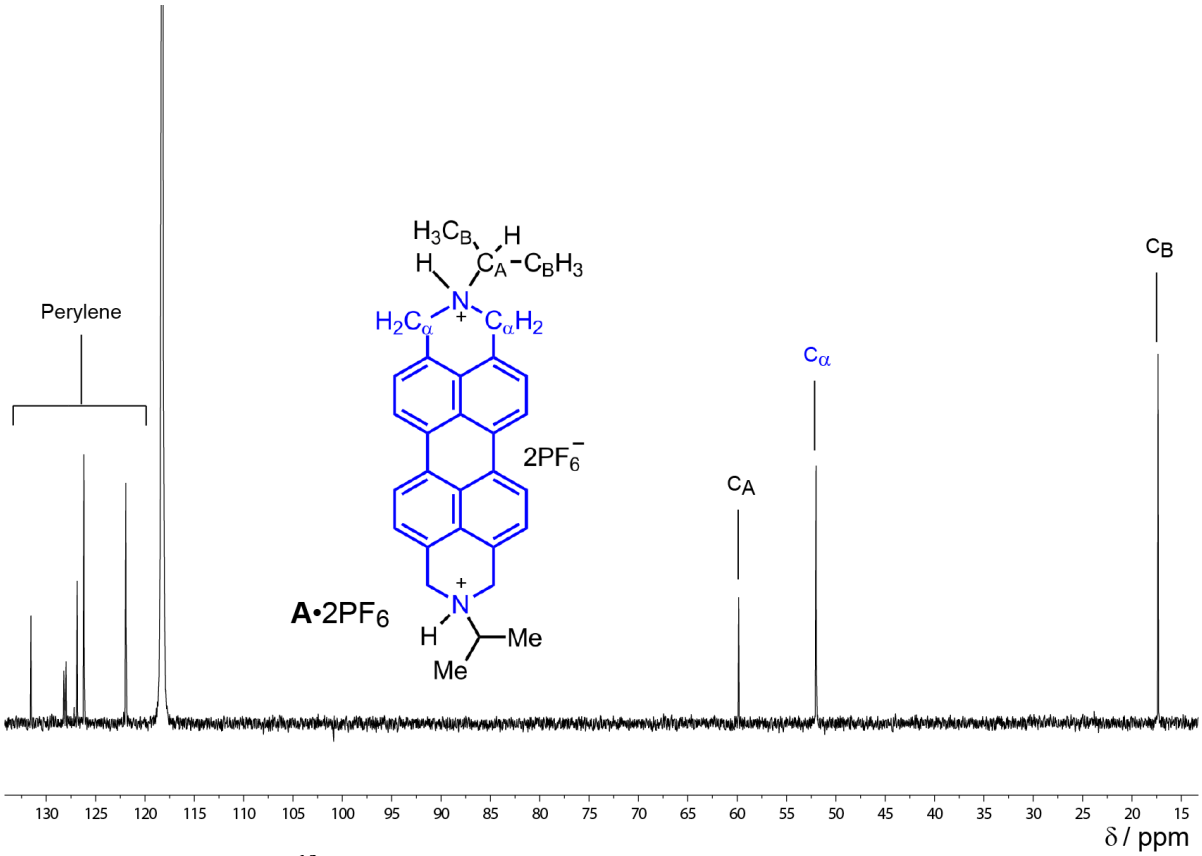


Figure S6. ^{13}C NMR Spectrum (125 MHz, CD_3CN, 298 K) of **A**•$2PF_6$

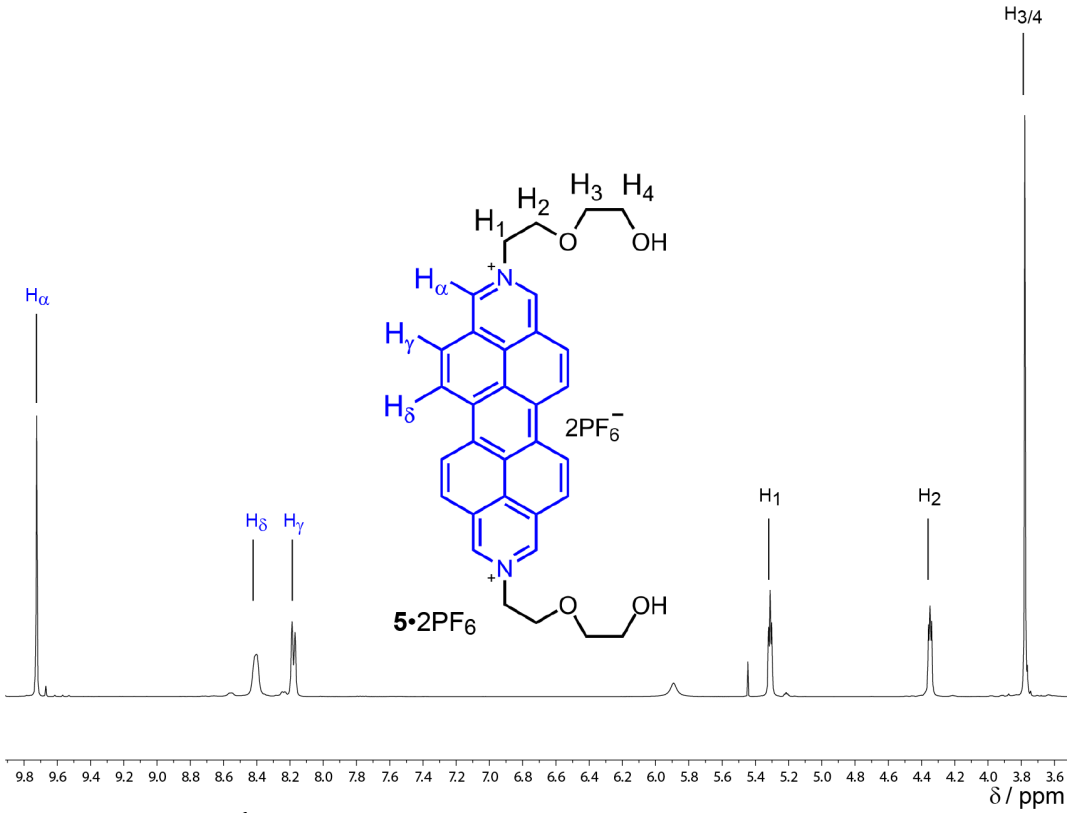


Figure S7. ^{1}H NMR Spectrum (500 MHz, CD_3CN, 298 K) of **5**•2PF_6

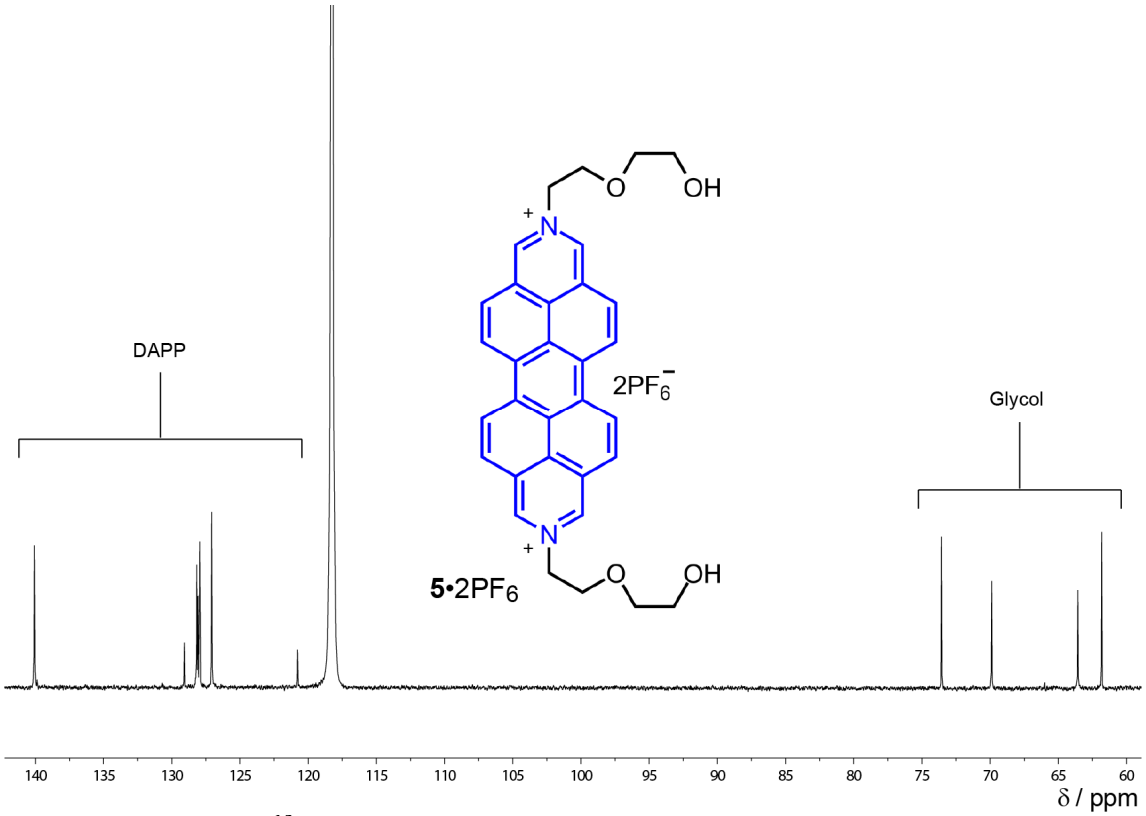


Figure S8. ^{13}C NMR Spectrum (125 MHz, CD_3CN, 298 K) of **5**•2PF_6

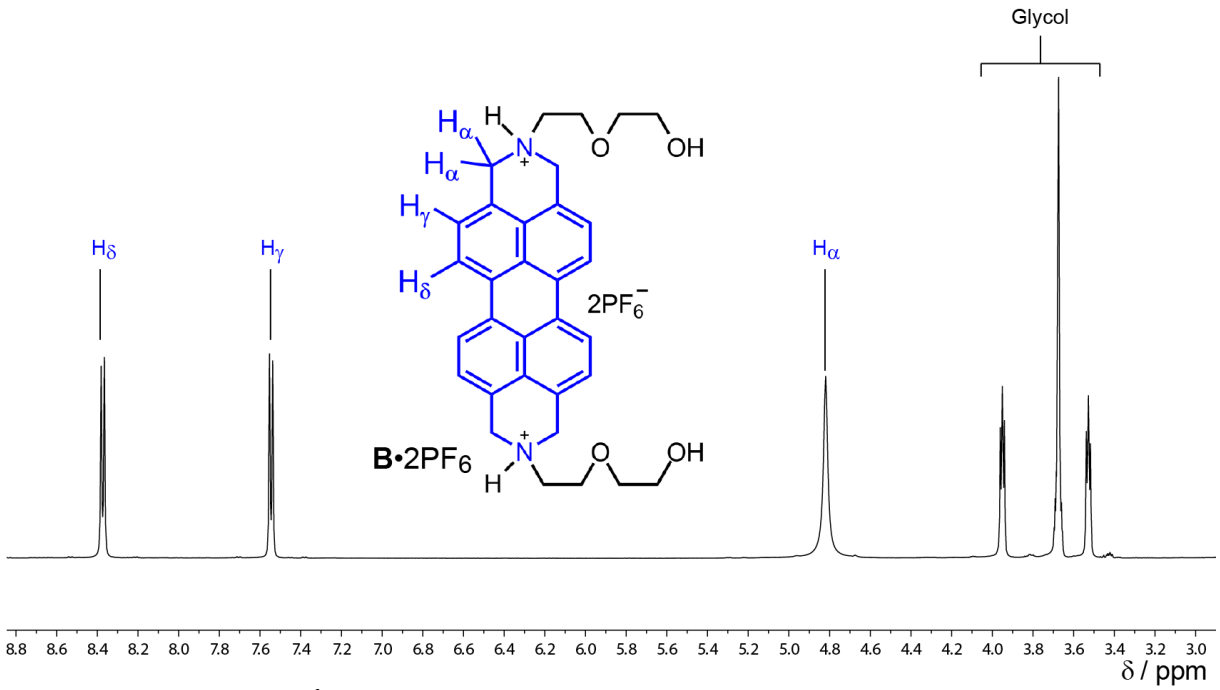


Figure S9. ^{1}H NMR Spectrum (500 MHz, CD_3CN, 298 K) of **B**•2PF_6

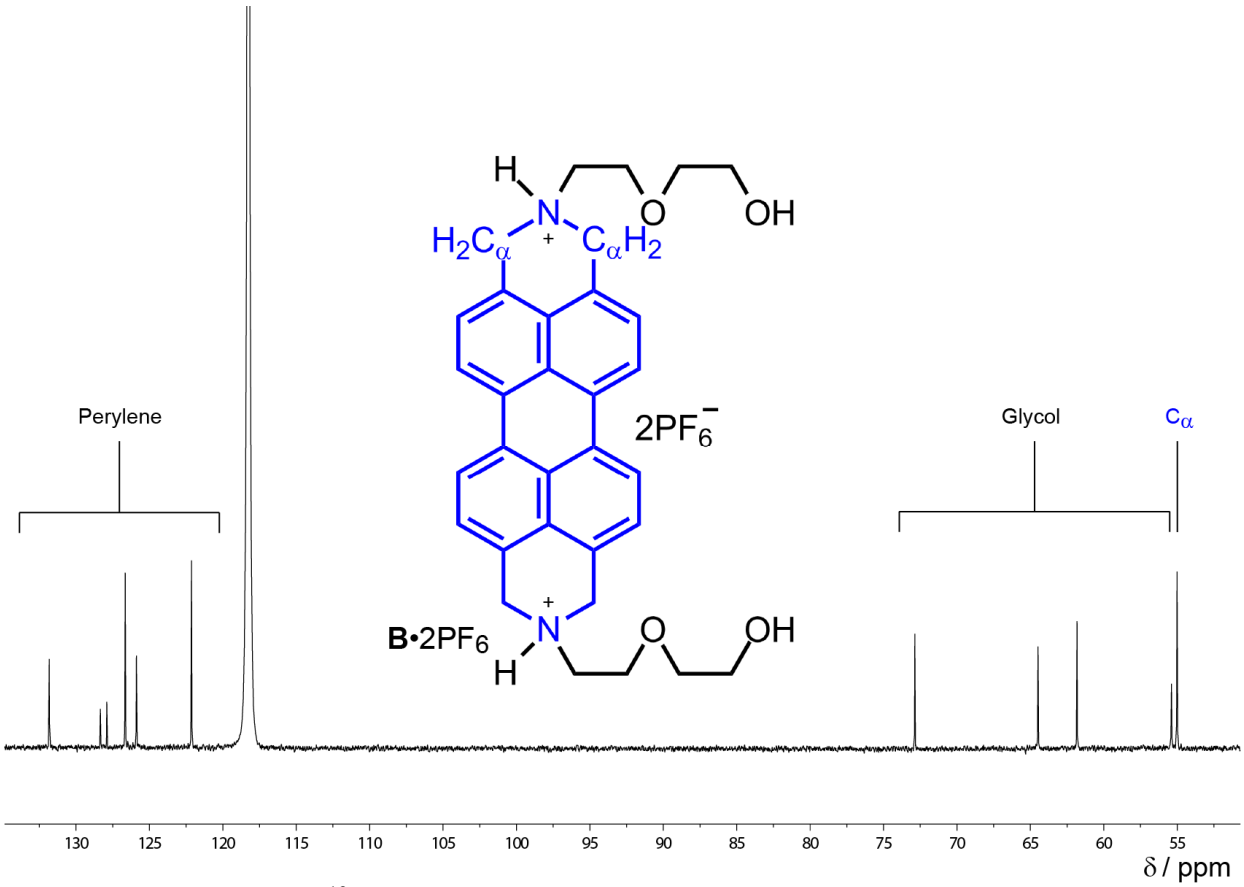


Figure S10. ^{13}C NMR Spectrum (125 MHz, CD_3CN, 298 K) of **B**•2PF_6

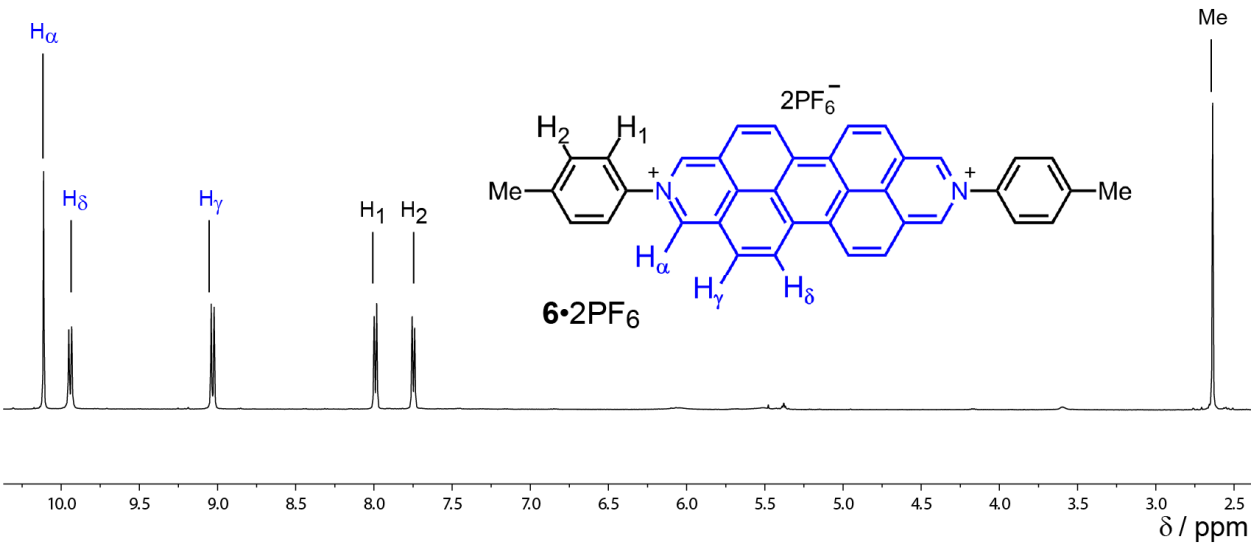


Figure S11. ^{1}H NMR Spectrum (500 MHz, CD_3CN, 298 K) of **6**•$2PF_6$

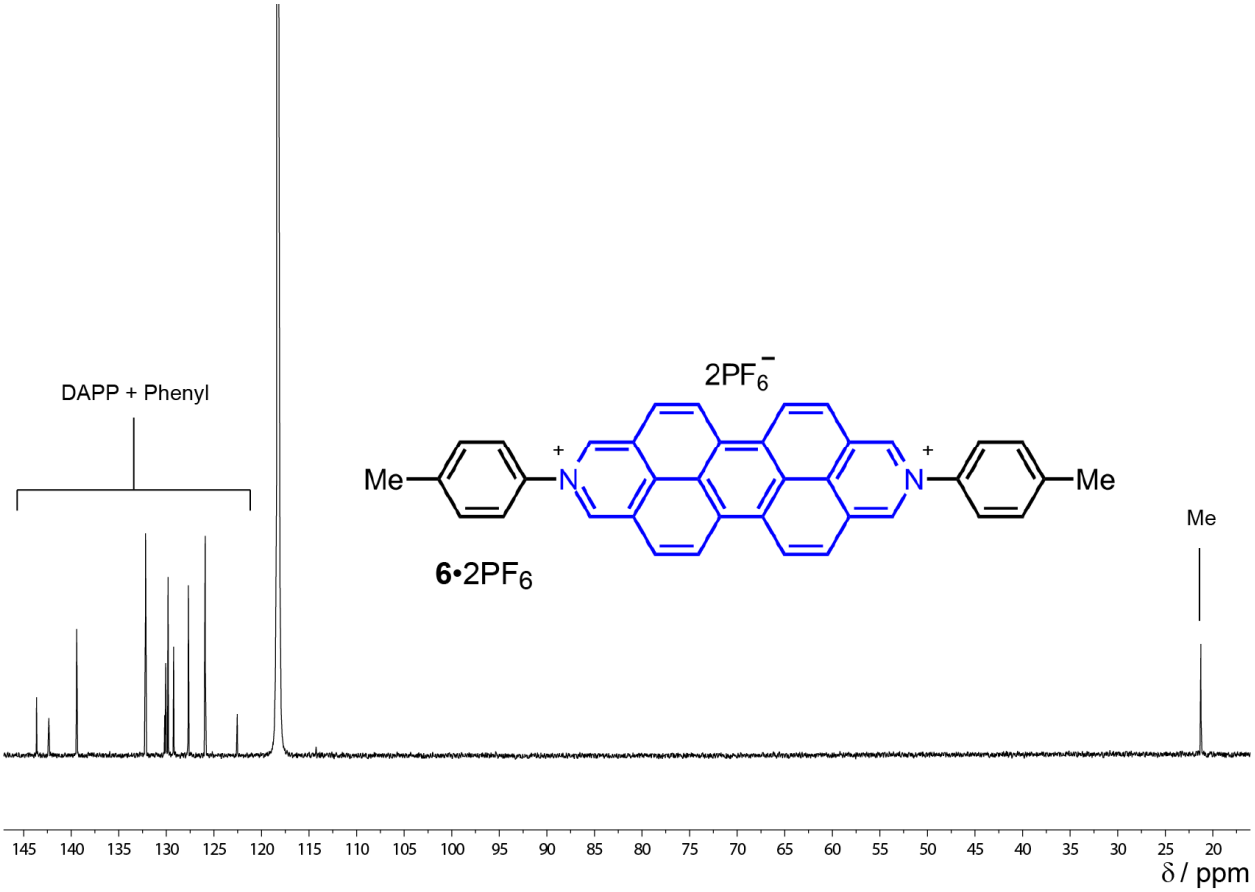


Figure S12. ^{13}C NMR Spectrum (125 MHz, CD_3CN, 298 K) of **6**•$2PF_6$

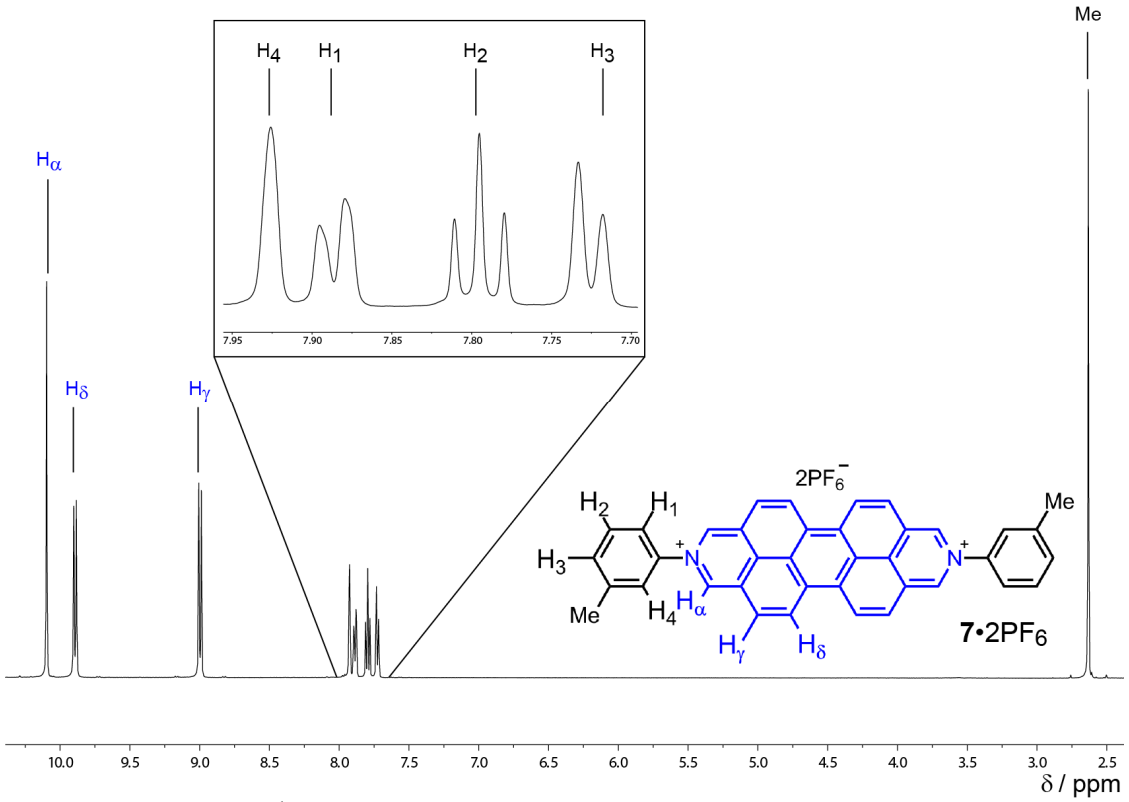


Figure S13. ^{1}H NMR Spectrum (500 MHz, CD_3CN, 298 K) of **7**•$2PF_6$

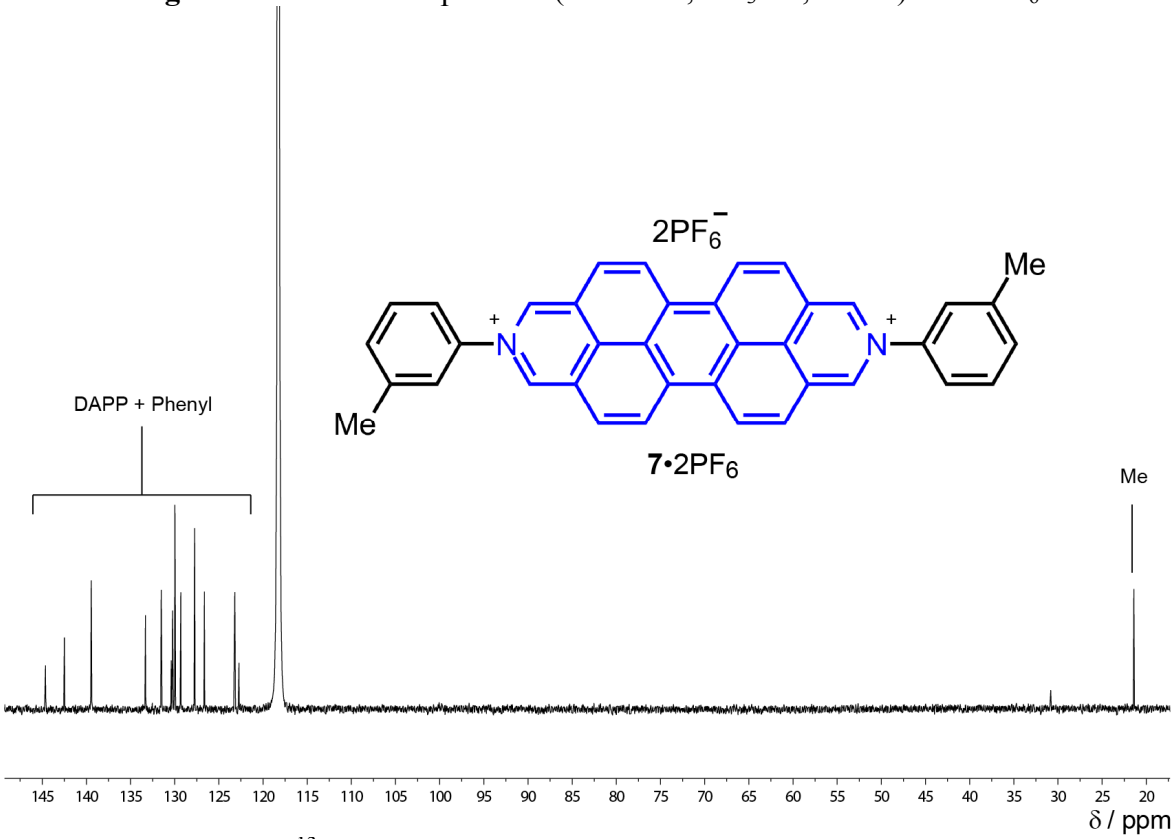


Figure S14. ^{13}C NMR Spectrum (125 MHz, CD_3CN, 298 K) of **7**•$2PF_6$

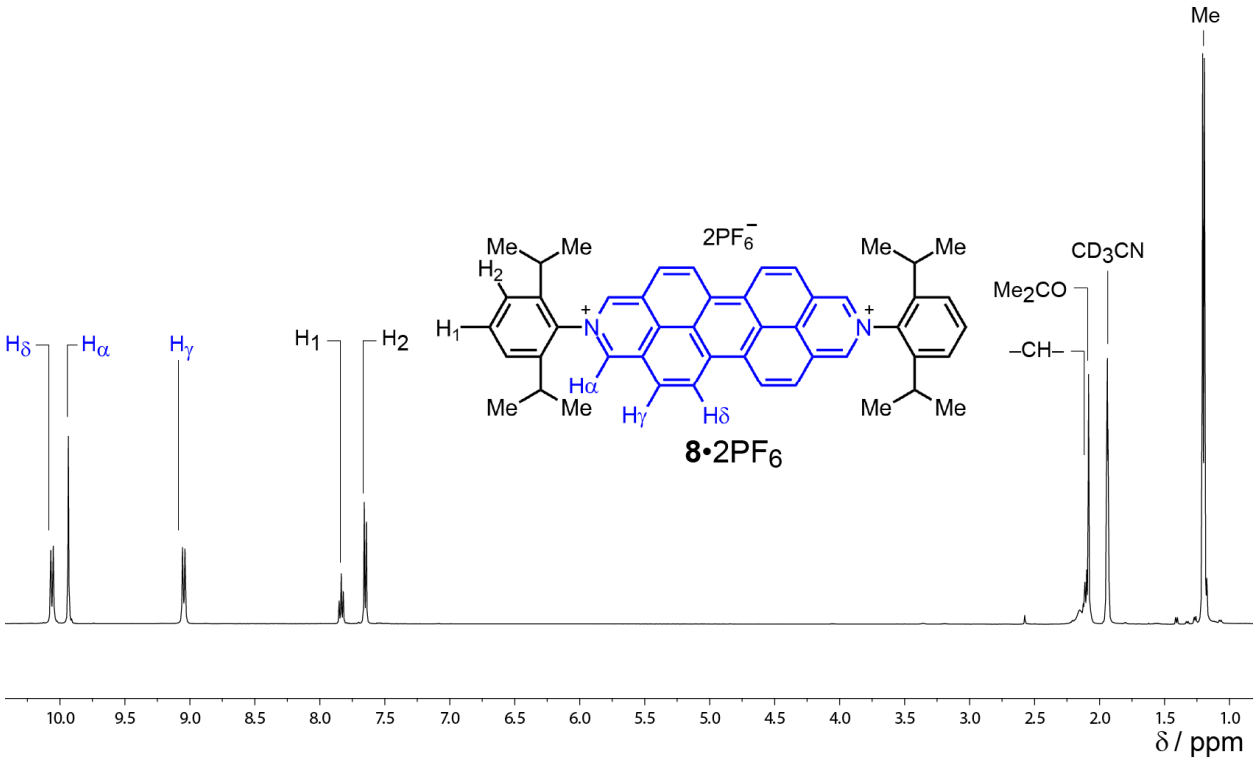


Figure S15. ^{1}H NMR Spectrum (500 MHz, CD_3CN, 298 K) of **8**•$2PF_6$

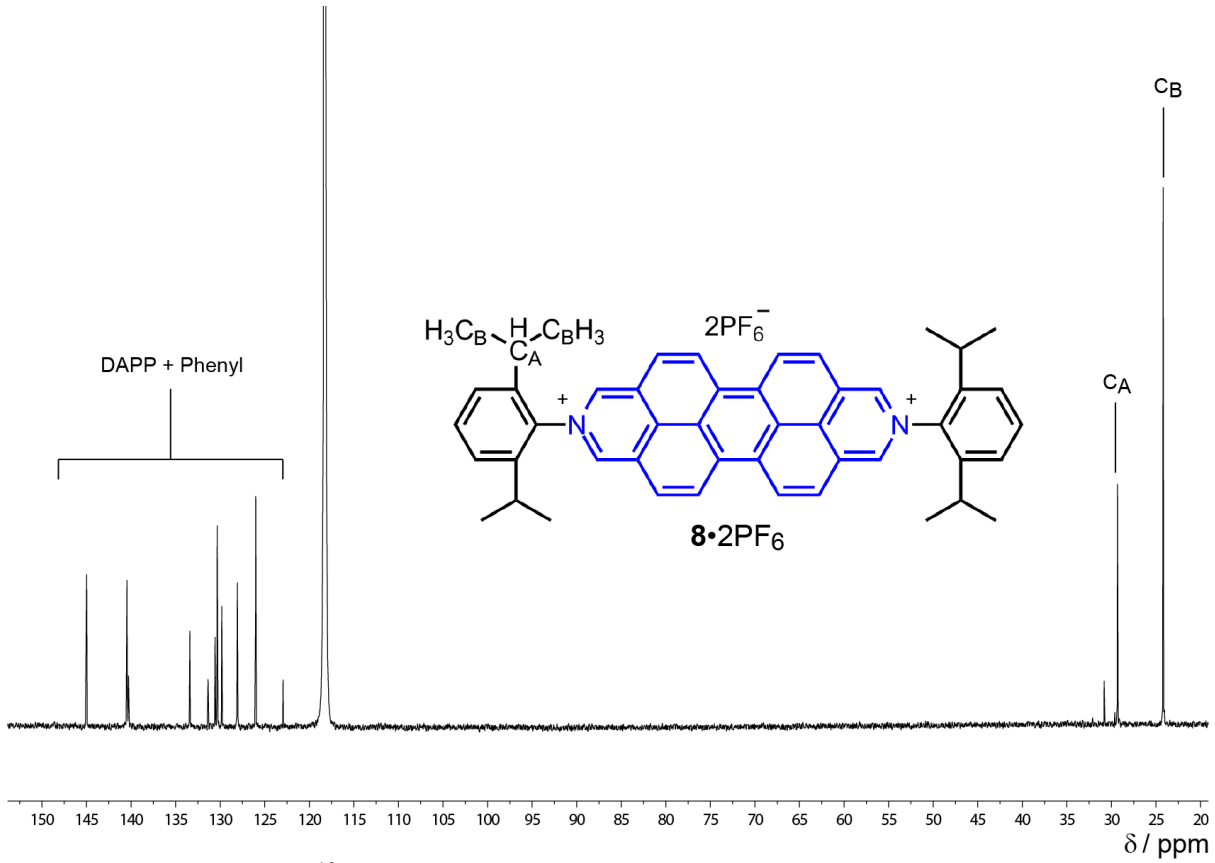


Figure S16. ^{13}C NMR Spectrum (125 MHz, CD_3CN, 298 K) of **8**•$2PF_6$

S3. Cell Viability Studies and 50% Inhibitory Concentration Data

Table S1: Cell viability data (%) for compounds 1-8•2Cl (10 μM) for the 10 cell lines tested.

	FaDu	SKMEL-2	HT-29	HT-1080	HepG2	HL-60	Jurkat	PC-3	HeLa	MDA-MB-231
1	77.83 ± 1.17	142.57 ± 2.37	75.34 ± 3.68	96.06 ± 1.45	27.82 ± 0.84	105.02 ± 3.35	80.63 ± 1.68	96.97 ± 2.02	67.01 ± 2.65	90.80 ± 1.48
2	87.57 ± 2.26	100.05 ± 1.99	85.96 ± 2.81	96.76 ± 1.61	49.50 ± 2.26	98.03 ±2.99	82.38 ±1.23	98.81 ± 2.73	91.02 ± 3.26	93.54 ± 1.54
3	63.06 ± 7.73	93.93 ± 0.83	87.28 ± 1.06	42.95 ± 1.88	95.89 ± 2.52	123.19 ± 4.36	100.14 ± 0.25	106.99 ± 1.28	58.51 ± 0.38	81.80 ± 1.27
4	89.87 ± 3.32	89.69 ± 3.63	83.90 ± 2.51	92.72 ± 1.45	90.00 ± 4.93	96.40 ± 2.86	81.32 ± 1.41	82.95 ± 2.42	62.65 ± 1.16	89.32 ± 1.53
5	63.50 ± 1.65	153.85 ± 4.06	88.44 ± 6.46	95.38 ± 2.67	44.92 ± 2.49	105.16 ± 3.44	87.92 ± 2.57	89.54 ± 2.82	62.58 ± 1.15	91.07 ± 0.68
6	85.70 ± 1.90	88.33 ± 2.60	86.36 ± 8.67	105.90 ± 1.22	98.54 ± 4.08	99.74 ± 3.59	83.79 ± 1.48	93.78 ± 3.76	100.87 ± 0.68	100.17 ± 0.93
7	82.42 ± 3.12	112.03 ± 2.96	80.51 ± 4.42	100.24 ± 0.82	101.12 ± 3.74	101.64 ± 3.14	76.52 ± 2.51	85.25 ± 1.32	98.93 ± 1.41	96.56 ± 0.90
8	20.55 ± 1.14	7.18 ± 2.50	14.94 ± 1.68	35.65 ± 1.83	66.77 ± 5.15	51.11 ± 3.41	28.86 ± 1.87	45.56 ± 1.22	32.32 ± 1.80	66.13 ± 3.49

Table S2: 50% Inhibitory concentration (IC_{50}) data (μM) for compounds A•2Cl, B•2Cl, 8•2Cl and doxorubicin against selected cell lines.

	FaDu	SKMEL-2	HT-29	HepG2	Jurkat	HeLa
A	N/A	N/A	0.62 ± 0.08	1.29 ± 0.11	8.55 ± 0.17	N/A
B	N/A	9.16 ± 7.09	N/A	N/A	5.16 ± 0.18	1.79 ± 0.08
8	4.81 ± 0.16	12.32 ± 0.19	0.51 ± 0.26	N/A	N/A	N/A
Dox	1.88 ± 0.59[5]	3.78 ± 0.22	0.46 ± 0.07	1.16 ± 0.25	0.007[6]	1.45 ± 0.05

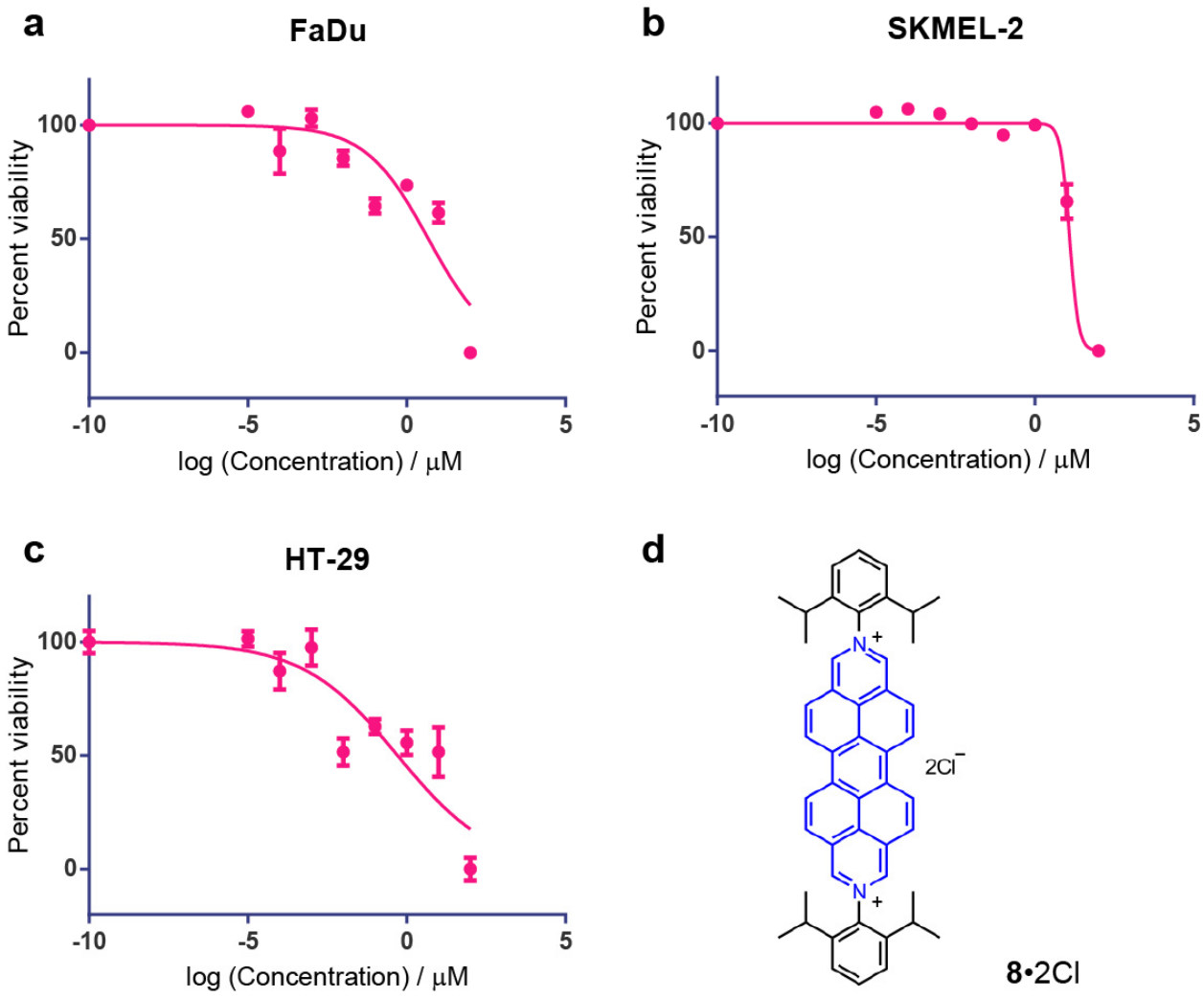


Figure S17. 50% Inhibitory concentration plots with **8**•2Cl for (**a**) FaDu, (**b**) SKMEL-2, and (**c**) HT-29 cancer cell lines. (**d**) Structural formula for **8**•2Cl.

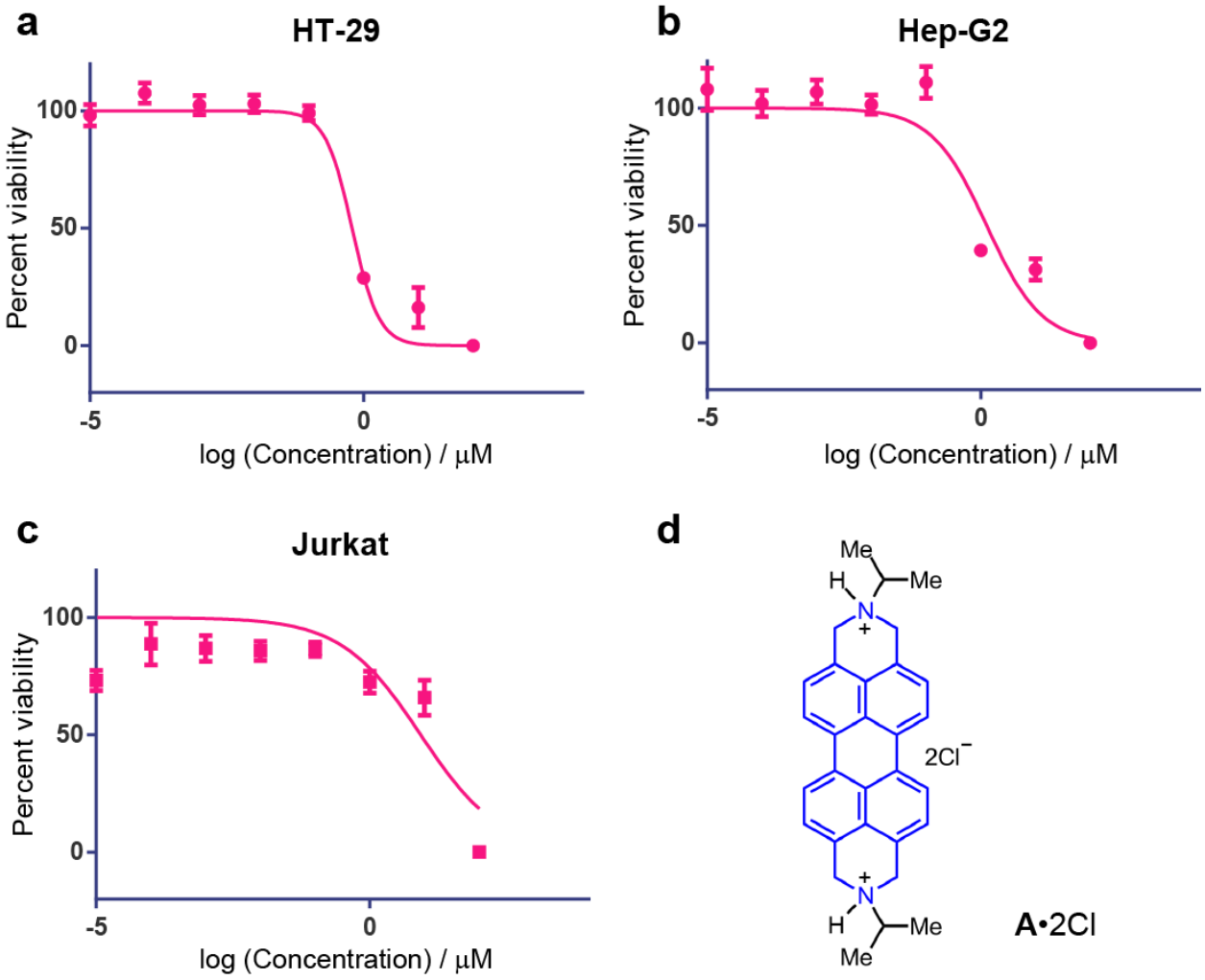


Figure S18. 50% Inhibitory concentration plots with **A**•2Cl for (**a**) HT-29, (**b**) HepG2, and (**c**) Jurkat cancer cell lines. (**d**) Structural formula for **A**•2Cl.

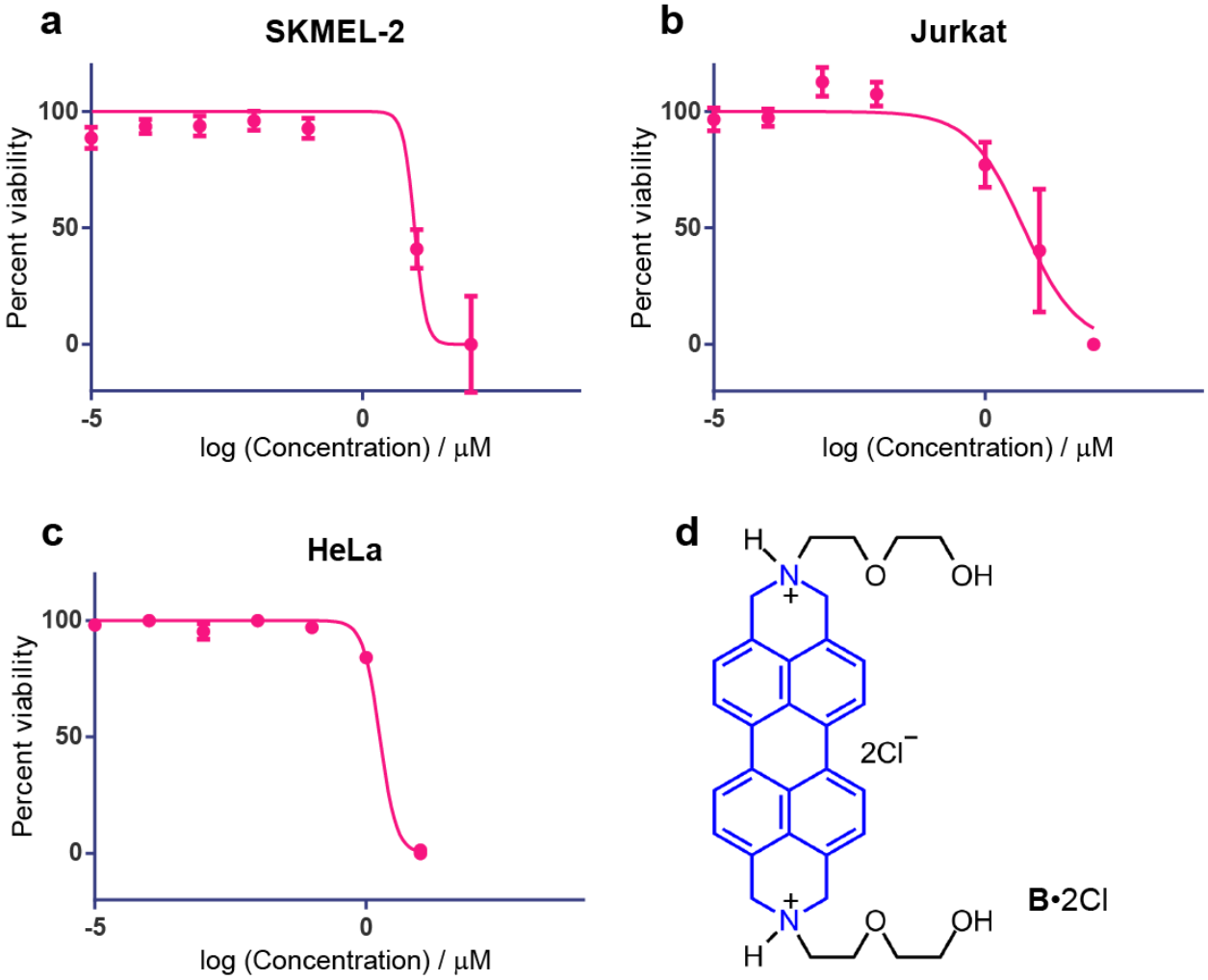


Figure S19. 50% Inhibitory concentration plots with **B**•2Cl for (**a**) SKMEL-2, (**b**) Jurkat, and (**c**) HeLa cancer cell lines. (**d**) Structural formula for **B**•2Cl.

S4. Dynamic Light Scattering Data

Table S3: DI water, no addatives

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-

No peaks were detected when running the DI water control

Table S4: pH 7.2 Phosphate Buffer Solution (PBS), no additives

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-

No peaks were detected when running the Phosphate Buffer Solution control

Table S5: RPMI 1640 medium containing 5% fetal bovine serum, no additives

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	0.342	10.42	62.7	2.033	99.4	8.718	100
		52.00	37.0	13.03	0.6	-	-
2	0.366	10.59	58.6	3.470	99.0	7.106	100
		44.16	38.1	15.16	1.0	-	-
3	0.376	10.17	58.7	2.222	99.2	8.034	100
		47.79	39.6	12.63	0.8	-	-

Table S6: 8•2Cl (10µL, 8mM) added to DI water

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	0.157	196.6	92.0	33.94	50.1	182.6	0.8
		50.76	8.0	5.078	49.9	48.27	99.2
2	0.217	225.5	80.0	69.33	48.1	-	-
		78.48	20.0	16.18	51.9	67.23	100
3	0.213	215.0	84.3	44.08	45.4	193.1	2.0
		62.77	15.7	8.234	54.6	57.64	98.0

Table S7: 8•2Cl (20µL, 8mM) added to DI water

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	0.210	209.3	100	107.5	49.1% (95.83 nm) 50.9% (260.8 nm)	182.6	100
2	0.211	234.7	73.2	63.42	47.3	201.5	3.4
		85.58	26.8	17.31	52.7	72.03	96.6
3	0.248	171.4	89.0	50.8	65.8	128.3	100
		1913	11.0	600.2	34.2	1704	0.0

Table S8: 8•2Cl (30µL, 8mM) added to DI water

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	0.229	286.0	61.8	70.21	44.5	241.5	3.1
		102.5	38.2	23.96	55.5	83.97	96.9
2	0.223	232.0	100	168.3	86.9 (174.5 nm) 13.1 (638.0 nm)	207.5	100
3	0.235	206.8	78.9	62.45	48.4	-	-
		80.96	21.1	15.27	51.6	73.85	100

Table S9: 8•2Cl (30µL, 8mM) added to DI water approximately 4 hours after addition

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	0.190	222.1	89.9	49.11	55.2	195.7	2.5
		59.85	10.1	7.441	44.8	55.75	97.5

Table S10: 8•2Cl (10µL, 8mM) added to pH 7.2 Phosphate Buffer

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	0.287	287.4	61.8	66.11	44.5	250.8	98.6
		1242	38.2	310.6	55.5	1095	1.4
2	0.325	463.3	76.1	93.23	79.3	423.1	18.8
		179.1	23.9	26.25	20.7	173.9	81.2
3	0.308	347.0	78.6	72.74	13.2	309.7	99.7
		3851	21.4	874.1	86.8	3845	0.3

Table S11: 8•2Cl (20µL, 8mM) added to pH 7.2 Phosphate Buffer

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	0.324	278.8	66.4	78.64	55.2	235.7	97.9
		935.6	33.6	260.8	44.8	780.6	2.1
2	0.261	500.6	69.7	125.2	77.7	457.4	14.8
		209.7	30.3	46.39	22.3	192.5	85.2
3	0.238	426.3	91.7	87.02	91.9	382.2	25.6
		130.5	8.3	15.72	8.1	123.5	74.4

Table S12: 8•2Cl (20µL, 8mM) added to pH 7.2 Phosphate Buffer approximately 4 hours after addition

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	0.527	466.8	100	22.89	100	467.0	100

Table S13: 8•2Cl (10µL, 8mM) added to RPMI 1640 medium containing 5% fetal bovine serum

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	0.979	241.5	55.6	94.26	0.1	-	-
		10.47	25.1	2.931	98.3	7.624	100
		39.20	19.20	10.30	1.5	-	-
2	0.975	230.0	57.4	72.71	0.1	-	-
		31.95	21.4	6.366	2.6	26.08	0.1
		9.041	21.2	1.270	97.3	8.197	99.9
3	0.950	240.3	55.1	71.30	0.1	-	-
		9.600	23.1	1.5555	97.6	8.500	99.9
		34.53	21.3	7.970	2.3	26.53	0.1

Table S14: 8•2Cl (20µL, 8mM) added to RPMI 1640 medium containing 5% fetal bovine serum

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	0.674	350.8	76.5	257.2	0.4	-	-
		9.700	12.0	1.342	98.3	8.762	100
		45.00	11.6	10.84	1.2	34.74	-
2	0.676	348.9	78.3	140.6	0.5	-	-
		37.65	10.8	7.769	1.9	30.39	-
		9.601	10.8	1.421	97.6	8.601	100
3	0.348	343.2	71.2	80.11	0.4	-	-
		30.59	12.0	5.770	3.2	25.48	0.1
		8.674	9.0	1.260	96.3	7.766	99.9

Table S15: 8•2Cl (30µL, 8mM) added to RPMI 1640 medium containing 5% fetal bovine serum

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	0.653	287.7	71.1	69.45	0.5	-	-
		53.42	17.9	9.75	1.2	45.28	-
		9.948	11.0	1.05	98.3	9.428	100
2	0.735	252.7	77.3	49.25	0.4	-	-
		35.51	13.8	4.843	2.3	32.20	-
		8.565	8.9	0.8792	97.3	8.141	100
3	0.711	279.8	76.6	68.97	0.4	-	-
		46.54	13.7	8.736	1.2	39.02	-
		9.328	9.7	1.599	98.4	8.03	100

Table S16: 8•2Cl (30µL, 8mM) added to RPMI 1640 medium containing 5% fetal bovine serum approximately 4 hours after addition

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	0.644	199.0	80.2	44.9	0.4	-	-
		25.18	11.3	3.769	5.8	22.27	0.3
		8.782	8.5	0.9901	93.8	8.242	99.7

Table S17: 1•2Cl (10µL, 4mM) added to DI water

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	0.583	464.9	100	75.82	100	435.4	100
2	0.429	702.8	92.4	163.7	94.8	618.9	19.1
		158.3	7.6	20.85	5.2	149.8	80.9
3	0.248	728.4	100	159.7	100	651.8	100

Table S18: 1•2Cl (20µL, 4mM) added to DI water

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	0.607	768.5	64.1	98.59	66.4	738.6	0.6
		113.6	35.9	8.942	33.6	111.3	99.4
2	0.439	530.9	100	93.77	100	494	100
3	0.607	431.9	100	98.13	100	377.0	100

Table S19: 1•2Cl (20µL, 4mM) added to DI water approximately 4 hours after addition

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	1.00	894.8	100	125.2	100	853.8	100

Table S20: 1•2Cl (10µL, 4mM) added to Phosphate Buffer Solution

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	0.541	288.3	100	15.32	100	286.8	100

Table S21:1•2Cl (10µL, 4mM) added to RPMI 1640 medium containing 5% fetal bovine serum

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	0.516	35.70	48.9	8.613	2.4	26.82	0.1
		8.793	37.2	1.398	97.6	7.71	99.9
		230.7	13.8	54.08	0.0	-	-
2	1.000	38.27	50.2	11.67	1.9	-	-
		9.163	35.9	2.426	97.6	8.178	100
		414.3	14.3	76.28	0.0	-	-
3	1.000	29.84	44.6	7.593	2.1	-	-
		8.793	35.3	1.398	97.6	7.126	100
		192.6	20.1	24.67	0.0	-	-

Table S22: 1•2Cl (20µL, 4mM) added to RPMI 1640 medium containing 5% fetal bovine serum

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	0.275	180.9	36.7	31.47	0.1	-	-
		30.86	33.6	5.649	2.8	25.85	0.1
		8.835	29.6	1.322	97.1	7.853	99.9
2	0.309	178.3	43.7	21.97	0.1	-	-
		25.00	33.1	3.741	4.5	22.09	0.1
		7.916	23.3	1.071	95.4	7.239	99.9
3	0.607	41.35	42.2	14.05	2.2	27.03	-
		9.116	29.5	1.649	97.7	7.748	100
		299.3	28.3	80.37	0.1	-	-

Table S23: 1•2Cl (20µL, 4mM) added to RPMI 1640 medium containing 5% fetal bovine serum approximately 4 hours after addition

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	0.248	154.7	40.4	41.38	0.1	-	-
		30.21	34.1	7.318	4.0	21.91	0.2
		8.923	25.5	1.631	95.9	7.594	99.8

Table S24: 3•2Cl (10µL, 4mM) added to DI water

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	0.639	545.1	98.7	41.93	59.0	541.6	99.9
		5560	1.3	579.8	41.0	5590	0.1
2	1.000	318.2	100	23.34	100	315.8	100
3	1.000	508.1	100	44.18	100	502.2	100

Table S25: 3•2Cl (20µL, 4mM) added to DI water

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	1.000	505.5	100	53.93	100	494.9	100
2	1.000	413.8	100	28.21	100	411.0	100
3	1.000	454.3	100	15.87	100	454.7	100

Table S26: 3•2Cl (30µL, 4mM) added to DI water

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	1.000	172.1	100	11.97	100	171.5	100
2	1.000	448.1	100	23.41	100	466.2	100
3	0.995	573.4	100	41.98	100	570.9	100

Table S27: 3•2Cl (30µL, 4mM) added to DI water approximately 4 hours after addition

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	0.670	471.2	100	36.94	100	466.2	100

Table S28: 3•2Cl (10µL, 4mM) added to Phosphate Buffer Solution (80 µM)

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	1.000	421.9	100	32.80	100	416.6	100
2	1.000	505.1	100	45.78	100	498.2	100
3	0.614	1113	91.2	182.9	94.9	1055	12.7
		218.5	8.8	22.52	5.1	213.0	87.3

Table S29: 3•2Cl (10µL, 4mM) added to Phosphate Buffer Solution (80 µM) approximately 4 hours after addition

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	1.000	347.4	100	16.28	100	347.5	100

Table S30: 3•2Cl (10µL, 4mM) added to RPMI 1640 medium containing 5% fetal bovine serum

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	0.868	17.56	38.8	1.573	6.5	16.90	0.3
		342.0	35.9	0.000	0	-	-
		6.232	25.3	0.5506	93.5	6.006	99.7
2	0.235	8.529	40.7	1.392	97.9	7.48	99.9
		30.96	38.9	5.858	2.1	25.64	0.1
		338.7	20.4	54.43	0.0	-	-
3	0.650	22.03	41.0	2.545	4.3	20.50	0.2
		7.324	34.4	0.7894	95.7	6.92	99.8
		226.5	24.6	13.41	0.0	-	-

Table S31: 3•2Cl (20µL, 4mM) added to RPMI 1640 medium containing 5% fetal bovine serum

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	0.627	399.4	39.7	39.09	0.1	-	-
		8.360	30.6	1.169	97.8	7.531	100
		30.33	29.6	4.102	2.0	27.59	-
2	0.489	18.0	36.0	3.705	8.1	14.44	0.5
		540.2	31.1	57.84	0.0	-	-
		6.107	18.2	0.8459	91.7	5.524	99.5
3	0.520	9.569	40.5	2.4765	99.0	6.528	100
		414.1	30.7	39.29	0.0	-	-
		36.00	28.8	4.966	1.0	-	-

Table S32: 3•2Cl (20µL, 4mM) added to RPMI 1640 medium containing 5% fetal bovine serum approximately 4 hours after addition

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	0.527	281.5	44.0	19.12	0.0	-	-
		18.19	39.6	1.952	6.7	17.15	0.2
		5.594	16.4	0.5863	93.3	5.293	99.8

Table S33: 5•2Cl (10µL, 8mM) added to DI water

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-

No peaks observed for PEG-DAPP at this concentration in DI water

Table S34: 5•2Cl (20µL, 8mM) added to DI water

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-

No peaks observed for PEG-DAPP at this concentration in DI water

Table S35: 5•2Cl (30µL, 8mM) added to DI water

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-

No peaks observed for PEG-DAPP at this concentration in DI water

Table S36: 5•2Cl (30µL, 8mM) added to DI water approximately 4 hours after addition

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	-	-	-	-	-	-	-

No peaks observed for PEG-DAPP at this concentration in DI water

Table S37: 5•2Cl (10µL, 8mM) added to pH 7.2 Phosphate Buffer Solution

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-

No peaks observed for PEG-DAPP at this concentration in PBS water

Table S38: 5•2Cl (20µL, 8mM) added to pH 7.2 Phosphate Buffer Solution

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	0.382	232.7	89.7	108.4	23.4	126.8	100
		4076	10.3	1056	76.6	-	-
2	0.300	279.2	94.5	184.6	13.6 (106.0 nm) 30.2 (346.6 nm)	104.9	100
		3862	5.5	1131	56.2	-	-
3	0.262	324.5	98.5	223.4	67.4	112.2	100
		4406	1.5	899.0	32.6	-	-

Table S39: 5•2Cl (30µL, 8mM) added to pH 7.2 Phosphate Buffer Solution

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	0.384	401	97.7	264.3	3 peaks 105.7 nm, 294.9 nm, 726.4 nm	110.9	100
		4865	2.3	695.2	44.6	-	-
2	0.331	232.8	50.9	85.49	36.3	161.9	100
		817.6	49.1	370.5	63.7	-	-
3	0.363	898.9	54.8	423.6	62.0	180.9	100
		238.7	45.2	82.58	33.0	-	-

Table S40: 5•2Cl (30µL, 8mM) added to pH 7.2 Phosphate Buffer Solution approximately 4 hours after addition

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	1.00	946.9	100	203.9	100	849.7	100

Table S41: 5•2Cl (10µL, 8mM) added to RPMI 1640 medium containing 5% fetal bovine serum

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	0.657	361.4	37.5	181.4	0.2	-	-
		14.03	32.8	3.937	98.2	10.53	100
		64.77	28.2	24.32	1.4	-	-
2	0.237	146.2	49.9	32.53	-	-	-
		23.33	31.9	6.072	0.1	-	-
		9.592	18.2	2.074	99.0	7.808	100
3	0.822	84.69	37.2	33.11	0.8	-	-
		13.00	31.5	2.654	99.0	10.62	100
		665.5	31.3	373.7	0.2	-	-

Table S42: 5•2Cl (20µL, 8mM) added to RPMI 1640 medium containing 5% fetal bovine serum

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	0.252	289.3	36.1	64.00	0.1	-	-
		12.91	34.9	3.093	98.9	9.656	0.0
		58.37	29.0	14.47	1.0	42.75	100
2	0.698	369.4	38.6	123.3	0.2	-	-
		12.35	30.4	2.080	98.2	10.66	100
		62.29	26.9	15.03	0.9	-	-
3	0.612	348.4	40.2	119.8	0.1	8.340	99.9
		41.71	26.6	14.26	2.5	27.32	0.1
		9.972	21.9	1.909	96.7	-	-

Table S43: 5•2Cl (30µL, 8mM) added to RPMI 1640 medium containing 5% fetal bovine serum

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	0.372	114.4	30.4	21.39	0.2	-	-
		11.09	27.8	1.427	98.4	10.14	100
		1076	27.5	175.8	0.2	-	-
		37.84	14.3	8.753	0.2	-	-
2	0.249	371.4	34.5	86.41	0.2	-	-
		12.98	33.4	1.635	99.3	11.81	100
		79.62	32.1	16.84	0.6	-	-
3	0.246	288.7	46.6	91.03	0.2	-	-
		12.63	31.5	1.815	98.9	11.39	100
		59.03	22.0	13.05	0.9	46.66	-

Table S44: 5•2Cl (30µL, 8mM) added to RPMI 1640 medium containing 5% fetal bovine serum approximately 4 hours after addition

Run #	PdI	Diameter Intensity Measurement (nm)	Integrated Intensity Peak Percentage	Intensity FWHM (Intensity) (± nm)	Integrated Volume Peak Percent	Diameter Number Measurement (nm)	Integrated Number Peak Percentage
1	1.00	372.6	62.9	100	0.4	-	-
		12.14	22.2	1.841	98.1	10.74	100
		43.99	14.9	7.895	1.5	37.05	-

S5. References

1. Takahashi, M.; Suzuki, Y.; Ichihashi, Y.; Yamashita, M.; Kawai, H. 1,3,8,10-Tetrahydro-2,9-Diazadibenzo[cd,lm]perylenes: Synthesis of Reduced Perylene Bisimide Analogues. *Tetrahedron Lett.* **2007**, *48*, 357–359.
2. Ustinov, A. V.; Dubnyakova, V. V.; Korshun, V. A. A Convenient 'Click Chemistry' Approach to Perylene Diimide–Oligonucleotide Conjugates. *Tetrahedron* **2008**, *64*, 1467–1473.
3. Ramanan, C.; Smeigh, A. L.; Anthony, J. E.; Marks, T. J.; Wasielewski, M. R. Competition between Singlet Fission and Charge Separation in Solution-Processed Blend Films of 6,13-Bis(triisopropylsilylethynyl)pentacene with Sterically-Encumbered Perylene-3,4:9,10-bis(dicarboximide)s. *J. Am. Chem. Soc.* **2011**, *134*, 386–397.
4. Basuray, A. N.; Jacquot de Rouville, H.-P.; Hartlieb, K. J.; Kikuchi, T.; Strutt, N. L.; Bruns, C. J.; Ambrogio, M. W.; Avestro, A.-J.; Schneebeli, S. T.; Fahrenbach, A. C. *et al*. The Chameleonic Nature of Diazaperopyrenium Recognition Processes. *Angew. Chem., Int. Ed.* **2012**, *51*, 11872–11877.
5. Ma, J.; Lu, S.; Yu, L.; Tian, J.; Li, J.; Wang, H.; Xu, W. FaDu Cell Characteristics Induced by Multidrug Resistance. *Oncology Reports* **2011**, *26*, 1189–1195.
6. Drummond, C. J.; Finlay, G. J.; Broome, L.; Marshall, E. S.; Richardson, E.; Baguley, B. C. Action of SN 28049, a New DNA Binding Topoisomerase II-Directed Antitumour Drug: Comparison with Doxorubicin and Etoposide. *Invest. New Drugs* **2011**, *29*, 1102–1110.