Supporting Information for

pH-sensitive micelle with mitochondria-targeted and aggregation-induced emission characterization: synthesis, cytotoxicity and biological applications

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1. Synthesis of PEG-AIE-TPP copolymer

1.1 Synthesis of compound 1

Starting material 2,4-dihydroxybenzaldehyde (4.20 g, 0.03 mol) and 1,6-dibromohexane (7.32 g, 0.03 mol) were first dissolved in acetone (60 mL), to the mixture were added K_2CO_3 (4.20 g, 0.03 mol). Then the reaction mixture was refluxed for 12 h. After cooling to room temperature, the solvent was evaporated and then the residue was dissolved in EtOAc (60 mL) and washed with brine (40 mL × 2). The organics were dried over anhydrous Na_2SO_4 and concentrated under reduced pressure. The residue was further purified by silica gel column chromatography to afford **1** as colorless oil (5.78 g, 64 % yield). ^{1}H NMR (300 MHz, $CDCl_3$) δ: 11.48 (s, 1H), 9.71 (s, 1H), 7.43-7.40 (d, J = 9.0 Hz, 1H), 6.54-6.51 (d, J = 9.0 Hz, 1H), 6.41 (s, 1H), 5.30 (s, 1H), 4.01-3.99 (t, J = 6.0 Hz, 2H), 3.45-3.40 (t, J = 6.0 Hz, 2H), 1.90-1.82 (m, 4H), 1.52-1.51 (m, 4H).

1.2 Synthesis of compound 2

Compound **1** (3.01g, 0.01 mol) was dissolved in EtOH (50 mL), to the mixture were added 80% hydrazine monohydrate (0.31 g, 5 mmol). The mixture was refluxed for 4 h. Precipitates were filtrated under vacuum and washed with cold ethanol three times to afford **2** as yellow powder after drying (2.33 g, 78 % yield). ^{1}H NMR (300 MHz, $CDCl_3$) δ: 11.51 (br s, 2H), 9.72 (s, 2H), 7.45-7.42

(d, J = 9.0 Hz, 2H), 6.56-6.52 (dd, J = 9.0 Hz, J = 3.0 Hz, 2H), 6.42 (s, 2H), 4.04-4.00 (t, J = 6.0 Hz, 4H), 3.47-3.43 (t, J = 6.0 Hz, 4H), 1.93-1.81 (m, 8H), 1.53-1.51 (m, 8H).

1.3 Synthesis of compound 3

Compound **2** (2.12 g, 3.54 mmol) and triphenylphosphine (0.93 g, 3.54 mmol) were dissolved in acetonitrile (40 mL), and the mixture was stirred under reflux for 12 h. After completion of the reaction, the mixture was cooled to room temperature. The solvent was then removed by evaporation under pressure, and the residue was purified by silica gel column chromatography to afford **3** as a yellow solid (2.19 g, 72 % yield). ^{1}H NMR (300 MHz, $CDCl_3$) δ: 11.71 (br s, 2H), 8.54 (s, 2H), 7.86-7.72 (m, 15H), 7.28-7.16 (m, 2H), 6.49-6.44 (m, 4H), 3.99-3.93 (m, 4H), 3.78-3.42 (m, 4H), 2.03-1.50 (m, 16H).

1.4 Synthesis of compound 4

To a stirred solution of mPEG2000 (5.02 g, 2.5 mmol) in dichloromethane (50 mL) was added 4-carboxybenzaldehyde (0.38 g, 2.5mmol), DCC (0.52g, 2.5mmol) and DMAP (0.03g, 0.25mmol). This solution was allowed to stir 24 h at room temperature. Then, the resulting solution was filtered and the filtrate was concentrated by rotary evaporation to remove dichloromethane. The raw product was recrystallized from isopropanol to yield **4** as a yellow solid (4.58 g, 86 % yield). ^{1}H NMR (300 MHz, $CDCl_3$) δ: 10.11 (s, 1H), 8.23-8.20 (d, J = 9.0 Hz, 2H), 7.97-7.94 (d, J = 9.0 Hz, 2H), 4.53-4.50 (t, J = 6.0 Hz, 2H), 3.87-3.84 (t, J = 6.0 Hz, 2H), 3.64 (s, ~170H), 3.38 (s, 3H).

1.5 Synthesis of compound 5

To a stirred solution of methyl 4-hydroxybenzoate (2.21 g, 14.5 mmol) in EtOH (20 mL) was added 80% hydrazine monohydrate (1.77g, 29.1 mmol). The mixture solution was refluxed for 2 h. Precipitates were filtrated and washed with ethanol two times yielded a white solid, 4-hydroxybenzoylhydrazine, which was dried in a vacuum oven for 24 h. ^{1}H NMR (300 MHz, $CDCl_3$) δ: 9.90 (Ar-CONH-), 9.49 (Ar-OH), 7.60 and 6.70 (aromatic protons), 4.36 (-N-NH_2).

1.6 Synthesis of compound 6

To a stirred solution of Compound **4** (1.86 g, 0.87 mmol) in DMF (20 mL) was added 4-

hydroxybenzoichydrazine (0.13 g, 0.87 mmol). This solution was allowed to stir 24 h at 60 ℃. Then poured the reaction solution into cold ethyl ether, the precipitations were filtrated and dried at 40 °C in vacuo. ^{1}H NMR (300 MHz, $CDCl_3$) δ: 10.78 (s, 1H), 8.41 (s, 1H), 8.04-8.01 (d, J = 9.0 Hz, 2H), 7.93-7.90 (d, J = 9.0 Hz, 2H), 7.83-7.80 (d, J = 9.0 Hz, 2H), 6.95-6.92 (d, J = 9.0 Hz, 2H), 4.47 (m, 2H), 3.84 (m, 2H), 3.63 (s, ~170H), 3.37 (s, 3H).

1.7 Synthesis of compound 7

Compound **6** (1.12 g, 0.50 mmol) and compound **3** (0.43 g, 0.50 mmol) were first dissolved in DMF (10 mL), followed by addition of K_2CO_3 (0.08 g, 0.60 mmol). Then the mixture was allowed to stir 18 h at 60 ℃. Resulting solution was concentrated in vacuo and purified by silica gel column chromatography to afford **7** as a yellow solid. ^{1}H NMR (300 MHz, DMSO-d_6) δ: 11.60 (s, 2H), 11.41 (s, 1H), 8.65 (s, 2H), 8.43 (s, 2H), 7.89-7.41 (m, 21H), 7.09 (m, 2H), 6.88 (m, 2H), 6.40-6.31 (m, 4H), 4.36 (m, 4H), 3.89 (m, 4H), 3.75 (m, 4H), 3.55 (s, ~170H), 3.29-3.27 (m, 7H), 1.71-1.17 (m, 16H).