Electronic Supplementary Information

A novel cationic conjugated polymer for homogeneous fluorescence-based DNA detection

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Synthesis Procedure

2,5-Bis(3-\([N,N\)-diethylamino]-1-oxapropyl)-1,4-diiodobenzene (DINEt₂)

2,5-Diiodohydroquinone (6.45 g), 2-chlorotriethylamine hydrochloride (6.75 g), \(K_2CO_3\) (10.33 g), were added to 150 mL of acetone (dried over \(Na_2SO_4\)) and the mixture was refluxed under nitrogen atmosphere for 3 days. After reaction the yellow slurry was poured into 300 mL of \(H_2O\) and a solid precipitate collected. The precipitate was dissolved in \(Et_2O\), and the filtrate was extracted with \(Et_2O\) (3 \(\times\) 20 mL). The \(Et_2O\) solutions were combined and washed with 1 M \(NaOH\) (3 \(\times\) 10 mL), \(H_2O\) (1 \(\times\) 20 mL), and brine (1 \(\times\) 20 mL). The \(Et_2O\) layer was dried over \(Na_2SO_4\), then the solvent was removed under vacuum, giving a very light yellow solid. The solid was recrystallized twice from \(MeOH/H_2O\) (7.1 g, 71% yield). \(^1\)H NMR (CDCl₃) 7.21 (s, 2 H), 4.00 (t, 4 H), 2.91 (t, 4 H), 2.66 (q, 8 H), 1.07 (t, 12 H) ppm.

Poly\({2,5\text{-bis}[3-\((N,N\text{-diethylamino})\text{-1-oxapropyl}]\text{-p-phenylenevinylene}]\text{-alt-}p\text{-phenylenevinylene}\}(PPVNET₂)

To a stirred mixture of DINEt₂ (1.01 g, 1.80 mmol), \(p\)-divinylbenzene (0.107 g, 0.84 mmol), palladium acetate (7.21 mg, 0.032 mmol), and tri-\(o\)-tolylphosphine (48.7 mg, 0.16 mmol) in 30 mL of anhydrous DMF was added tri-\(n\)-butylamine (0.50 mL, 2.09 mmol) were added. The reaction mixture was refluxed at 90°C with stirring for 6 h under a nitrogen atmosphere and then poured into methanol. The precipitate was collected, redissolved in chloroform, and filtered to remove the catalyst residue. The filtrate was concentrated and precipitated into methanol, followed again by filtration and reprecipitation. The crude polymer was further purified by extraction in a Soxhlet extractor with methanol for 24 h and then dried under a vacuum at 25 °C for 24 h. PPVNET₂ was obtained as 0.40 g of an orange solid. \(^1\)H NMR (CDCl₃, ppm): 1.16 (broad, 12H,), 2.73 (broad, 4H, ), 3.00 (broad, 4H), 4.17 (broad, 4H, ), 7.18 (broad, 5H, ), 7.53 (broad, 5H ). (see Fig. S1)

Poly\({2,5\text{-bis}[3-\((N,N\text{-diethylamino})\text{-1-oxapropyl}]\text{-p-phenylenevinylene}]\text{-alt-}p\text{-phenylenevinylene}\) dibromide (PPVNE₂Br₂)

0.2 g of PPVNET₂ was stirred at room temperature with an excess of bromoethane (20 mL) in 5 mL of THF under a nitrogen atmosphere for 5 days. The partially quaternized amine
polymers began to precipitate between 3 and 5 days at room temperature. After reaction, THF and bromomethane were removed under reduced pressure to give PPVNE₂Br₂.

![NMR Spectroscopy](image)

**Fig. S1**

¹H NMR spectroscopy of poly[2,5-bis[3-(N,N-diethylamino)-1-oxapropyl]-p-phenylenevinylene]-alt-p-phenylenevinylene). Peaks f, g, h and i are attributed to side chain protons. Peaks of vinylene protons overlap with those of aromatic protons in the region of 7 – 7.4 ppm.