

Synthesis and Application of Benzooxadiazole Based Conjugated Polymers in High Performance Phototransistors

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Synthesis of polymers

A mixture of dibromo monomer (0.30 mmol), compound **1** (0.30 mmol), NaHCO₃ (1.11 g, 8 mmol), THF (20 mL), toluene (6 mL) and H₂O (2 mL) was carefully degassed before and after Pd(PPh₃)₄ (6.00 mg, 5.18 μmol) was added. The mixture was heated at reflux and stirred for 3d under N₂ atmosphere. Phenyl boric acid (10 mg) and bromobenzene (0.2 mL) were added successively at a time interval of 5 h to end-cap the bromo and boronic acid endgroups, respectively. After cooled down to room temperature, chloroform (100 mL) were added, the organic layer was washed with water (40 mL×3) and evaporated the solvent, the residue was poured into a large amount of acetone, and the resulting precipitates were collected by filtration and washed with acetone. The crude product was dissolved in a large amount of hot chlorobenzene and filtrated. After the removal of most of the solvent, the resulted concentrated solution was precipitated into a large amount of acetone. The precipitates were collected by filtration and dried under vacuum.

CZ-BO8:

¹H NMR (400 MHz, 1,2-dichlorobenzene-d₄): δ (ppm) 9.19 (m, 2H), 8.43-8.45 (m, 2H), 8.22 (m, 2H), 8.10 (m, 2H), 8.04-8.08 (m, 2H), 4.65 (m, 6H), 1.18-1.71 (m, 62H).

GPC (PS standards): $M_w = 44.0 \text{ kg mol}^{-1}$, $M_n = 13.4 \text{ kg mol}^{-1}$ and PDI = 3.28.

CZ-BO12:

^1H NMR (400 MHz, 1,2-dichlorobenzene- d_4): δ (ppm) 8.64 (m, 2H), 7.89-7.91 (m, 2H), 7.68 (m, 2H), 7.54-7.55 (m, 2H), 7.53 (m, 2H), 4.10 (m, 6H), 0.65-1.04 (m, 78H).

GPC (PS standards): $M_w = 65.7 \text{ kg mol}^{-1}$, $M_n = 18.9 \text{ kg mol}^{-1}$ and PDI = 3.48.

CZ-BT8:

^1H NMR (400 MHz, 1,2-dichlorobenzene- d_4): δ (ppm) 8.93 (m, 2H), 8.17-8.18 (m, 2H), 7.92 (m, 2H), 7.82 (m, 2H), 7.77 (m, 2H), 4.39 (m, 6H), 0.95-2.27 (m, 62H).

GPC (PS standards): $M_w = 47.7 \text{ kg mol}^{-1}$, $M_n = 17.7 \text{ kg mol}^{-1}$ and PDI = 2.69.

CZ-BT12:

^1H NMR (400 MHz, 1,2-dichlorobenzene- d_4): δ (ppm) 8.67 (m, 2H), 7.93 (m, 2H), 7.70 (m, 2H), 7.57 (m, 2H), 7.52 (m, 2H), 4.16 (m, 6H), 0.70-2.10 (m, 78H).

GPC (PS standards): $M_w = 56.3 \text{ kg mol}^{-1}$, $M_n = 19.6 \text{ kg mol}^{-1}$ and PDI = 2.87.

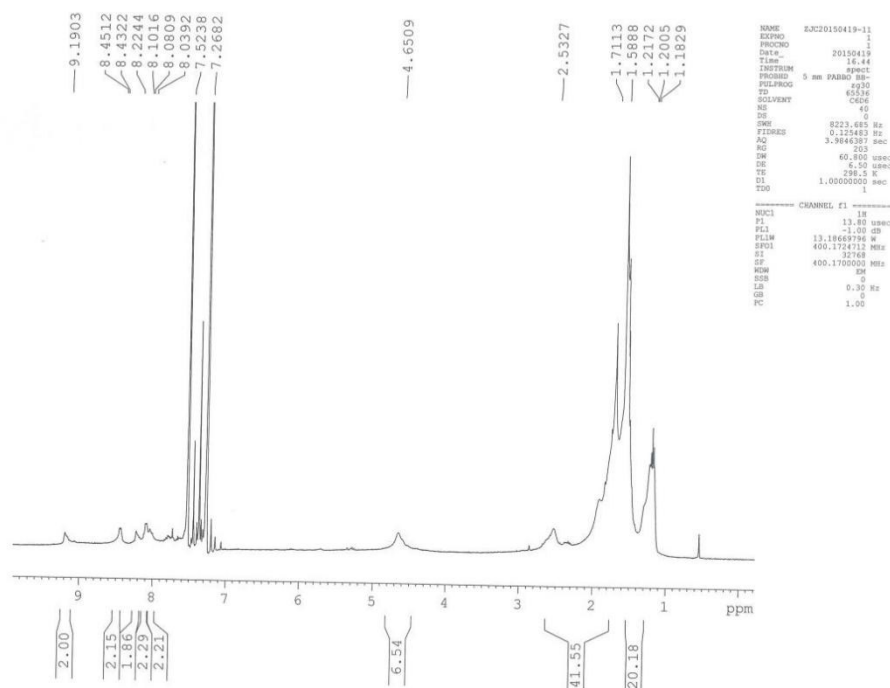


Fig. S1 ^1H NMR spectrum of CZ-BO8 (measured in 1,2-dichlorobenzene- d_4)

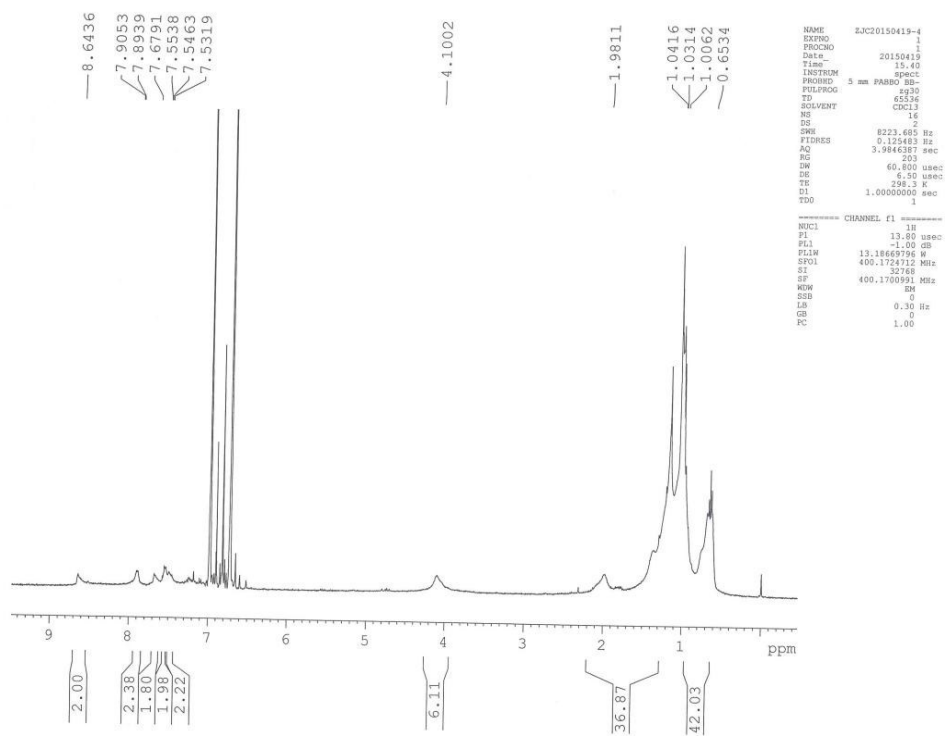


Fig. S2 ^1H NMR spectrum of CZ-BO12 (measured in 1,2-dichlorobenzene- d_4).

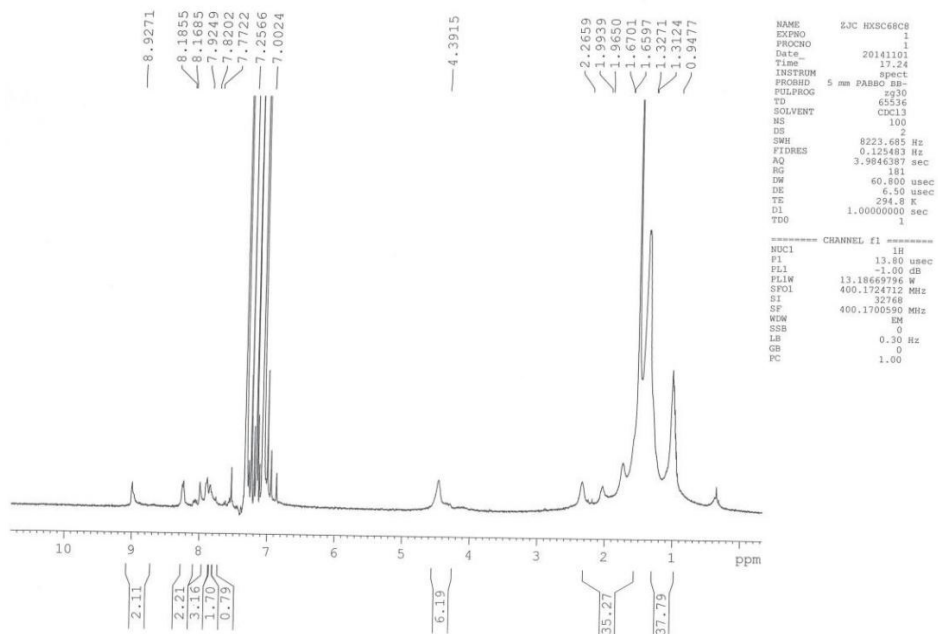


Fig. S3 ^1H NMR spectrum of CZ-BT8 (measured in 1,2-dichlorobenzene- d_4)

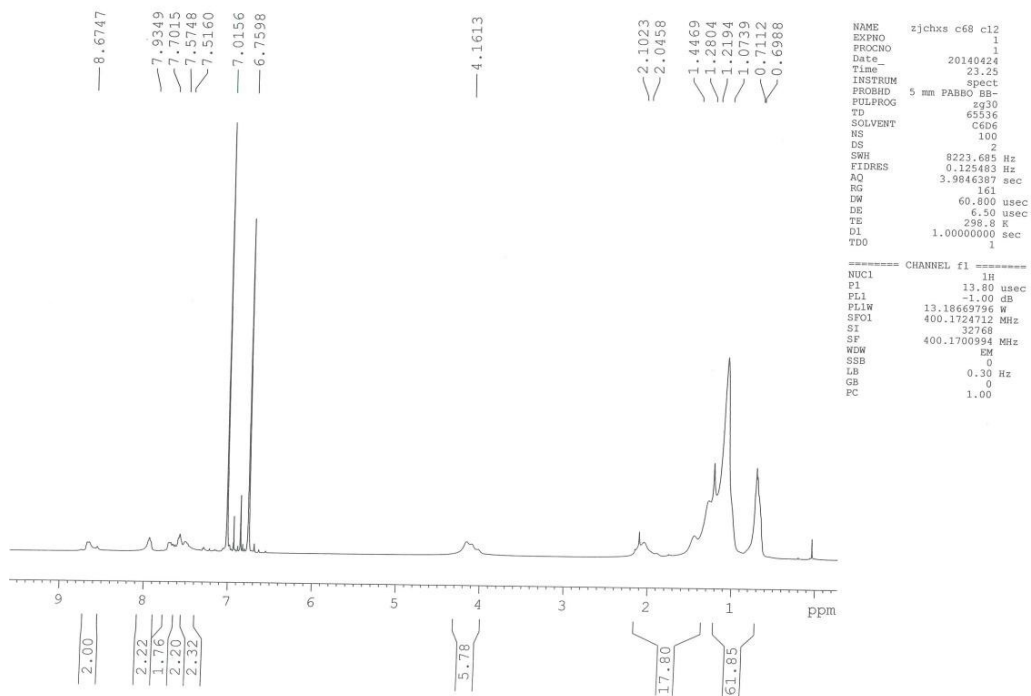


Fig. S4 ^1H NMR spectrum of **CZ-BT12** (measured in 1,2-dichlorobenzene- d_4)