# **Supporting Information**

# 2.1 Materials and instruments

All starting materials in this work were obtained from the Shanghai Chemical Reagent Co. Ltd (Shanghai, China) and used as received, except that 2,6-dibromo-4,8-bis(5-(2-ethylhexyl)-thiophen-2-yl)benzo[1,2-b:4,5-b']dithiophene (BDTT) was procured from Suzhou Ge'ao New Material Co. Ltd. N,N-Dimethylformamide (DMF) and tetrahydrofuran (THF) were dried over CaH<sub>2</sub> and freshly distilled prior to use. Other reagents and solvents were purchased commercially as analytical-grade quality and used without further purification. Column chromatography was performed on silica gel (200-300 mesh).

Elemental analysis tests: The tests were performed with an elemental analyzer model Vario EL III from Elementar Elemental Analysis Systems, Germany, which detects the content of C, H, N and S in the complexes and polymers by burning the samples in a stream of oxygen. Fourier transform infrared spectroscopy test (FT-IR): The infrared spectrometer with the model number Nicolet 6700 and scanning wavenumber range of 4000~400cm<sup>-1</sup> was used for the test, which was manufactured by Nicol, U.S.A. It was pressed by mixing the test sample with KBr at a mass ratio of about 1:100 and grinding it well. NMR spectroscopy: DMSO-d<sub>6</sub> or CDCl<sub>3</sub> was used as the solvent and tested by NMR spectrometer (made by Bruker, Switzerland, model MALDI-TOF, with a hydrogen spectrum test frequency of 400 MHz and a carbon spectrum test frequency of 100 MHz, whose internal standard reagent is a small amount of TMS). Thermal gravimetric analysis (TGA): The thermal decomposition temperature (T<sub>d</sub>) of the dye molecules was determined using a model SDT Q600 thermogravimetric analyzer, which was produced by TA, USA. Gel permeation chromatography (GPC): A medium-temperature gel permeation chromatograph (model Waters-1515) was used for the test. The test conditions were THF after water removal as the mobile phase, column temperature of 80 °C, and flow rate of 1.0 mL/min. Cyclic voltammetry (CV) test: Model CHI650D, in a three-electrode system, the reference electrode is the saturated glycury electrode, the working electrode is the glassy carbon electrode, and the counter electrode is the platinum electrode. The sample is tested in a solution of tetrabutylammonium tetrafluoroborate ((n- $C_4H_9)_4N^+BF_4^-$ ) acetonitrile at a concentration of 0.1 mol/L, where a concentration of

 $3 \times 10^{-5}$  mol/L ferrocene is used as the internal standard and the scanning speed was

100 mV/s. Ultraviolet-Visible Absorption Spectroscopy Test (UV-Vis): The model CARY-60 UV-Vis spectrometer was produced by Agilent Technologies. Photovoltaic performance test: Current density-voltage (J-V) curves were obtained by DSSC at AM 1.5G with 100 mW/cm<sup>2</sup> light intensity simulating sunlight by Keithley 2400 test. The external quantum effect (*IPCE*) test is performed with a light source provided by an Oriel Cornerstone monochromator, where the DSSC has an effective working area of 0.25 cm<sup>2</sup>.

# 2.2 Fabrication of DSSCs devices

Treatment of conductive glass (FTO): the fluorine-doped tin dioxide conductive glass was ultrasonically cleaned with detergent and distilled water for 15 min, washed several times with anhydrous ethanol and acetone, respectively, and placed in inert conditions at 450 °C for about 30 min before being removed and set aside. Preparation of TiO<sub>2</sub> photoanodes: the TiO<sub>2</sub> slurry was poured onto a screen plate and printed on a conductive substrate to form a film of about 10  $\mu$ m, which was then dried several times at 125 °C to evaporate the organic solvent, resulting in a TiO<sub>2</sub> film of about 16  $\mu$ m thickness. Then the prepared TiO<sub>2</sub> film was calcined in a muffle furnace with a programmed temperature increase for 30 min to remove the residual organic solvent completely. The calcined TiO<sub>2</sub> films were then treated with aqueous TiCl<sub>4</sub> (0.04 mol/L) at 70 °C for 30 min, washed with water and anhydrous ethanol, and then calcined in a muffle furnace at 500 °C for 30 min. When the temperature cools down to 40 °C, the calcined photoanode is quickly removed and immersed in a solution of

photosensitizer with a concentration of  $2 \times 10^{-4}$  mol/L prepared by DMF as a solvent

and protected from light for 36 h. The final purpose is to adsorb the dye on the  $TiO_2$  photoanode. Configuration of electrolyte: Prepare a mixture of 0.1 mol/L LiI, 0.05 mol/L I<sub>2</sub>, 0.6 mol/L 1,2-dimethyl-3-propylimidazolium iodide (DMPII) and 0.5 mol/L 4-tert-butylpyridine (TBP) in acetonitrile. Preparation of counter electrodes: the conductive substrate (FTO) with small holes was coated with H<sub>2</sub>PtCl<sub>6</sub> (0.02 mol/L, isopropanol as solvent) solution and calcined continuously at 400 °C for 15 min. Assembled batteries: a photoanode of TiO<sub>2</sub> film conductive glass adsorbed with dye is bonded to a counter electrode having a platinum (Pt) coated conductive glass. The electrolyte is injected through the small hole reserved at the back of the counter

electrode and then the hole is closed and sealed to obtain a complete device.<sup>[1]</sup>

### 2.3 Synthesis of target dye sensitizers

#### 1 Synthesis of 4-butoxybenzaldehyde



Fig.S1 <sup>1</sup>H-NMR spectrum of 4-butoxybenzaldehyde in CDCl<sub>3</sub>

5 g of p-hydroxybenzaldehyde (45.5 mmol), 7.0 g of n-bromobutane (51.1 mmol), 22.5 g of potassium carbonate (163.0 mmol) and 100 mL of acetone were added to a 250 mL round bottom flask, followed by the reaction for 24 h at 80 °C<sup>[2]</sup>. After the reaction was completed, it was cooled sufficiently to room temperature and then placed in the refrigerator overnight to allow the solid to precipitate completely. The mixture was filtered and then the filter residue was washed with acetone until it was off-white. The filtrate was spun at 45°C to obtain the liquid crude product and dried overnight. The resulting liquid was subjected to column treatment, and the detergent was ethyl acetate with petroleum ether in the ratio of 1:8 (v/v) to obtain a pale yellow liquid of 4.2 g with a yield of 51%. FT-IR (KBr,cm<sup>-1</sup>): 3440(-OH), 2950, 2870(C-H), 2730(C-H), 1700 (C=O), 1600, 1510(C=C), 1460(C-H), 1260, 1100(C-O), 746(-CH<sub>2</sub>CH<sub>2</sub>-). <sup>1</sup>H-NMR (CDCl<sub>3</sub>, ppm): 9.86(s, 1H), 7.82(d, 2H), 6.98(d, 2H), 4.02(t, 2H), 1.76 (m, 2H), 1.46-1.57 (m, 2H), 0.97(t, 3H). <sup>13</sup>C-NMR (CDCl<sub>3</sub>, ppm):150.31, 142.20, 132.39, 127.59, 120.52, 73.87, 32.32, 19.34, 13.95.

# 2 Synthesis of 1,2-dithiophene-1,2-dione

3.6 g thiophene-3-carboxaldehyde (30 mmol), 6.18 g K<sub>2</sub>CO<sub>3</sub> (45 mmol), 16 ml DMSO and 0.153 g 3-benzyl-5-(2-hydroxyethyl)-4-methylthiazolium bromide (30 mol%) were added to a 50 ml single-necked flask and warmed to 60 °C for 36 h in an atmosphere of carbon dioxide<sup>[3]</sup>. After the reaction was completed and cooled to room temperature, 100 mL of water was added to the partition funnel, followed by three extractions with 50 mL of anhydrous ether and then the organic phase was collected and dried by adding anhydrous magnesium sulfate for 12 h. The pale yellow liquid crude product was obtained by filtering and spinning. The resulting crude product was subjected to column treatment, and the eluent was ethyl acetate and petroleum ether in the ratio of ethyl acetate to petroleum ether of 1:12 (v/v), yielding 1.62 g of golden



Fig.S2 <sup>1</sup>H-NMR spectrum of 1,2-dithiophen-1,2-dione in CDCl<sub>3</sub>

yellow needle-like solid in 73% yield. m.p.94.1-94.7 °C. FT-IR (KBr, cm<sup>-1</sup>): 3440cm<sup>-1</sup> (-OH), 3110cm<sup>-1</sup> (=C-H), 1680cm<sup>-1</sup> (C=O), 1160cm<sup>-1</sup> (C-C), 1500cm<sup>-1</sup> (C=C), 1100cm<sup>-1</sup> (C-S), 700cm<sup>-1</sup>(=C-H).<sup>1</sup>H-NMR (CDCl<sub>3</sub>, ppm): 8.35-8.36 (d,1H), 7.69-7.71 (d,1H), 7.39-7.41 (q,1H). <sup>13</sup>C-NMR (CDCl<sub>3</sub>, ppm): 186.81, 137.59, 137.50, 127.54, 126.96.

#### 3 Synthesis of benzo[1,2-b:6,5-b']dithiophene-4,5-dione

150 mL of dichloromethane and 2.22 g of 1,2-dithiophene-1,2-dione (10 mmol) were added to a 250 mL single-necked flask and stirred for 5 min, then 8.1 g of FeCl<sub>3</sub> (50 mmol) was slowly added and the reaction was carried out at 45 °C for 24 h. After the reaction was completed and left for 1 h, 300 ml of water was added and extracted three times with appropriate amount of dichloromethane. The organic phase was collected and dried with anhydrous magnesium sulfate for 24 h<sup>[3]</sup>. The black flocculent solid was obtained by filtration and spin-drying. The obtained crude product was purified by column chromatography, and the eluent used was 1:12 (v/v) of ethyl acetate and petroleum ether, which finally yielded 1.76 g of black needle-like solid in 80% yield. m.p.289.1-289.6 °C. FT-IR (KBr, cm<sup>-1</sup>): 3090(=C-H), 2930, 2850, 1390, 1280(-C-H), 1660 (C=O), 1510 (C=C), 1100(C-S), 885(C-C), 727(=C-H).<sup>1</sup>H-NMR (CDCl<sub>3</sub>, ppm): 7.50(d,1H,=CH), 7.20 (d, 1H, =CH). <sup>13</sup>C-NMR (CDCl<sub>3</sub>, ppm): 174.62, 143.96, 135.11, 127.88,125.66.



**Fig.S3** <sup>1</sup>H-NMR spectrum of benzo[1,2-b:6,5-b']dithiophene-4,5-dione in CDCl<sub>3</sub> **4** Synthesis of 2,7-dibromobenzo[1,2-b:6,5-b']dithiophene-4,5-dione



Fig.S4 <sup>1</sup>H-NMR spectrum of 2,7-Dibromobenzo[1,2-b:6,5-b']dithiophene-4,5-dione in CDCl<sub>3</sub>

4.40 g of benzo[1,2-b:6,5-b']dithiophene-4,5-dione (20 mmol), 3.738 g of NBS (42 mmol) and 100 mL of DMF were added to a 250 mL single-necked flask and warmed to 70 °C for 24 h<sup>[4]</sup>. After the reaction is completed, cool to room temperature, pour directly into 400 mL of water and let stand for 30 min to make the solid precipitate completely. After extraction and drying for 48 h, a light blue solid of 2.85 g was obtained with a yield of 75.3 %. m.p. 204.3-204.9 °C. FT-IR (KBr, cm<sup>-1</sup>): 3450(-OH), 30110(=CH), 2930, 2850, 1410, 1280(-C-H), 1680(C=O), 1510(C=C), 1080(C-S), 629(C-Br). <sup>1</sup>H-NMR (CDCl<sub>3</sub>, ppm): 7.47 (s,1H, =CH). <sup>13</sup>C- NMR (CDCl<sub>3</sub>, ppm): 172.57, 143.63, 135.37, 130.03, 114.65.

# 5 Synthesis of 5,8-dibromo-2-(4-butoxyphenyl)-1H-dithio[3,2-e:2',3'-g]benzimidazole

2 g of 2,7-dibromobenzo[1,2-b:6,5-b']dithiophene-4,5-dione (5.28 mmol), 0.553 g of 4-butoxybenzaldehyde (62 mmol), 40 ml of glacial acetic acid and 9.4 g of ammonium acetate were added to a 100 ml monolithic flask and the reaction was carried out under the atmosphere of nitrogen and warmed up to 120 °C for 12 h<sup>[5]</sup>. After the reaction is completed, fully cool to room temperature, pour into 300 mL of water and adjust the pH value to about 7 with ammonia. When the yellowish flocculent solid was precipitated, it was filtered and washed three times with 20 mL of dichloromethane and dried overnight to obtain a yellowish solid of 2.88 g with a yield of 54%. m.p. 280.3-280.7 °C. FT-IR (KBr, cm<sup>-1</sup>): 3440(-OH), 3260(N-H), 3090 (=C-H), 2952,2868 (C-H), 1680 (C=O), 1580 (C=N), 1470 (-CH<sub>3</sub>), 1260 (-C-O-C), 737 (-CH<sub>2</sub>), 667(C-Br). <sup>1</sup>H- NMR (DMSO, ppm):0.93(t,3H), 1.43-1.48 (q,2H), 1.71-1.75 (t,2H), 4.04-4.07 (t,2H), 7.13-7.15 (d,1H), 8.09-8.11 (d,1H), 13.36 (s,1H). <sup>13</sup>C-NMR (CDCl<sub>3</sub>, ppm): 160.60, 150.09, 128.37, 127.53, 125.16, 122.49, 115.46, 112.99, 67.89, 31.20, 21.53, 19.21, 14.20.



**Fig.S5** <sup>1</sup>H-NMR spectrum of 5,8-dibromo-2-(4-butoxyphenyl)-1H-dithio[3,2-e:2',3'-g]benzimidazole in CDCl<sub>3</sub>

# 6 Synthesis of 5-formyl-8-hydroxyquinoline

Add 20 g (137.6 mmol) of 8-hydroxyquinoline to a 500-mL three-necked flask, followed by 80 mL of anhydrous ethanol and slowly add a 1:1 mass ratio of aqueous

sodium hydroxide solution (40 g NaOH, 40 mL H<sub>2</sub>O) through a constant pressure separatory funnel under stirring. After the system was completely dissolved, it was heated to 80 °C and refluxed, and then 36 g (304 mmol) of CHCl<sub>3</sub> was slowly added through a constant-pressure partition funnel at 1h and reacted for 24h<sup>[6]</sup>. After the reaction is completed, add 50 ml of distilled water. The ethanol and chloroform were removed by distillation under reduced pressure, and the liquid was poured into 500 ml of distilled water after spin-drying. Next neutralize with dilute hydrochloric acid (hydrochloric acid: water=10:1) to pH 7, at which point a large amount of brown solid appears. The brown solid was dried to obtain 3.0 g of orange-pink fine filamentous crystals with a yield of 12.3%. m.p. 171.8~172.9°C. FT-IR (KBr, cm<sup>-1</sup>): 3447cm<sup>-1</sup> (-OH), 2920cm<sup>-1</sup>(C-H), 1690cm<sup>-1</sup>(C=O), 1576cm<sup>-1</sup> (C=C), 1510cm<sup>-1</sup> (C=N). <sup>1</sup>H-NMR (CDCl<sub>3</sub>, ppm): 10.15(s, 1H), 9.67(d, 1H), 8,87(d, 1H), 8.00 (d, 1H), 7.67(q, 1H), 7.65(d, 1H).<sup>13</sup>C-NMR (CDCl<sub>3</sub>, ppm):192.04, 157.86, 148.74, 140.45, 137.85, 134.76, 126.59, 124.72, 123.56, 109.02.



**Fig.S6** <sup>1</sup>H-NMR spectrum of 5-formyl-8-hydroxyquinoline in CDCl<sub>3</sub> **7 Synthesis of 2-cyano-3-(8-hydroxyquinolin-5-yl)acrylic acid** 



**Fig.S7** <sup>1</sup>H-NMR spectrum of 2-cyano-3-(8-hydroxyquinolin-5-yl)acrylic acid in CDCl<sub>3</sub> After adding 3.0 g (17.3 mmol) of 5-formyl-8-hydroxyquinoline and 2.22 g (26.0

mmol) of cyanoacetic acid to a 500 ml three-necked flask in sequence, add 9 ml of acetic acid and 100 ml of acetonitrile. After dissolution, slowly add 1ml of piperidine and react the system at 90 °C for 36h<sup>[7]</sup>. After the reaction is completed, spin dry the solvent in a vacuum drying oven until dried completely to obtain a yellow lump of crude product. The crude product was ground to powder form and then the solid was washed with trichloromethane three times. Then the solid was dried and recrystallized twice with ethanol to obtain 2.0 g of orange solid powder in 59.1% yield. m.p. 200~201 °C. <sup>1</sup>H-NMR (DMSO-*d*<sub>6</sub>, ppm): 8.96 (s,1H), 8.87 (d,1H), 8.62 (d,1H), 8.42 (d,1H), 7.71 (q,1H), 7.26 (d,1H). The active hydrogens on the hydroxyl and carboxyl groups could not be characterized in the NMR spectra due to the formation of hydrogen bonds, but the successful synthesis of the target products could be demonstrated by combining FT-IR and <sup>13</sup>C-NMR characterization. The result is as follows: FT-IR (KBr, cm<sup>-1</sup>): 3180cm<sup>-1</sup>(-OH), 2235cm<sup>-1</sup>(C≡N), 1896cm<sup>-1</sup>(C=O), 1662cm<sup>-1</sup>(C=O), 1613cm<sup>-1</sup>(C=C), 1566cm<sup>-1</sup>(C=N). <sup>13</sup>C-NMR (CDCl<sub>3</sub>, ppm): 164.17, 159.12, 150.04, 149.44, 138.68, 132.58, 131.15, 128.71, 123.93, 118.86, 117.26, 112.16, 102.93.

# 8 Synthesis of Hg(II)-containing complexes (BDTD-Hg)

Add 0.268 g 5,8-dibromo-2-(4-butoxyphenyl)-1H-dithio[3,2-e:2',3'-

g]benzimidazole (0.5 mmol), 0.12 g 2-cyano-3-(8-hydroxyquinolin-5-yl)acrylic acid (0.5 mmol), and 30 mL THF to a 100 mL single-mouth flask and raise the temperature to 40 °C to dissolve completely. Then 0.149 g of HgCl<sub>2</sub> (0.55 mmol) was dissolved in 20 mL of anhydrous methanol and added slowly dropwise through a constant pressure funnel. After the dropwise addition was completed, the reaction was warmed up to 75 °C for 24 h<sup>[8]</sup>. After the reaction is completed, cool to room temperature and place in the refrigerator overnight to allow the solid to precipitate completely. After filtering and washing with water three times and anhydrous ethanol three times to obtained an earthy yellow solid (0.356 g) with a yield of 71.2%. FT-IR (KBr, cm<sup>-1</sup>):3443(-OH), 2923, 2852(C-H), 2208(C=N), 1613(C=C), 1560(C=N), 1100(S-O-Hg), 494(S-Hg).

### 9 Synthesis of Cd(II)-containing complexes (BDTD-Cd)

This reaction was taken in the same way as the synthesis of BDTD-Hg, and HgCl<sub>2</sub> was changed to 0.134 g (0.55 mmol)  $Cd(CH_3COO)_2 \cdot 2H_2O$ . After the same post-treatment as that, an orange-yellow solid of 0.355 g was obtained in 75% yield. FTIR (KBr, cm<sup>-1</sup>): FT-IR (KBr, cm<sup>-1</sup>): 3440(-OH), 2924, 2855(C-H), 2205(C=N), 1611(C=C), 1561(C=N), 1102(S-O-Cd), 496(S-Cd).

# 10 Synthesis of Zn(II)-containing complexes (BDTD-Zn)

This reaction was taken in the same way as the synthesis of BDTD-Hg, and HgCl<sub>2</sub> was changed to 0.105 g (0.55 mmol)  $Zn(CH_3COO)_2 \cdot 2H_2O$ . After the same post-treatment as that, 0.340 g of golden solid was obtained with a yield of 76%. FTIR (KBr, cm<sup>-1</sup>): 3441(-OH), 2926,2853(C-H), 2208(C=N),1611(C=C), 1560(C=N), 1109(S-O-Zn), 508(S-Zn).

## 11 Synthesis of Cu(II)-containing complexes (BDTD-Cu)

This reaction was taken in the same way as the synthesis of BDTD-Hg by changing  $HgCl_2$  to 0.109 g (0.55 mmol) Cu(CH<sub>3</sub>COO)·2H<sub>2</sub>O. After the same post-treatment as it was obtained a brown solid 0.324 g in 72.5% yield. FTIR (KBr, cm<sup>-1</sup>): 3437(-OH), 2926, 2855(C-H), 2209(C=N), 1614(C=C), 1563(C=N), 1106(S-O-Ni), 511(S-Ni).

# 12 Synthesis of Ni(II)-containing complexes (BDTD-Ni)

This reaction was taken in the same way as the synthesis of BDTD-Hg, and HgCl<sub>2</sub> was changed to 0.107 g (0.55 mmol) Ni(CH<sub>3</sub>COO)<sub>2</sub>·4H<sub>2</sub>O. After the same post-treatment as that, a light yellow solid 0.333 g was obtained in 74.5% yield. FTIR (KBr, cm<sup>-1</sup>): 3439(-OH), 2926,2854(C-H), 2205(C=N), 1613(C=C), 1560(C=N), 1107(S-O-Ni), 514(S-Ni).

# 13 Synthesis of polymeric metal complexes (BDTT-BDTD-Hg)

This polymer was synthesized according to the Yamamoto polymerization reaction. The above mercury complex BDTD-Hg monomer 0.252 g (0.25 mmol), 2,6-dibromo-4,8-bis(5-(2-ethyloctyl)thiophen-2-yl)benzo[1,2-b:4,5-b']dithiophene (BDTT) donor monomer 0.184 g (0.25 mmol), 0.08 g (1. 25 mmol) zinc powder 0.13 g ( 0.5 mmol) triphenylphosphorus, 0.16 g (0.25 mmol) bis(triphenylphosphorus)nickel dichloride, and 0.004 g (0.024 mmol) 2,2'-bipyridine were added sequentially to a 50 mL single-mouth flask. Then 15 mL of DMF was added and the reaction was carried out under nitrogen protection for 48 h at reflux<sup>[9]</sup>. After the reaction, the earthy yellow solid product 0.189 g was obtained by filtration and full washing and drying with anhydrous ethanol, yielding 51.8 %. FTIR (KBr, cm<sup>-1</sup>): 3440 (-OH), 2920,2 850(C-H), 2205(C=N), 1609(C=C), 1559(C=N), 1098(S-O-Hg), 490 (S-Hg). *Mn*=8.92×10<sup>3</sup> g/mol, *PDI*=2.15.

#### 14 Synthesis of polymeric metal complexes (BDTT-BDTD-Cd)

This polymer is synthesized in the same way as BDTT-BDTD-Hg. Only the mercury complex BDTD-Hg was replaced by the cadmium complex BDTD-Cd 0.236 g (0.25 mmol), which was then reacted with 0.184 g (0.25 mmol) of the donor BDTT under the same conditions to give a light brown solid powder of 0.174 g in 49.8 % yield after the same treatment.FTIR (KBr, cm<sup>-1</sup>): 3439(-OH), 2922,2853(C-H), 2203 (C=N), 1607 (C=C), 1557(C=N), 1100(S-O-Cd), 492(S-Cd). Mn=9.95×10<sup>3</sup> g/mol, PDI=2.12.

#### 15 Synthesis of polymeric metal complexes (BDTT-BDTD-Zn)

This polymer is synthesized in the same way as BDTT-BDTD-Hg. Only the mercury complex BDTD-Hg was replaced by the zinc complex BDTD-Zn 0.224 g (0.25 mmol), which was then reacted with 0.184 g (0.25 mmol) of the donor BDTT under the same conditions to give a brown solid powder of 0.187 g in 55.6 % yield after the same treatment. FTIR (KBr, cm<sup>-1</sup>): 3438(-OH), 2924,2851(C-H), 2206(C=N), 1608 (C=C), 1558(C=N), 1105(S-O-Zn), 505(S-Zn). Mn=9.61×10<sup>3</sup> g/mol, PDI=2.11.

## 16 Synthesis of polymeric metal complexes (BDTT-BDTD-Cu)

This polymer is synthesized in the same way as BDTT-BDTD-Hg. Only the mercury complex BDTD-Hg was replaced by the copper complex BDTD-Cu 0.224 g (0.25 mmol), which was then reacted with 0.184 g (0.25 mmol) of the donor BDTT under the same conditions to give a dark brown solid powder of 0.179 g in 53.2 % yield after the same treatment. FTIR (KBr, cm<sup>-1</sup>): 3435(-OH), 2923, 2853(C-H), 2205 (C=N), 1611 (C=C),1561(C=N), 1104(S-O-Cu), 508(S-Cu). Mn=9.60×10<sup>3</sup> g/mol, PDI=2.06.

## 17 Synthesis of polymeric metal complexes (BDTT-BDTD-Ni)

This polymer is synthesized in the same way as BDTT-BDTD-Hg. Only the mercury-coordinated BDTD-Hg material was replaced by the nickel-coordinated BDTD-Ni 0.222 g (0.25 mmol), which was then reacted with 0.184 g (0.25 mmol) of the donor BDTT under the same conditions to yield a dark brown solid powder of 0.185 g in 55.3% yield after the same treatment. FTIR (KBr, cm<sup>-1</sup>): 3436(-OH), 2924,2852(C-H), 2203 (C=N), 1610 (C=C),1559(C=N), 1105(S-O-Cu), 510(S-Cu). Mn=8.20×10<sup>3</sup> g/mol, PDI=2.10.

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