Supporting Information for:

Electrochemical polymerization in chiral liquid crystal on diffraction grating producing electro-active polymer with diffraction function: A combination of top-down and top-bottom techniques

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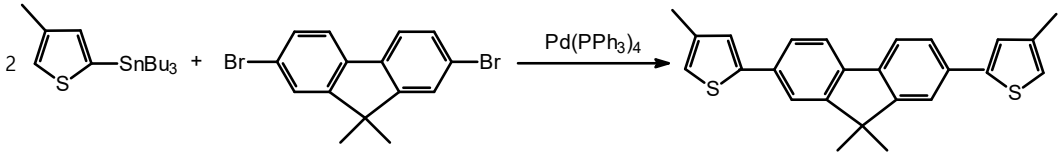
Synthesis of monomer

*ter*EDOT was prepared using a previously reported method (Goto, H. (2009) *J. Mater. Chem.*, *19*, 4914–4921). MT-F-MT (Scheme S1) was prepared as follows. In a round-bottom flask, 4-tributylstannyl-3-methyl thiophene (1.626 g, 4.2 mmol),2,7-dibromo-9,9-dimethyl-9*H*-fluorene (0.704 g, 2.0 mmol), and tetrakis(triphenylphosphine)palladium(0) $(PPh_3)_4$ in 7 mL of toluene were stirred under N_2 gas flow at 90 °C for 6 h. The crude product was purified by column chromatography (silica gel, $CHCl_3$/hexane = 3/17) to yield 0.323 g of the desired material. ^1H nuclear magnetic resonance (NMR) and ^{13}C NMR spectroscopy measurements (Figure S1) confirmed the chemical structure of MT-F-MT.



Scheme S1. Synthesis of MT-F-MT as a monomer.

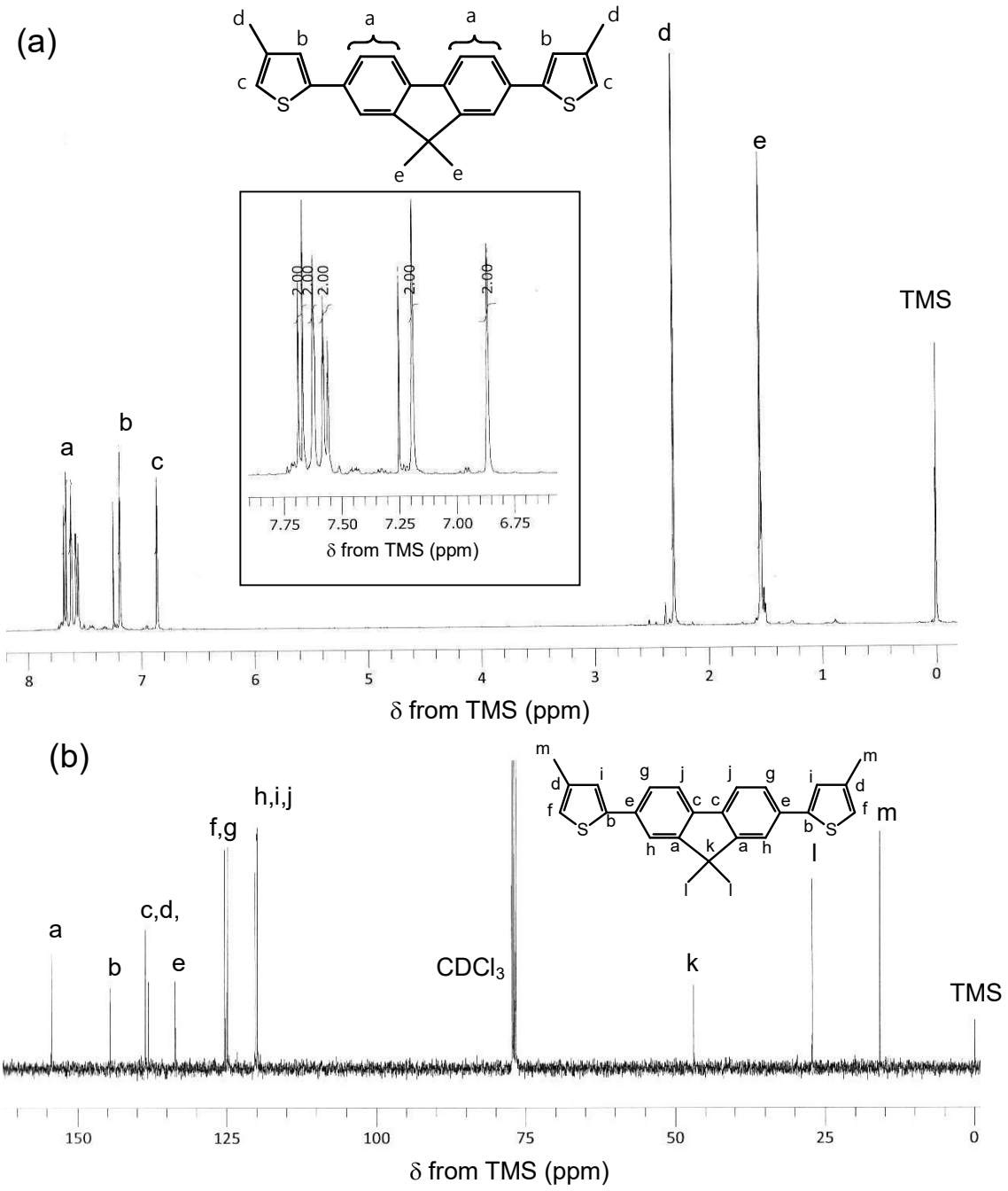


Figure S1. (a) ^{1}H NMR spectrum of MT-F-MT as a monomer. Inset shows low magnetic field. (b) ^{13}C NMR spectrum of MT-F-MT. Solvent: $CDCl_3$, TMS = tetramethysilane as an internal standard.

Techniques

Chemicals were purchased from Tokyo Chemical Industry (TCI; Tokyo). Reagents were used as-received. Toluene (solvent, Nakalai Tesque, Kyoto) was distilled prior to use.^{1}H NMR spectroscopy (ECS 400, JEOL) measurements were performed in $CDCl_3$ with an. Chemical shifts are reported in ppm down-field from TMS as an internal reference. Optical texture observations were conducted using a high-resolution polarizing microscope (ECLIPS LV 100, Nikon) with a LU Plan Fluor lens and a CFIUW lens (Nikon). Digital pictures were recorded with an Optio RZ10 (Pentax) camera. UV-vis absorption spectra were recorded on a UV-vis optical absorption spectrometer (V-630, Jasco). Electrochemical measurements were performed using an electrochemical analyzer (PGSTAT 12, AUTOLAB).Circular dichroism (CD) spectra were obtained with a J-720 spectrometer (Jasco).