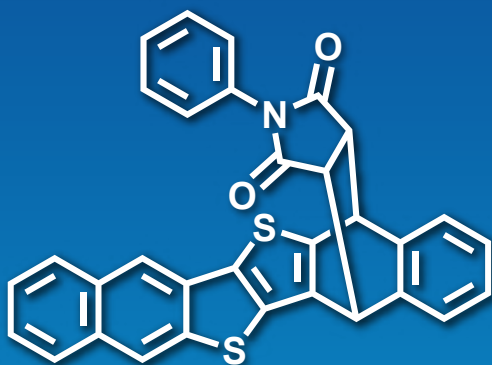
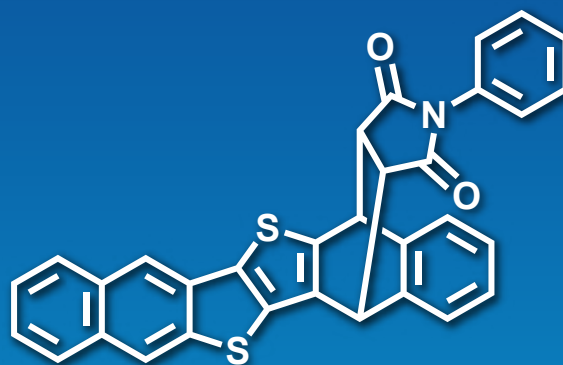


Organic Transistor Reagents

Soluble DNTT Precursors



endo-DNTT-PMI
[D5153]



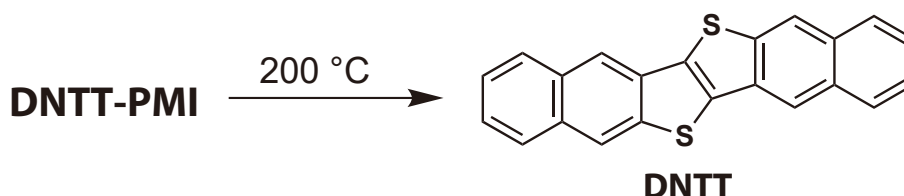
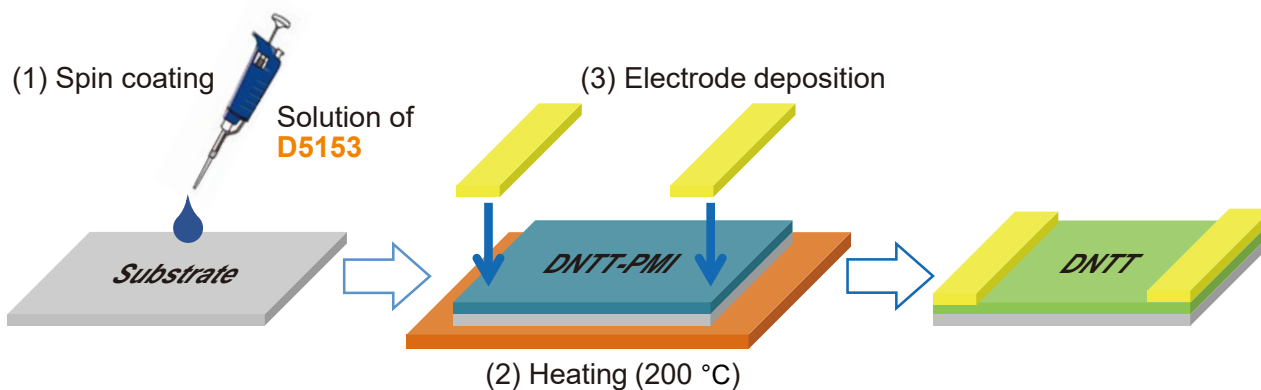
exo-DNTT-PMI
[D5154]

Advantages

- Solution-processable DNTT precursors
- Thermally convertible to DNTT in thin-film
- Applicable to organic transistor and memory devices

Application

Solution processed OFETs using DNTT-PMIs



Ref. (a) *J. Am. Chem. Soc.* **2007**, 129, 2224. (b) *Adv. Mater.* **2015**, 27, 727. (c) *Adv. Mater.* **2015**, 27, 6606. (d) *Organic Electronics* **2013**, 14, 1211. (e) *Appl. Phys. Express* **2015**, 8, 101601. (f) Y. Ikeda, T. Shiro, K. Takimiya, Patent JP5269825.

***endo*-DNTT-PMI**

50mg [D5153]

***exo*-DNTT-PMI**

50mg [D5154]

These products were commercialized with the cooperation of TEIJIN LIMITED.

Measurement of OFETs fabricated by using DNTT-PMI

Device fabrication (*endo*-DNTT-PMI)

- (1) Mix *endo*-DNTT-PMI (**D5153**) and polystyrene in 2:1 weight ratio
- (2) Dissolve mixed powder in CHCl_3 to prepare 1wt% solution
- (3) Spin-coat^{*1} the solution onto cleaned- and UV/ O_3 treated- $\text{n}^+\text{-Si/SiO}_2$ substrate
- (4) Anneal substrates at 200 °C for 10 min under air for converting the precursor to DNTT thin film
- (5) Fabricate source and drain electrodes^{*2} by vacuum deposition of Au

*1 Spin-coating condition: 500 rpm × 5 s → 2000 rpm × 20 s

*2 channel length: 20 μm or 200 μm, channel width: 1000 μm

(for *exo*-DNTT-PMI **D5154** based transistors, see *Org. Electron.* **2013**, *14*, 1211.)

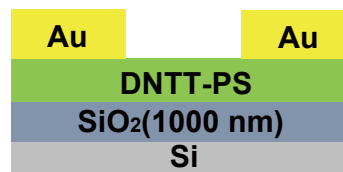


Fig. 1 Device structure

Thin-film and OFET properties

Fig. 2 shows polarized optical microscopy (POM) image of DNTT thin film prepared from DNTT-PMI. Image clearly shows polycrystalline film morphology. As shown in Fig.3, fabricated devices show typical p-type characteristics.

Maximum carrier mobility 0.86 cm^2/Vs was observed when channel length was 200 μm. Carrier mobility was greatly improved to 2.33 cm^2/Vs when the channel length was shortened to 20 μm.

This high mobility can be assumed to be as following: the source and drain channels were completely filled in single grain, so the carrier transportation barrier caused by grain boundaries reduced.

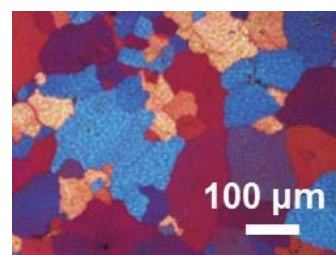


Fig. 2 POM image of DNTT thin film.

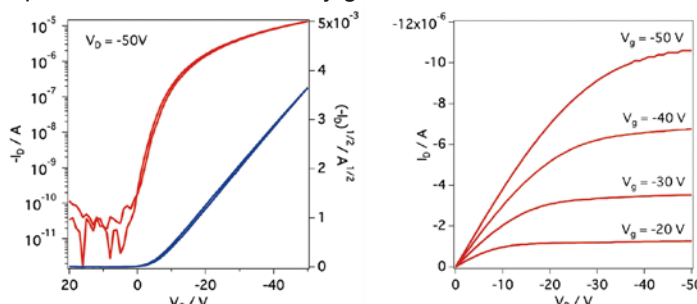


Fig. 3 Transfer (left) and output (right) curves of OFET device prepared from *endo*-DNTT-PMI.

Device	Anneal. Temp. (deg. C)	Channel Length (μm)	Mobility (cm^2/Vs)	on/off	V_{th} (V)
1	200	200	0.86	4.8×10^6	-5.5
2	210	200	0.85	4.6×10^5	-0.9
3	210	20	2.33	1.1×10^7	-3.1

Table 1 Summary of OFET properties of DNTT prepared from *endo*-DNTT-PMI.

Other notices of DNTT-PMIs

Solubility: *endo*-DNTT-PMI **D5153** (1.0wt% in CHCl_3). *exo*-DNTT-PMI **D5154** (0.2wt% in CHCl_3)
 Condition to Store: Store in the dark because the color of DNTT-PMIs gradually turns to red under light irradiation

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