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Product Information

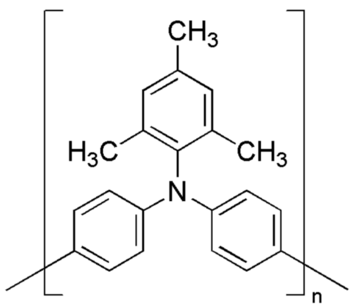
Poly[bis(4-phenyl)(2,4,6-trimethylphenyl)amine]

Catalog Number **702471**
Store at Room Temperature
Technical Bulletin AL-254

TECHNICAL BULLETIN

Synonyms: Poly(triaryl amine), PTAA

Product Description



$[C_6H_4N(C_6H_2(CH_3)_3)C_6H_4]_n$

Poly[bis(4-phenyl)(2,4,6-trimethylphenyl)amine] is an amorphous p-type polymer semiconductor.[1,2] It may be used to fabricate field-effect transistors (FETs).

PTAA is also useful as a hole transport material in organic light emitting diodes (OLEDs).

Precautions and Disclaimer

This product is for R&D use only, not for drug, household, or other uses. Please consult the Material Safety Data Sheet for information regarding hazards and safe handling practices.

Storage/Stability

Store the product at room temperature.

Procedure

Fabrication of PTAA field-effect transistors (FETs)

Bottom-gate bottom-contact FETs were fabricated in a nitrogen atmosphere on highly doped Si-wafers with a thermally grown 250 nm SiO_2 layer. The two layers served as the gate electrode and gate insulator. Au source and drain electrodes (30 nm thick) were defined by standard photolithography:

channel length (L) = 10 μm
channel width (W) = 10 mm

Prior to deposition of the PTAA polymer layer, the Si-wafers were treated with octyltrichlorosilane (OTS-18, Catalog Number 104817) by immersing them in 10 mM solutions in toluene for 15 minutes at 60 °C.

A homogeneous solution of PTAA was prepared in toluene at room temperature containing 1.0 wt% of the polymer. This solution was deposited via spin-coating at 500 rpm for 30 seconds followed by 2,000 rpm for 50 seconds.

Results

Electrical characterization of the PTAA FETs was conducted in a nitrogen atmosphere with a HP4155B semiconductor parameter analyzer. Field-effect mobilities were calculated from transfer characteristics (saturation regime) employing the relation:[3]

$$\frac{\delta I_{sd}(V_g)}{d V_g} = \frac{C_i \cdot W}{L} \mu_{FET}(V_g, V_{sd}) \cdot (V_g - V_0)$$

I_{sd} is the source-drain current (saturation regime)
V_g and V_{sd} gate and source-drain voltage, respectively
C_i the insulator capacitance
W and L the channel width and length
V_0 the turn-on voltage

Transfer and output curves for PTAA transistors are shown in Figures 1 and 2.

Figure 1.
Transfer output curves for PTAA transistors corresponding to field effect mobility of 4×10^{-3} cm^2/Vs.

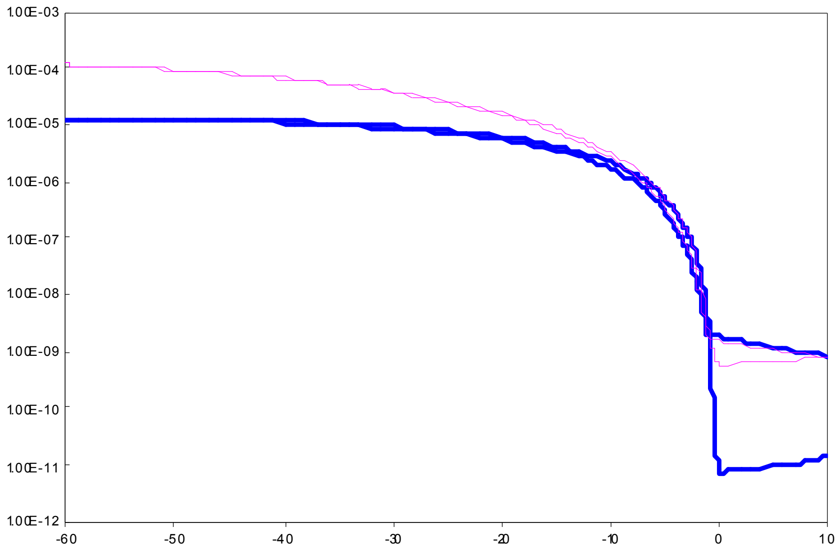
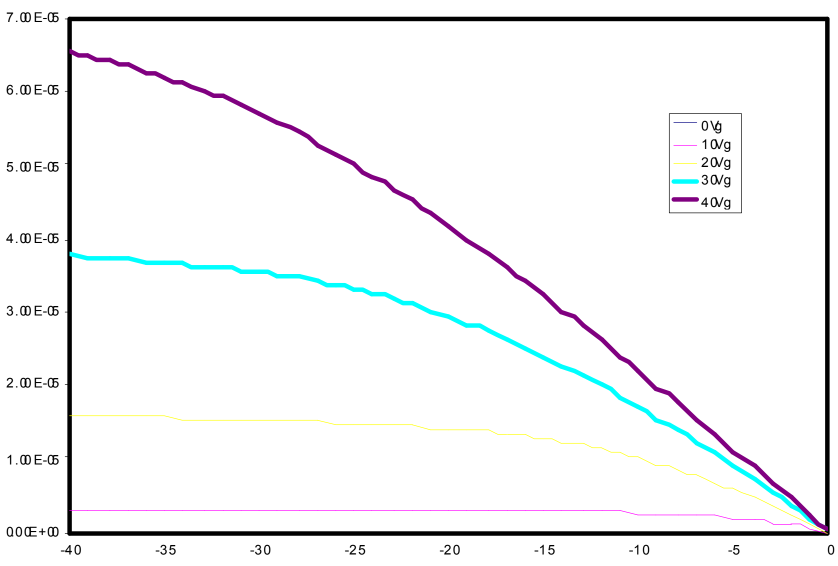


Figure 2.
Output curves for PTAA transistors corresponding to field effect mobility of 4×10^{-3} cm^2/Vs.



References

1. Chabinyc, M.L. et al., MRS Bull., 7th ed., **33**, 683, (2008)
2. Veres, J. et al., Adv. Funct. Mater., **13**, 199, (2003).
3. Brown, A.R. et al., Synth. Met., **88**, 37 (1997).

Data courtesy of Dr. Iain McCulloch, Imperial College London and Flexink, Inc.

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