**Product Information**

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

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

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**TECHNICAL BULLETIN**

**Synonyms:** Poly(triaryl amine), PTAA

**Product Description**

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.

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**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 \((L) = 10 \, \mu m\)
- 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:\(^3\)

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

\(I_{sd}\) 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 $4 \times 10^{-3}$ cm²/Vs.

Figure 2.
Output curves for PTAA transistors corresponding to field effect mobility of $4 \times 10^{-3}$ cm²/Vs.

References

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

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