Electronic Supplementary Information

Solution-processed ambipolar organic thin-film transistors and inverters in a single substrate through self-assembled monolayertreated electrodes

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Supplementary Note 1

Estimation of intrinsic channel mobility: The intrinsic channel mobilities (μ_{CH}) of different OTFTs for various operating condition were calculated using the equation ^{R1},

$$\mu_{\rm CH} = \frac{L}{W \times C \times (V_{\rm GS} - V_{\rm TH}) \times R_{\rm CH}}$$

where, L and W are the channel length and width, respectively, C is the is the capacitance per unit area of dielectric, V_{GS} is the gate–source voltage, and V_{TH} is the threshold voltage. R_{CH} is the channel resistance, which can be calculated by analyzing the TLM curves using the relation,

$$R_{\rm T} \times W = (R_{\rm C} + R_{\rm CH}) \times W$$

where $R_{\rm T}$ is the total resistance measured by the TLM method, and $R_{\rm C}$ is the contact resistance.



Fig. S1 (a) Ultraviolet photoelectron spectroscopy spectra of PNDI-TVT. (b) Tauc plot of PNDI-TVT.



Fig. S2 Contact angle on Au electrodes (a) before and (b) after PFBT SAM treatment.



Fig. S3 Atomic force microscopy (AFM) of $2 \mu m \times 2 \mu m$ sections of PNDI-TVT: (a) Channel part and (b) Au electrode part without PFBT SAM treatment. (c) Channel part and (d) Au electrode part with PFBT SAM treatment.



Fig. S4 Hysteresis characteristics of (a) n-channel and (b) p-channel of the PNDI-TVT ambipolar OTFTs with and without SAM.



Fig. S5 Comparison of the estimated channel mobility (μ_{CH}) and the field effect mobility at linear region (μ_{lin}) of the ambipolar OTFTs (a) without and (b) with the SAM treatment at different operating conditions. (c) An example for estimation of the channel resistance (R_{CH}) from the TLM data of the n-channel OTFT without the SAM treatment.



Fig. S6 (a) Voltage transfer characteristics and (b) corresponding voltage gains of the complementary-like inverter based on PNDI-TVT (without PFBT SAM treated).



Fig. S7 Schematic illustration representing the OTFT fabrication process.

Film	SAM treatment	Peak	Coherence length (Å)	d-spacing (Å)
PNDI-TVT	None	Alkyl (100)	8.7	13.9
		Backbone	13.7	8.4
		π – π stacking	6.7	4.0
	PFBT	Alkyl (100)	17.5	14.0
		Backbone	16.9	9.2
		π – π stacking	7.4	4.0

Table S1. Summary of different parameters estimated from the analysis of horizontal (in plane)and vertical (out of plane) line cut of the GIWAXS pattern.

References

[R1] G. Horowitz, J. Mater. Res., 2004, 19, 1946–1962.