

## Supporting Information:

# ***n*-Type Small Aromatic Core Diimides Flanked With Electron Donating Thienylethyl Moiety and Electrical Responses in Organic Devices**

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**Materials:** The starting material naphthalene-1, 4, 5, 8-tetracarboxylic dianhydride (> 95%) was purchased from Tokyo chemical industry co., Ltd, Japan. All other chemicals were procured from Sigma-aldrich and used as received.

**Instruments:** High-resolution ESI-FTMS was determined on a Thermo LTQ-Orbitrap XL mass spectrometer.  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra were obtained on a Bruker Avance 400 and 100 MHz NMR spectrometer, respectively. Cyclic voltammetry (CV) measurement was carried out using a Portable Electrochemical Interface & Impedance Analyzer (IVIUM Technologies). A three-electrode system, consisting of a platinum working electrode, a platinum mesh counter electrode, and  $\text{Ag}/\text{Ag}^+$  reference electrode with ferrocene/ferrocenium ( $\text{Fc}/\text{Fc}^+$ ) redox couple as the internal standard was used for the same. The spectrum was recorded in dichloromethane containing 0.1 M tetrabutylammonium hexafluorophosphate ( $\text{Bu}_4\text{NPF}_6$ ) as a supporting electrolyte. UV-visible measurement was performed on a Varian Cary 500 spectrometer. Thermogravimetric analysis (with a TA Instruments TGA 7, Perkin Elmer) and differential scanning calorimetry measurements (Diamond DSC, Perkin Elmer) of the molecules were performed under  $\text{N}_2$  gas at a heating rate of  $10\text{ }^\circ\text{C}/\text{min}$ . Density Functional Theory (DFT) calculation of the respective electronic states of synthesized materials was performed at the B3LPY/6-31G(d,p) level, using SPARTAN10. Powder XRD of studied material was carried out using an incident X-ray with wavelength of 0.154 nm (Cu source, PANalytical Empyrean XRD). The morphology of the studied material layers on various gate dielectrics were evaluated using tapping mode atomic force microscope (AFM, nanoscope IIIa, Digital Instruments).

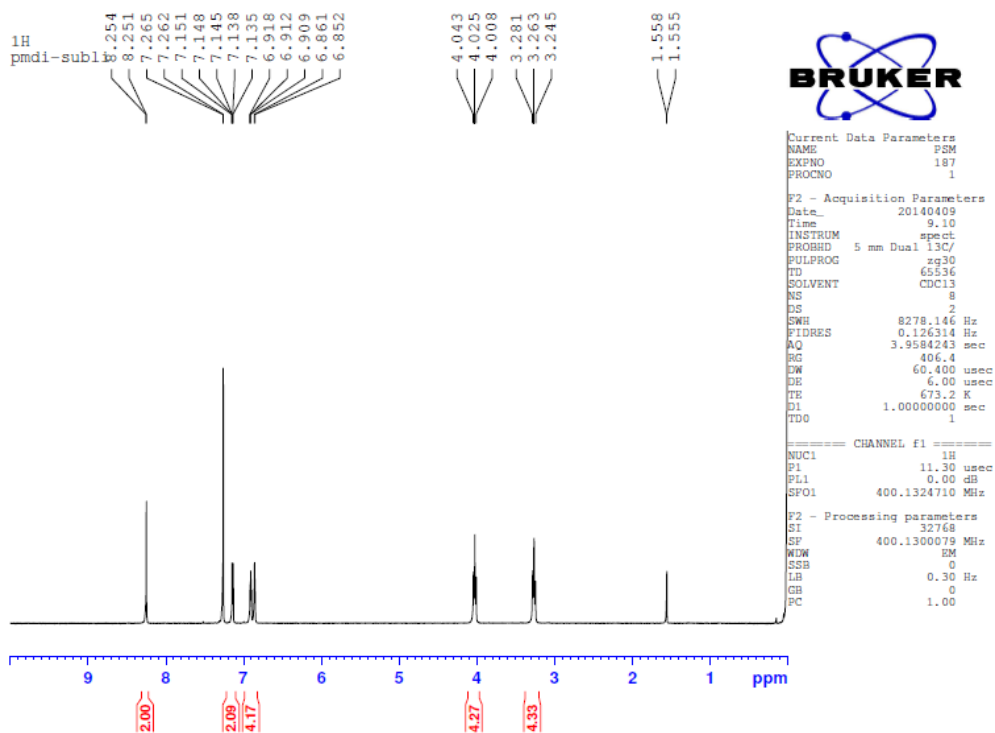


Figure S1-1. <sup>1</sup>H NMR spectrum of 3a

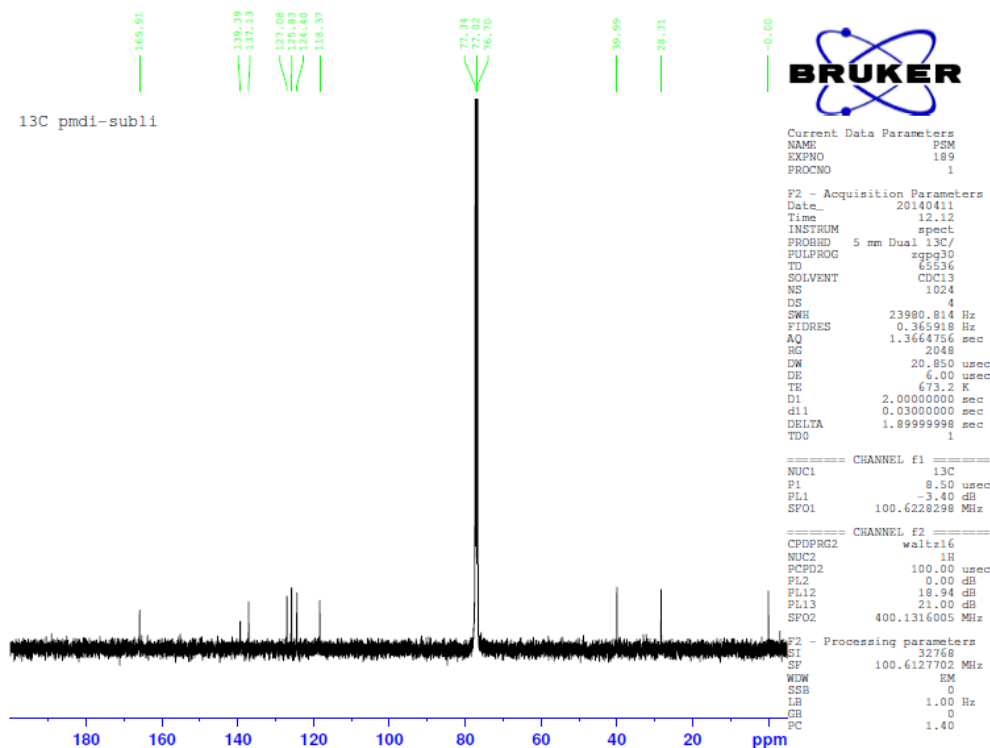


Figure S1-2. <sup>13</sup>C NMR spectrum of 3a

<sup>1</sup>H

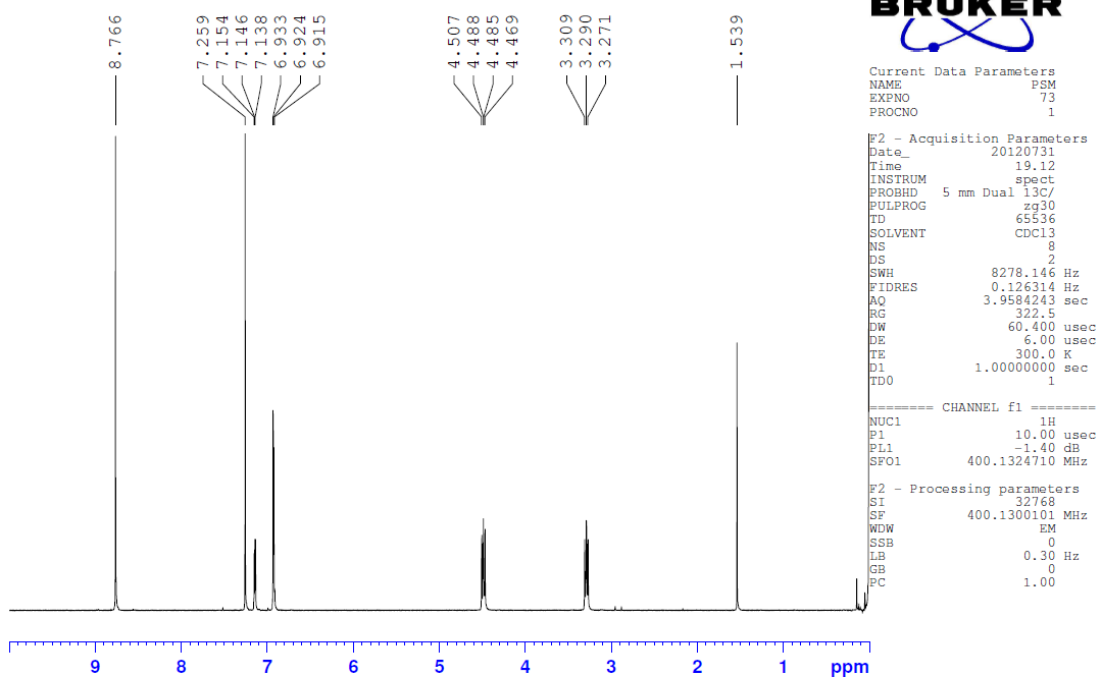


Figure S2-1. <sup>1</sup>H NMR spectrum of 3b

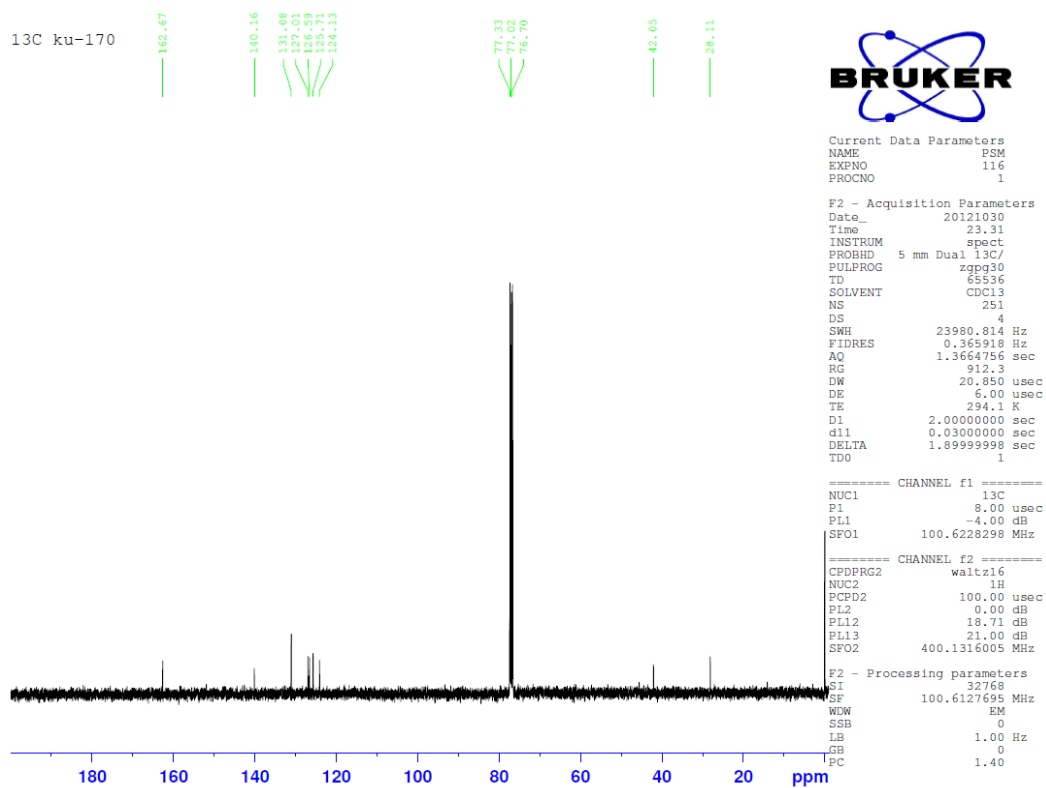
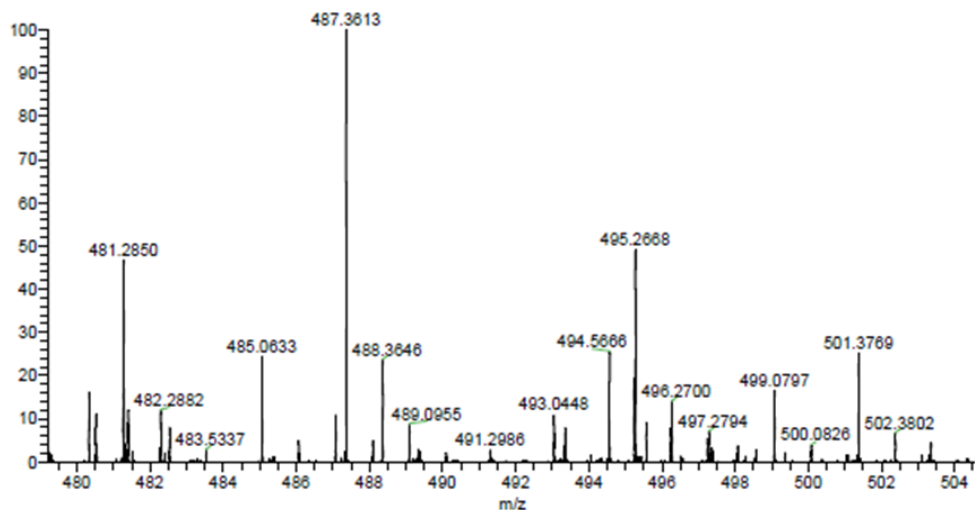
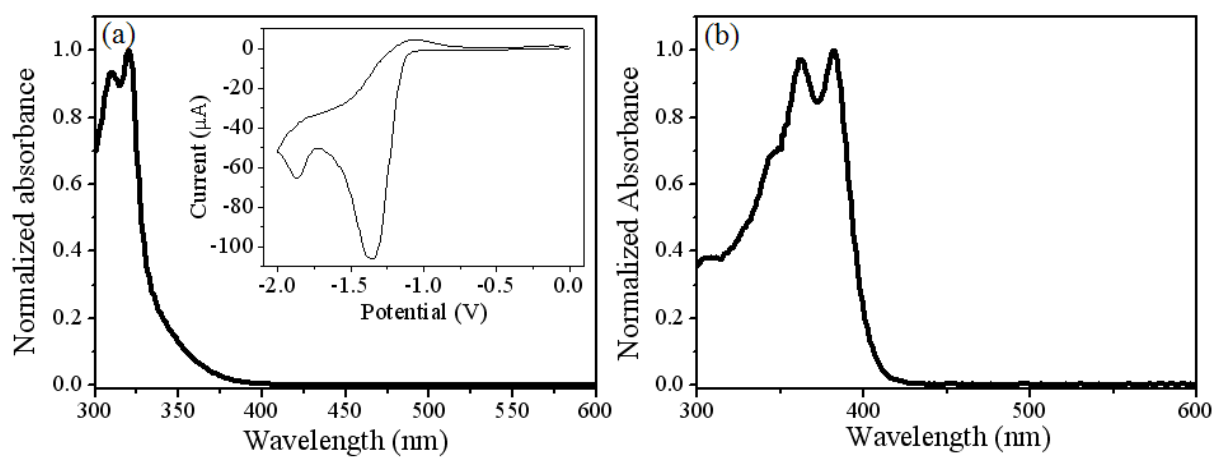


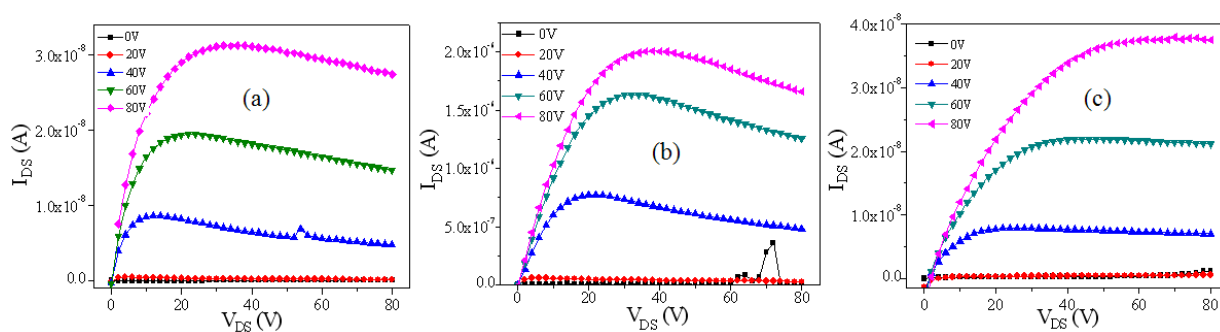
Figure S2-2. <sup>13</sup>C NMR spectrum of 3b



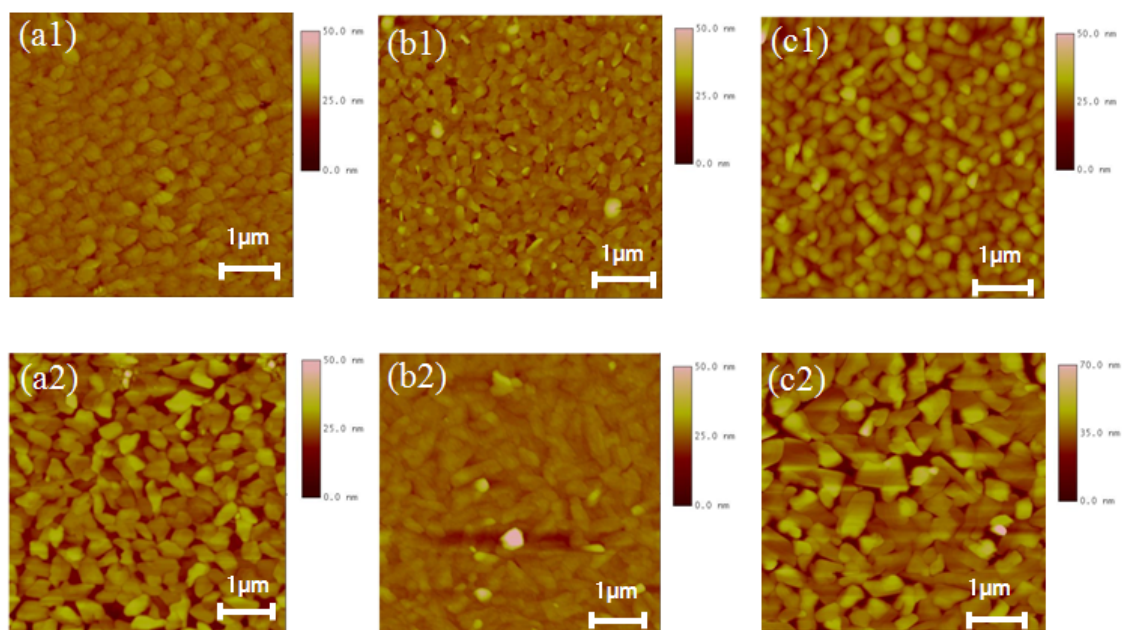
**Figure S2-3.** High-resolution ESI-FT mass spectrum of **3b**



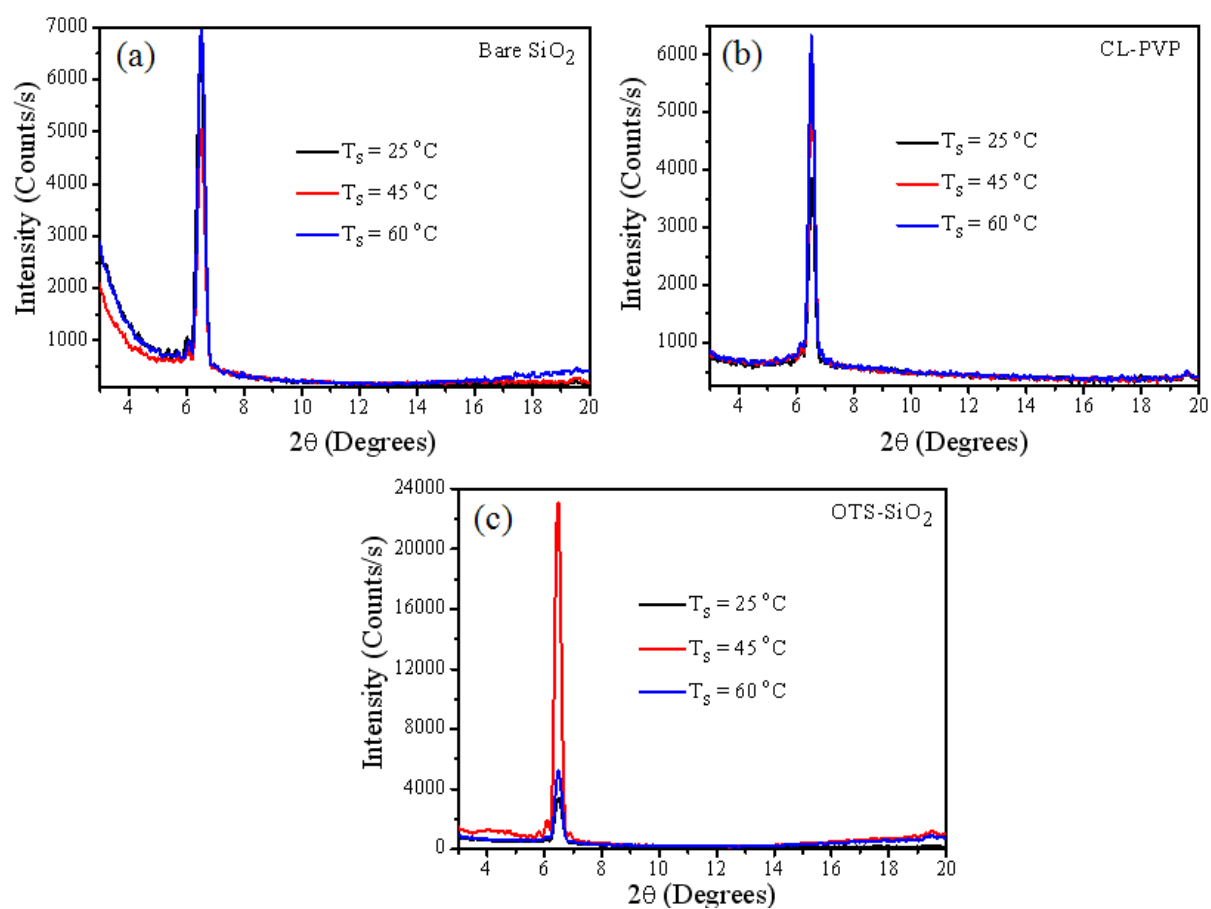
**Figure S3.** UV-visible spectra of **3a** (a) and **3b** (b) in chloroform. The cyclic voltammogram of **3a** in DCM (scan rate:  $50 \text{ mV s}^{-1}$ ) (inset, Fig. S3a).



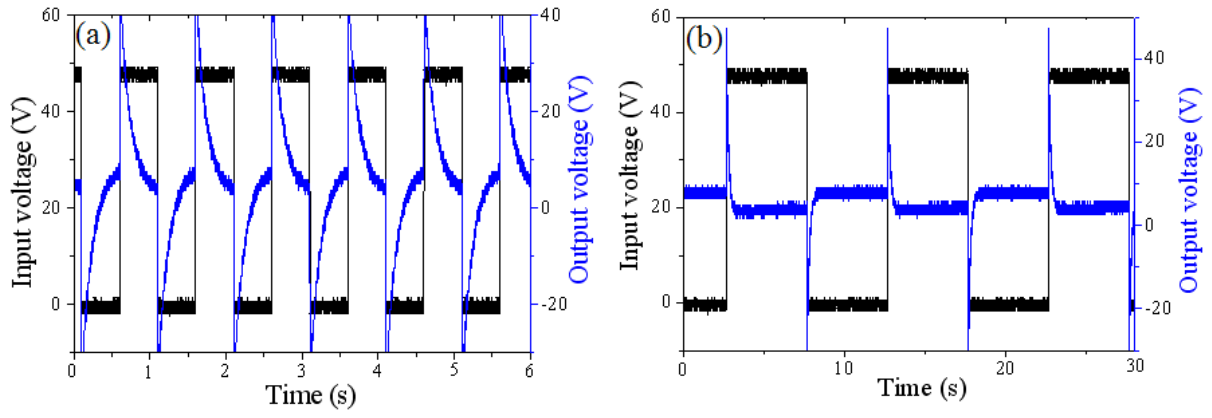
**Figure S4.** Output characteristics of OTFT with **3b** prepared at  $T_s = 25 \text{ }^\circ\text{C}$  on (a) bare  $\text{SiO}_2$ , (b) OTS treated  $\text{SiO}_2$  and (c) CL-PVP gate dielectric.



**Figure S5.** Tapping mode atomic force microscopy (AFM) images of **3b** thin-film (50 nm) on bare SiO<sub>2</sub> (a1, a2), OTS-treated SiO<sub>2</sub> (b1, b2) and CL-PVP (c1, c2) at  $T_s = 25$  °C and 60 °C, respectively.



**Figure S6.** Out-of-plane XRD patterns of **3b** thin-film (50 nm) on bare SiO<sub>2</sub> (a), CL-PVP (b), and OTS treated SiO<sub>2</sub> (c) at  $T_s = 25$  °C, 45 °C and 60 °C, respectively.



**Figure S7.** Dynamic response of resistance load-type inverter operated at (a) 0.1 Hz and (b) 0.01 Hz, respectively under a  $V_{DD} = 50$  V ( $R = 100$  M $\Omega$ ).