Supporting Information

Synthesis and Structural Analysis of Dimethylaminophenyl-End-Capped Diketopyrrolopyrrole for Highly Stable Electronic Devices with Polymeric Gate Dielectric

Amit Kumar [a#1], Akshaya Kumar Palai[a#2], Tae Joo Shin[b], Jaehyuk Kwon[a], Seungmoon Pyo[a*]

[a]Department of Chemistry, Konkuk University, 120 Neungdong-ro, Gwangjin-gu, Seoul 143-701, Republic of Korea

[b]UNIST Central Research Facilities & School of Natural Science, UNIST, Ulsan 689-798, Republic of Korea.

[1]Present Address: Amity Institute of Advanced Research and Studies (Materials and Devices), Amity University, Noida, UP-201303, India

[2]Present Address: Laboratory for Advanced Research in Polymeric Materials (LARPM), Central Institute of Plastics Engineering and Technology, Bhubaneswar 751 024, Odisha, India.

[#]Authors contributed equally to this work.

[*]Corresponding author (pyosm@konkuk.ac.kr)

Contents:

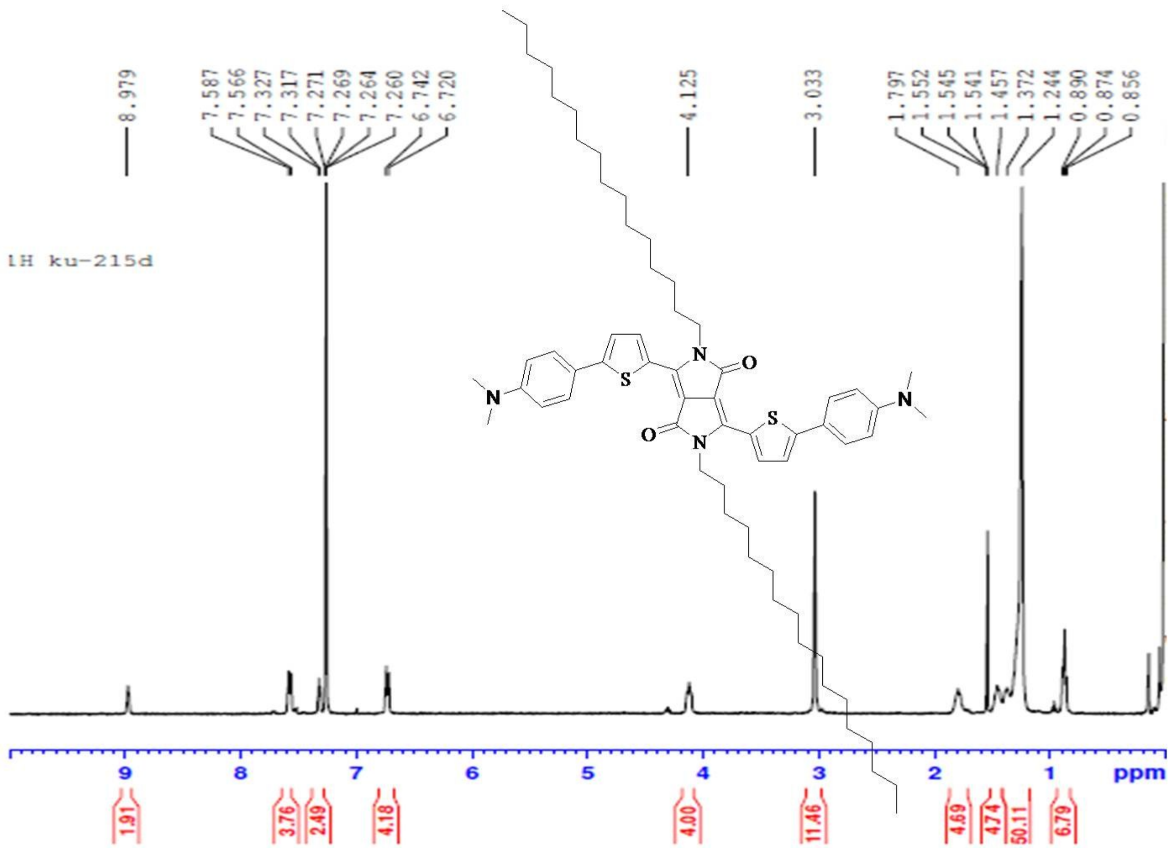

Figure S1. ^1H NMR spectra of $DPP(PhNMe_2)_2$

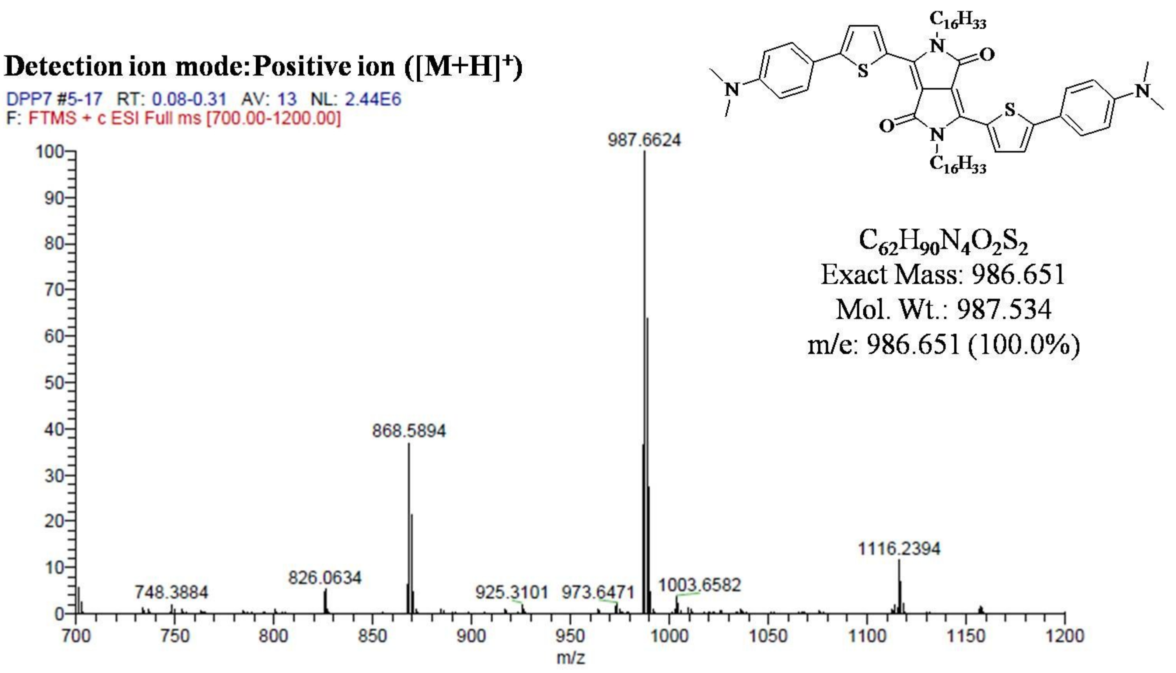

Figure S2. High-resolution ESI-FT mass spectra of $DPP(PhNMe_2)_2$

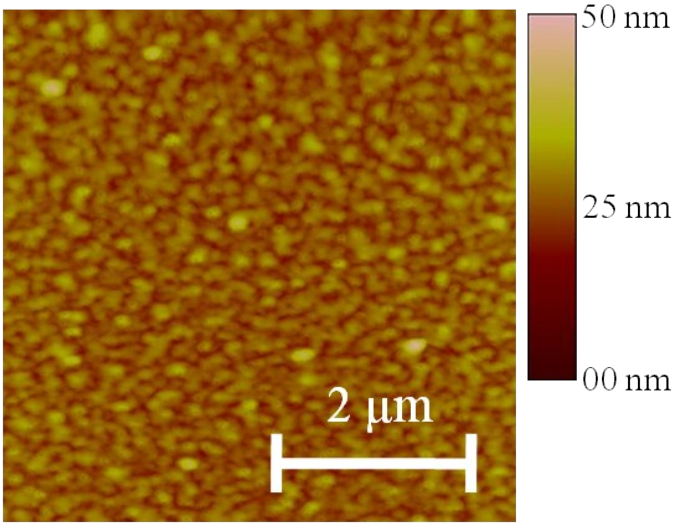

Figure S3. AFM height image (5 μm x 5 μm) of DPP(PhNMe$_2$)$_2$ thin-film prepared on a OTS treated Si/SiO$_2$ substrate.

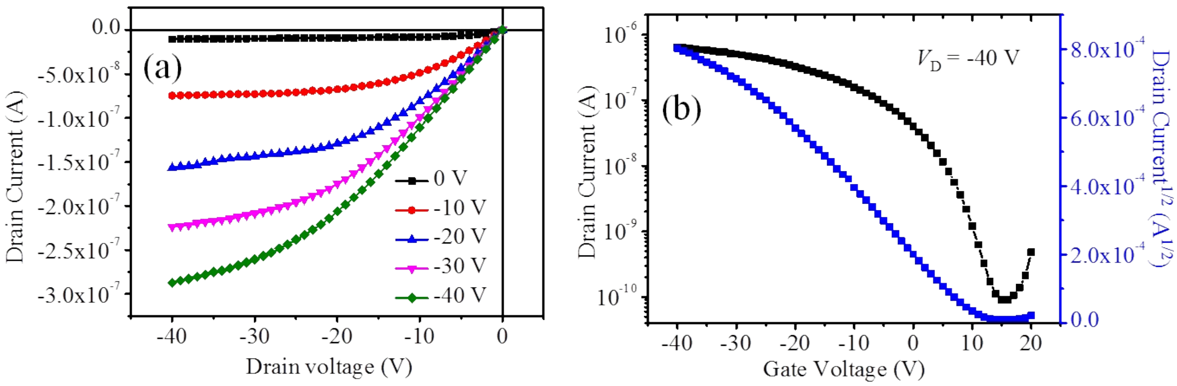

Figure S4. Typical (a) output and (b) transfer characteristic curves of bottom-gate top-contact OFETs comprising a DPP(PhNMe$_2$)$_2$ film on a OTS treated SiO$_2$ gate dielectric.

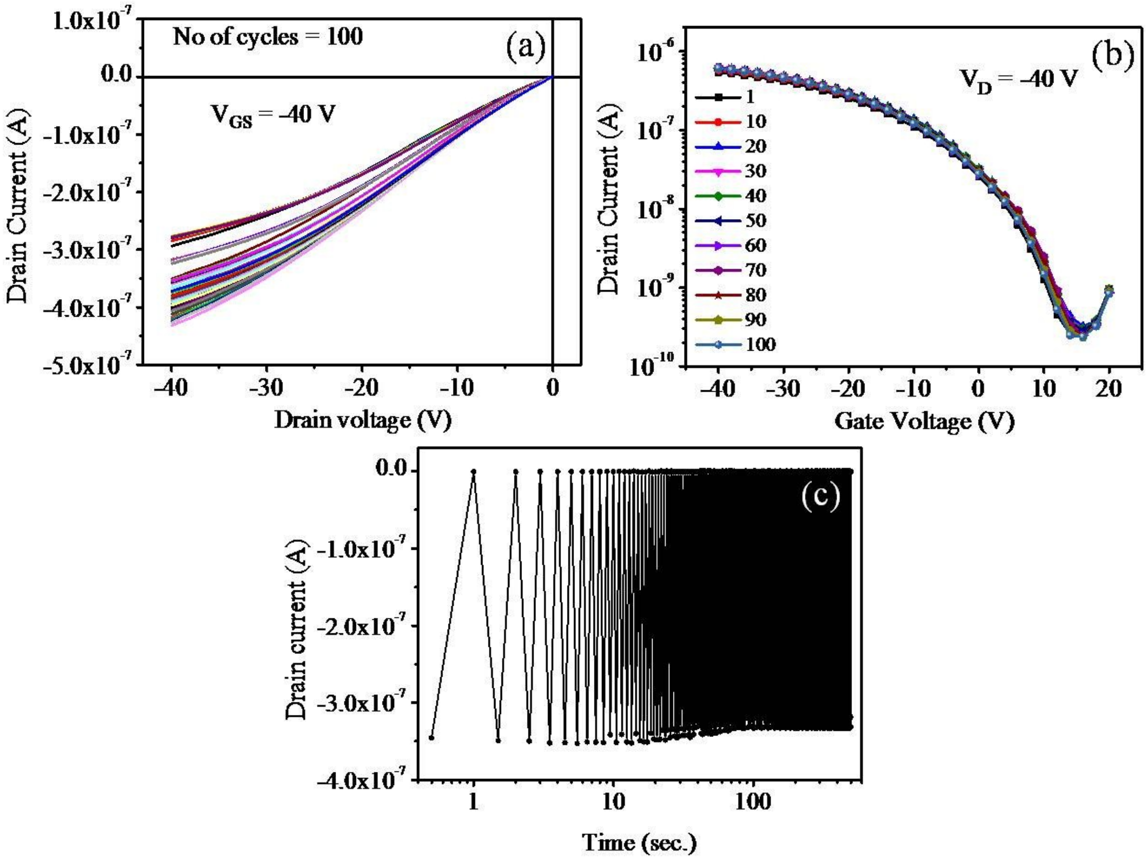

Figure S5. Operational stability of OTFT device based on OTS-SiO_2 gate dielectric evaluated by repeated (100 times) recording of (a) the drain current as a function of drain voltage at gate voltage of -40 V, (b) the drain current as a function of gate voltage at a drain voltage of -40 V, (c) Device operational stability tested by applying a square wave (amplitude 0 to -40 V) to the gate and a constant drain voltage of -40 V to the drain.

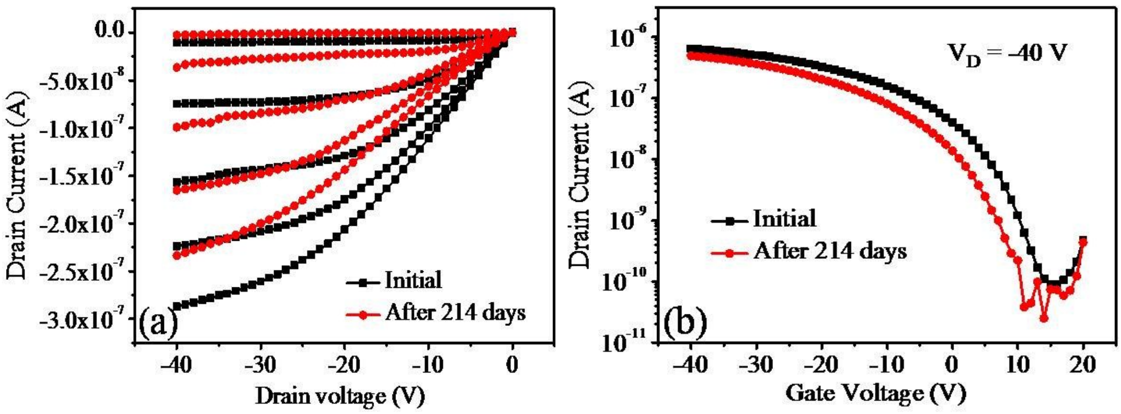

Figure S6. Comparison of output (a) and transfer curves (b) of DPP$(PhNMe_2)_2$ film based OFETs with OTS treated SiO_2 gate dielectric, measured after fabrication and after kept for 214 days in air.

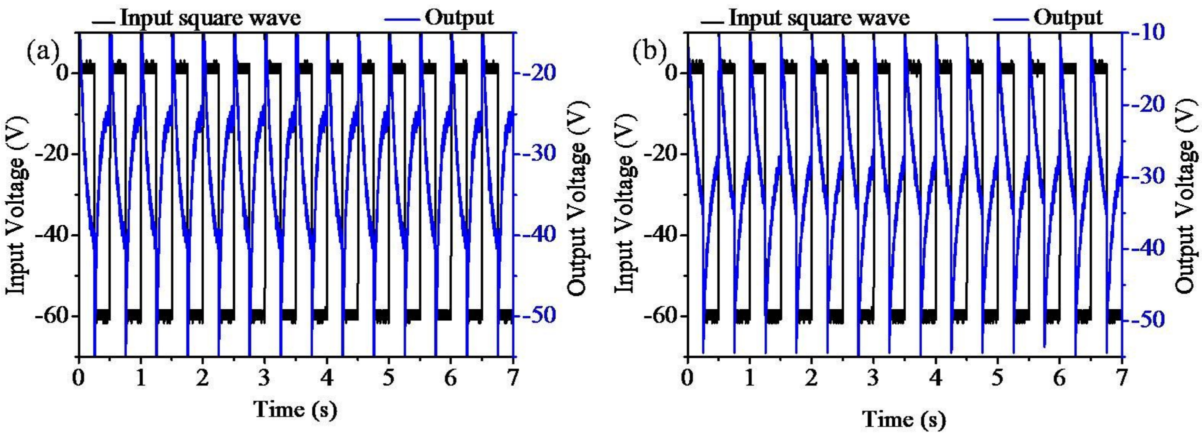

Figure S7. Input voltage signal (square, black) and output voltage response (blue curve) of the inverter based on $DPP(PhNMe_2)_2$ OFET with a 40 MΩ load resistor under the V_{IN} switching between 0 V and -60 V at V_{DD} = -60 V with (a) 5 Hz and (b) 10 Hz frequency, respectively

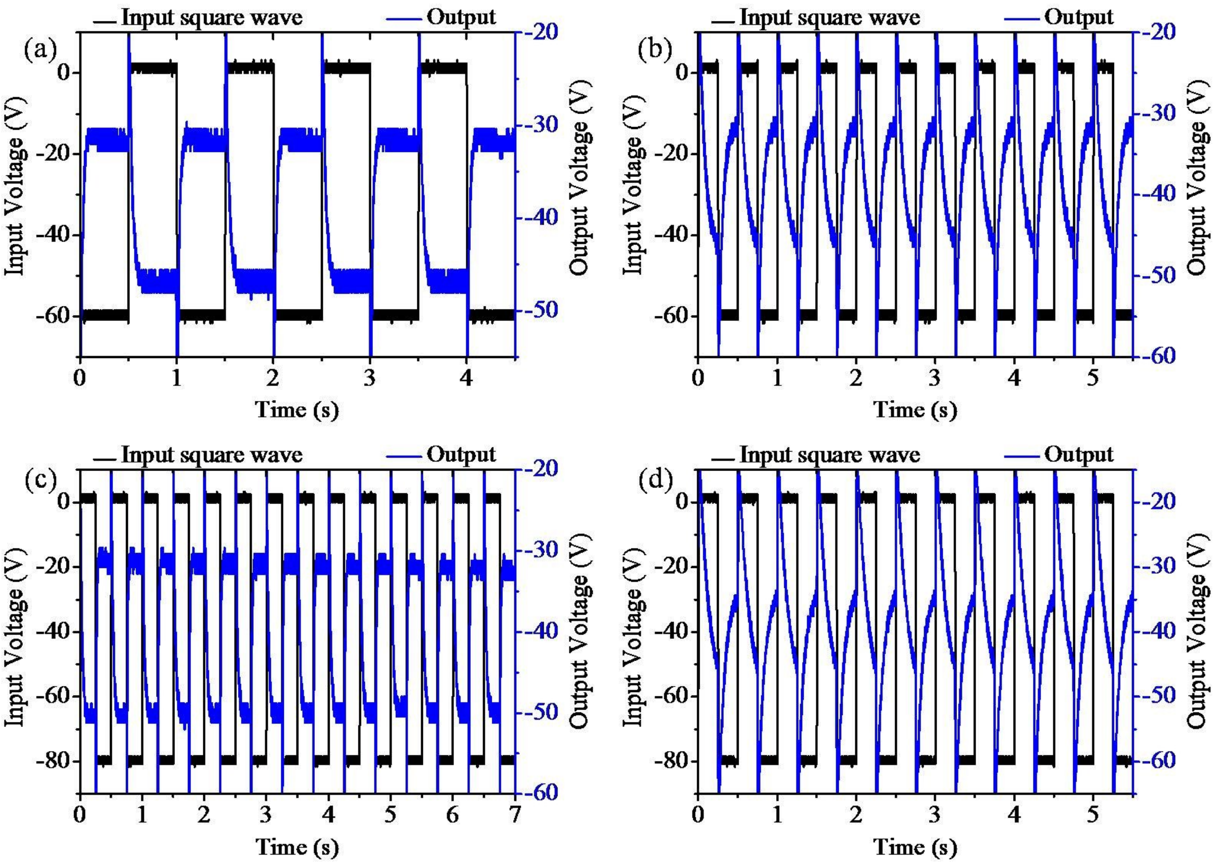

Figure S8. Input voltage signal (square, black) and output voltage response (blue curve) of the inverter based on $DPP(PhNMe_2)_2$ OFET with a 20 MΩ load resistor under the V_{IN} switching between 0 V and -60 V at V_{DD} = -60 V with (a) 1 Hz and (b) 5 Hz frequency, respectively and, (c) 1 Hz and (d) 5 Hz with a 100 MΩ load resistor under the V_{IN} switching between 0 V and -80 V at V_{DD} = -60 V.