Supporting Information for

High performance and air stable n-type single crystal transistors based on core-tetrachlorinated perylene diimides

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Compounds C8F-4ClPDI and C8-4ClPDI were synthesized according to literature procedures.[1]

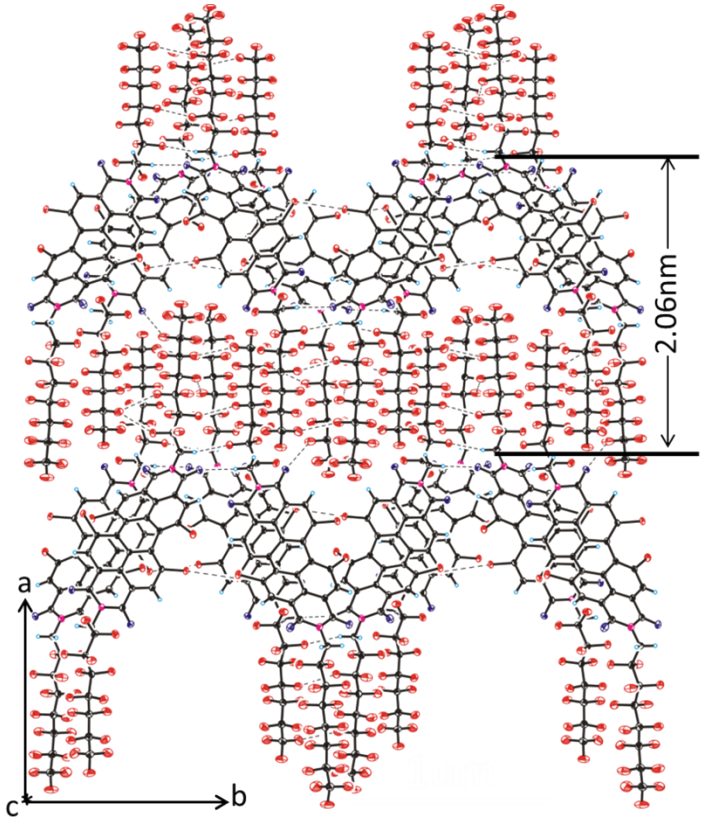

Figure S1. Molecular arrangement in the a-b plane and intermolecular interactions of C8F-4ClPDI.

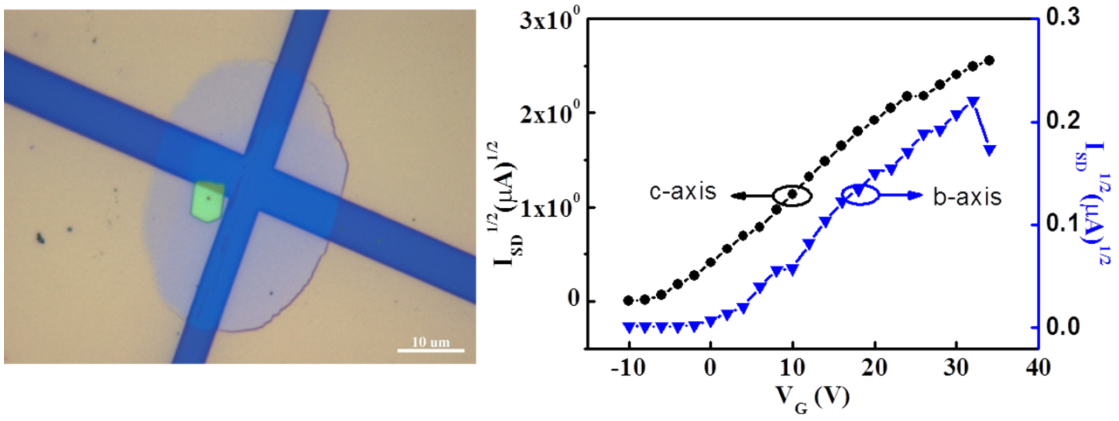

Figure S2. (a) OM image of transistor based on C8F-4ClPDI with four electrodes. (b) The transfer characteristic along c-axis and b-axis of C8F-4ClPDI single crystal.

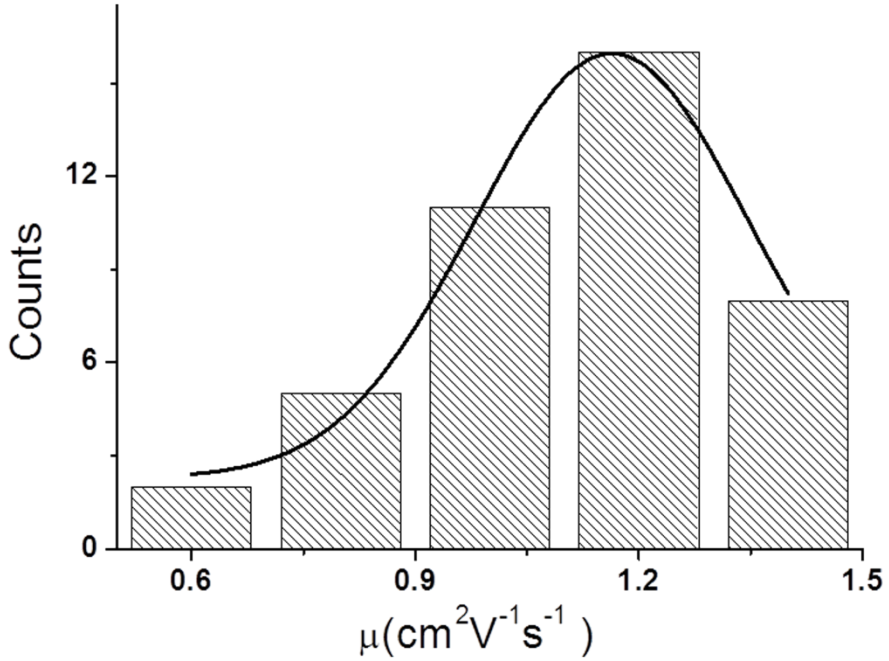

Figure S3. Statistical mobility distributions of 40 single crystal devices of C8F-4ClPDI.

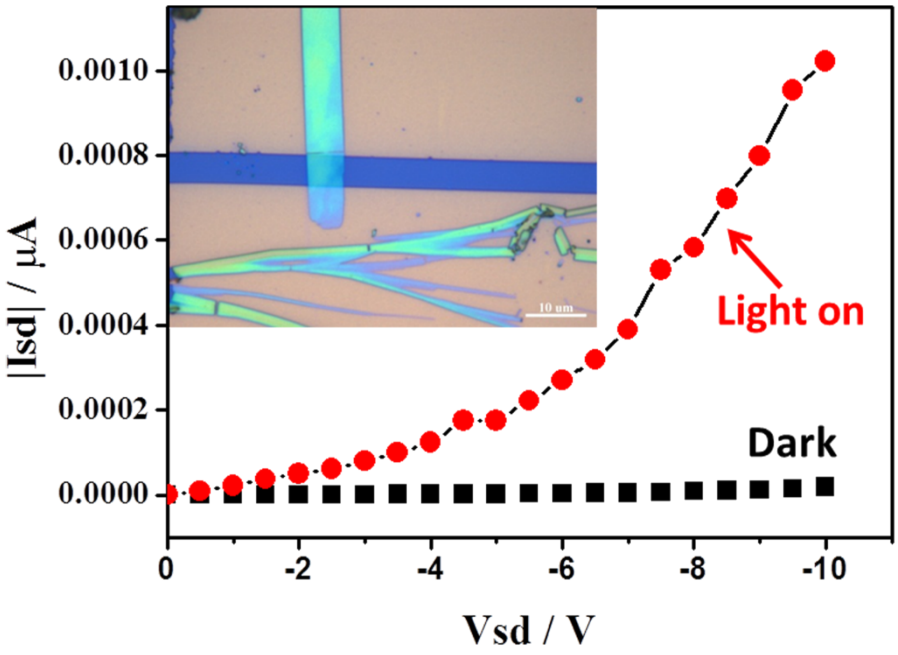

Figure S4. I-V curves measured in dark and under white light illumination (light density of 3.76 mw/cm^2), inset shows the photograph of the device during the test.

Table S1. Crystal data and structure refinement for C8F-4ClPDI

Identification code	a	
Empirical formula	C40 H8 Cl4 F30 N2 O4	
Formula weight	1292.28	
Temperature	173.1500 K	
Wavelength	0.71073 Å	
Crystal system	Monoclinic	
Space group	P 1 21/c 1	
Unit cell dimensions	a = 20.971(9) Å	α= 90°.
	b = 20.210(9) Å	β= 95.733(7)°.
	c = 10.319(5) Å	γ = 90°.
Volume	4351(3) Å^3	
Z	4	
Density (calculated)	1.973 Mg/m^3	
Absorption coefficient	0.450 mm^{-1}	
F(000)	2528	
Crystal size	0.52 x 0.31 x 0.03 mm^3	

Theta range for data collection	1.952 to 25.199°.
Index ranges	-25<=h<=25, -24<=k<=24, -12<=l<=12
Reflections collected	24787
Independent reflections	7823 [R(int) = 0.0863]
Completeness to theta = 25.242°	99.4 %
Absorption correction	Semi-empirical from equivalents
Max. and min. transmission	1.0000 and 0.4608
Refinement method	Full-matrix least-squares on F^2
Data / restraints / parameters	7823 / 0 / 721
Goodness-of-fit on F^2	1.198
Final R indices [I>2sigma(I)]	R1 = 0.0960, wR2 = 0.2436
R indices (all data)	R1 = 0.1118, wR2 = 0.2576
Extinction coefficient	n/a
Largest diff. peak and hole	0.512 and -0.579 e.$Å^{-3}$

Reference:

1. R. Schmidt, J. H. Oh, Y.-S. Sun, M. Deppisch, A.-M. Krause, K. Radacki, H. Braunschweig, M. Könemann, P. Erk, Z. Bao and F. Würthner, *J. Am. Chem. Soc*., 2009, **131**, 6215.