Supporting Information

For

A Bowl-shaped sumanene derivative with dense convex-concave columnar packing for high-performance organic field-effect transistors

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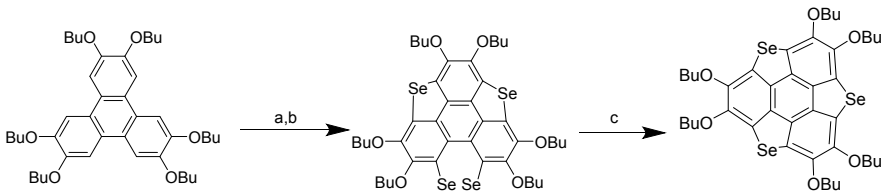
Section 1: Compound synthesis



3 4 2

Scheme S1. Synthesis scheme of 2.

2 was synthesized according to our previously reported approach. [1] Reaction conditions: a) 5 (6.6 g, 0.01 mol), TMEDA (15 mL), nBuLi (2.4m in hexane, 41.6 mL, 0.1 mol), 3 h; b) Se powder (7.9 g, 0.1 mol), -

78℃ to room temperature (RT); yields of products is 70 percentage. c) Cu powder (80–100 nm, 10 equiv), 200℃, 2 h; The solution was concentrated and further purified by column chromatography on silica (eluent, CH_2Cl_2) to give **3** as orange solid. 1H NMR (recorded on a Bruker DMX-400 spectrometer, CDCl3): δ 4.43 (t, J= 8Hz, 12H), 1.88-1.95(m, 12H), 1.62-1.71 (m, 12H), 1.10 (t, 18H). Anal. calcd for 2 (%): C: 56.57; H: 6.10; O: 16.76; Se: 6.10. Found: C: 56.55; H: 6.25.

Section 2: Growth of the microribbons

SiO_2/Si wafers containing a 300 nm-thick SiO_2 layer were successively cleaned with de-ionized water, isopropanol, de-ionized water, piranha solution (70/30 vol./vol. H_2SO_4/H_2O_2), de-ionized water and isopropanol. The cleaned wafers were modified with OTS by a vapor phase method and cleaned by chloroform and hexane. 10-20 μL toluene solution of **3** (1 mg/ml) was drop casted on the surface of a cleaned SiO_2/Si substrate which was kept in a glass weighing bottle. The weighting bottle was put into an oven stabilizing at 60℃ for 8 hours. After the solvent was evaporated completely, single-crystal microribbons could be found on the surface of the SiO_2/Si wafers.

Section 3: Characterization of the microribbons

The single-crystal microribbons were characterized by optical microscopes of and Olympus BX51 and polarized optical microscopes of Nikon LV100POL. TEM and SAED measurements were conducted on a JEOL 2010 (Japan). Intelligent mode atomic force microscopy (AFM) was performed using a Bruker Dimension Icon.

Section 4: Device characterization

The FET characteristics were measured using a micromanipulator 6150 probe station connected to a Keithley SCS 4200 in a clean and shielded box. The carrier mobility, μ, was calculated from the transfer curves in the saturated regime at the drain voltage of -50V according to the equation

$I_D = \left(\frac{w}{2L}\right) C_i \mu (V_G - V_T)^2$, where I_D is the drain current, μ is the field effect mobility, V_{th} is the threshold voltage, V_G is the applied gate voltage, L is the channel length (i.e. length of the single-crystal between the source and drain electrodes), W is the channel width (i.e. width of the single-crystal), and the C_i is the SiO_2 specific capacitance (measured to be 10nF). All measurements were carried out in the air at room temperature.

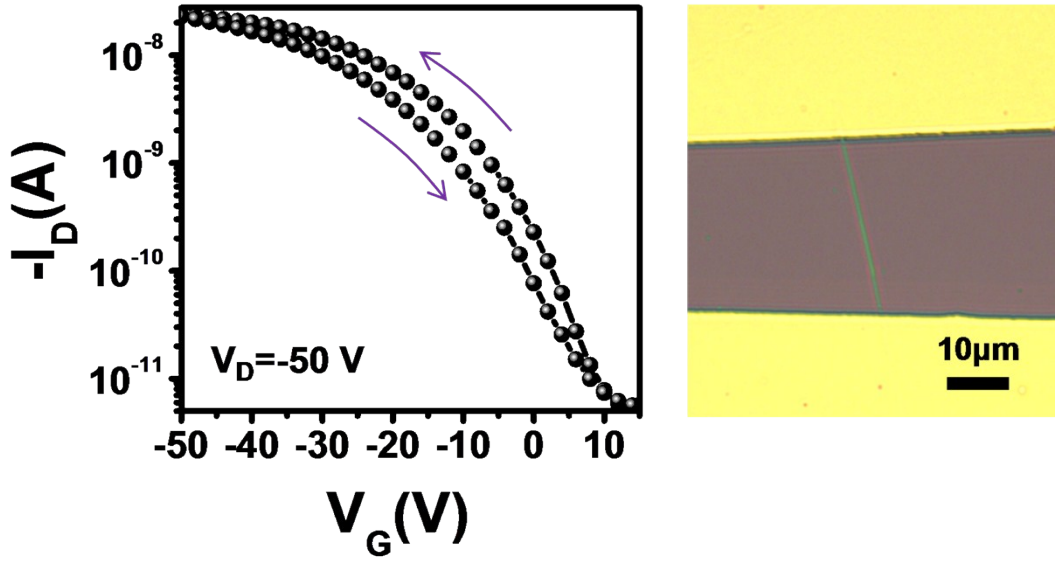


Fig. S1. Typical hysteresis curves of the device.

Notable hysteresis was found as the curve was scanned forwards and backwards. As our devices were prepared and measured in ambient air, the hysteresis was tentatively ascribed to the trapping of charges in the channel close to the semiconductor/dielectric interface by oxygen and/or moisture in the air.

[1] X. Li, Y. Zhu, J. Shao, B. Wang, S. Zhang, Y. Shao, X. Jin, X. Yao, R. Fang and X. Shao, *Angew. Chem., Int. Ed.,* 2014, **53,** 535.