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Supporting Information

Directly Writing 2D Organic Semiconducting Crystals for High-Performance Field-Effect Transistors

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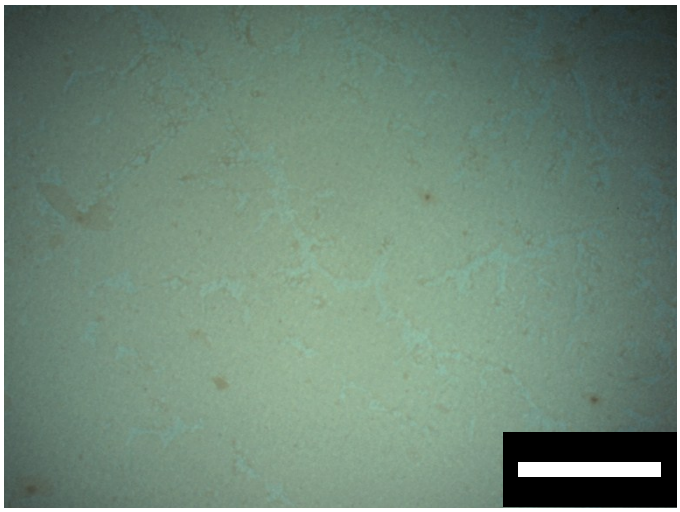

Figure S1. The silane of phenethyltrichlorosilane (PhTS) was used for the pretreatment on the SiO_2/Si substrate surface in order to improve its hydrophilicity. The deposited organic layer mainly consists of monolayer molecules. Because of the van der Waals interaction between the C8-BTBT molecules and the substrate, the molecules in the first layer are more horizontally oriented on the substrate. It thus leads to a weak π-π interaction among the semiconducting molecules, which is not favourable for the effective charge transport. Scale bar is for 50 μm.

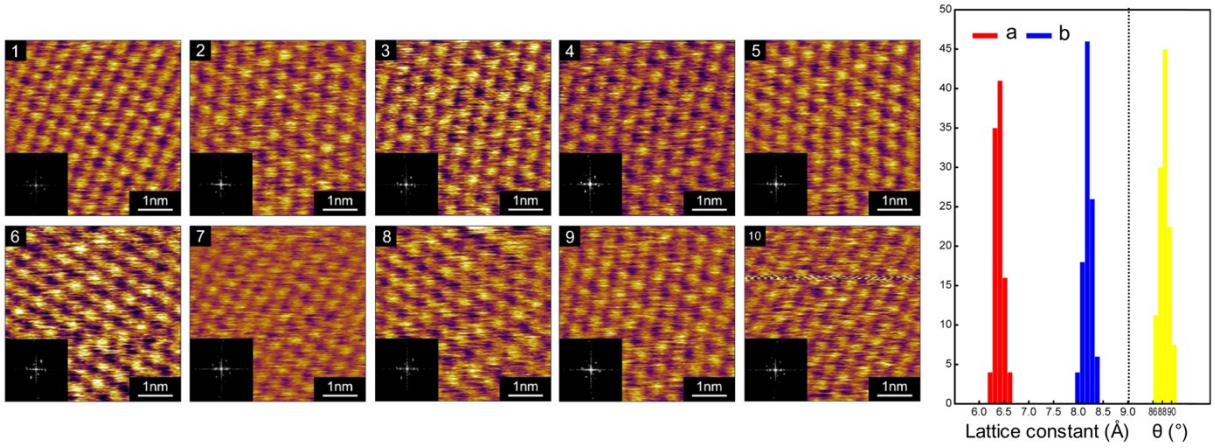

Figure S2. Single-crystalline characterizations of 2L C_8-BTBT molecules. High-resolution AFM image were taken from randomly chosen areas of a 2L C_8-BTBT film. Histogram of lattice constants for 2L C_8-BTBT molecules is shown in the right figure.

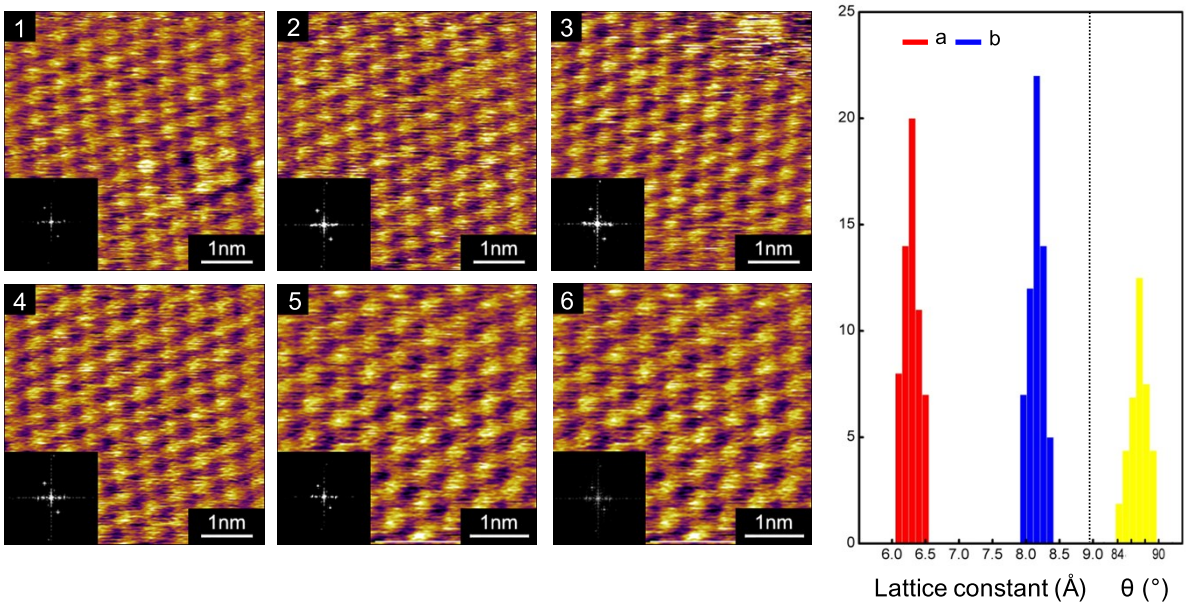

Figure S3. Single-crystalline characterizations of 3L C_8-BTBT molecules. High-resolution AFM image were taken from randomly chosen areas of a 3L C_8-BTBT film. Histogram of lattice constants for 3L C_8-BTBT molecules is shown in the right figure.

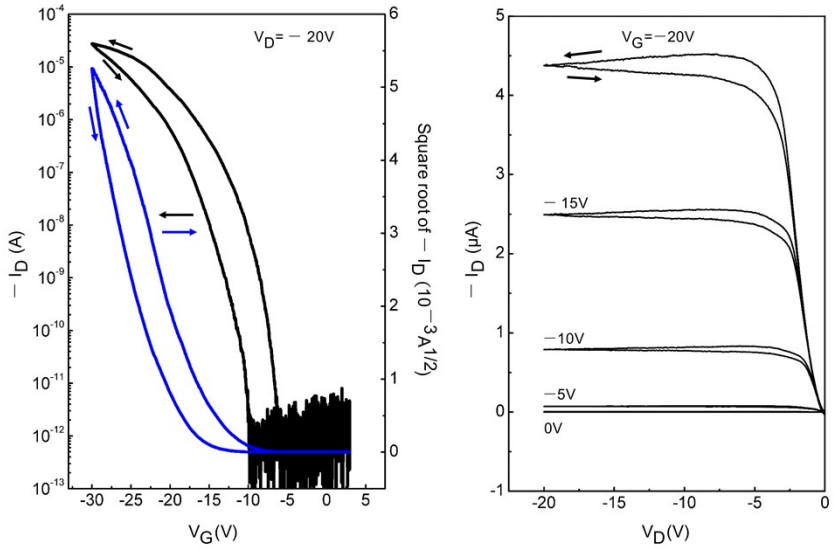

Figure S4. Transistor characteristics for the 2D C_8-BTBT crystal with the highest FET device performance. (a) Transfer characteristics at drain voltage of −20 V. And a high carrier mobility of 5.9 cm^2 V^{-1} s^{-1} was obtained. (b) Output characteristics at various gate voltage.