Supplementary Information

Realizing Low-voltage Operating Crystalline Monolayer Organic Field-effect Transistors with Low Contact Resistance

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Figure S1. AFM image of HTEB 2D molecular crystals on Si/SiO₂ with layer-by-layer structure.
Figure S2. HR-AFM image and corresponding 2D FFT pattern of the HTEB multilayer crystal on Si/SiO$_2$. Lattice constants were estimated to be $b = 6.0$ Å, $c = 7.8$ Å and $\theta = 85.9^\circ$. 
Figure S3. (a) Transfer curves, (b) output curves, (c) $G$-function curves and (d) extracted $R_c$ curves of the four HTEB MMC devices fabricated on Si/SiO$_2$ with channel length of 85.3 μm, 42.9 μm, 28.0 μm and 9.7 μm, respectively.
Figure S4. (a) Transfer curves, (b) output curves, (c) G-function curves and (d) extracted $R_c$ curves of the four HTEB 4-layer single-crystal devices fabricated on Si/SiO$_2$ with channel length of 86.8 μm, 54.1 μm, 22.3 μm and 9.2 μm, respectively.
Figure S5. (a) Transfer curves, (b) output curves, (c) $G$-function curves and (d) extracted $R_c$ curves of the four HTEB 15-layer single-crystal devices fabricated on Si/SiO$_2$ with channel length of 96.7 μm, 54.8 μm, 27.4 μm and 8.8 μm, respectively.
Figure S6. HTEB 4-layer crystal on HfO$_2$ insulator layer. (a) AFM image of HTEB 4-layer crystal, (b) OM image, (c) transfer curve and (d) output curve of the 4-layer single-crystal OFET with $L = 1.5 \ \mu$m and $W = 83.5 \ \mu$m. (e) $R_{\text{total}}W$ as a function of channel length for 4-layer single-crystal OFETs at $V_G = -2 \ \text{V}$. (f) $R_c/R_{\text{total}}$ as the function of channel length for monolayer and 4-layer single-crystal OFETs.