Supporting Information

Dual-Functional Optoelectronic Memories Based on Ternary Hybrid Floating Gate Layers

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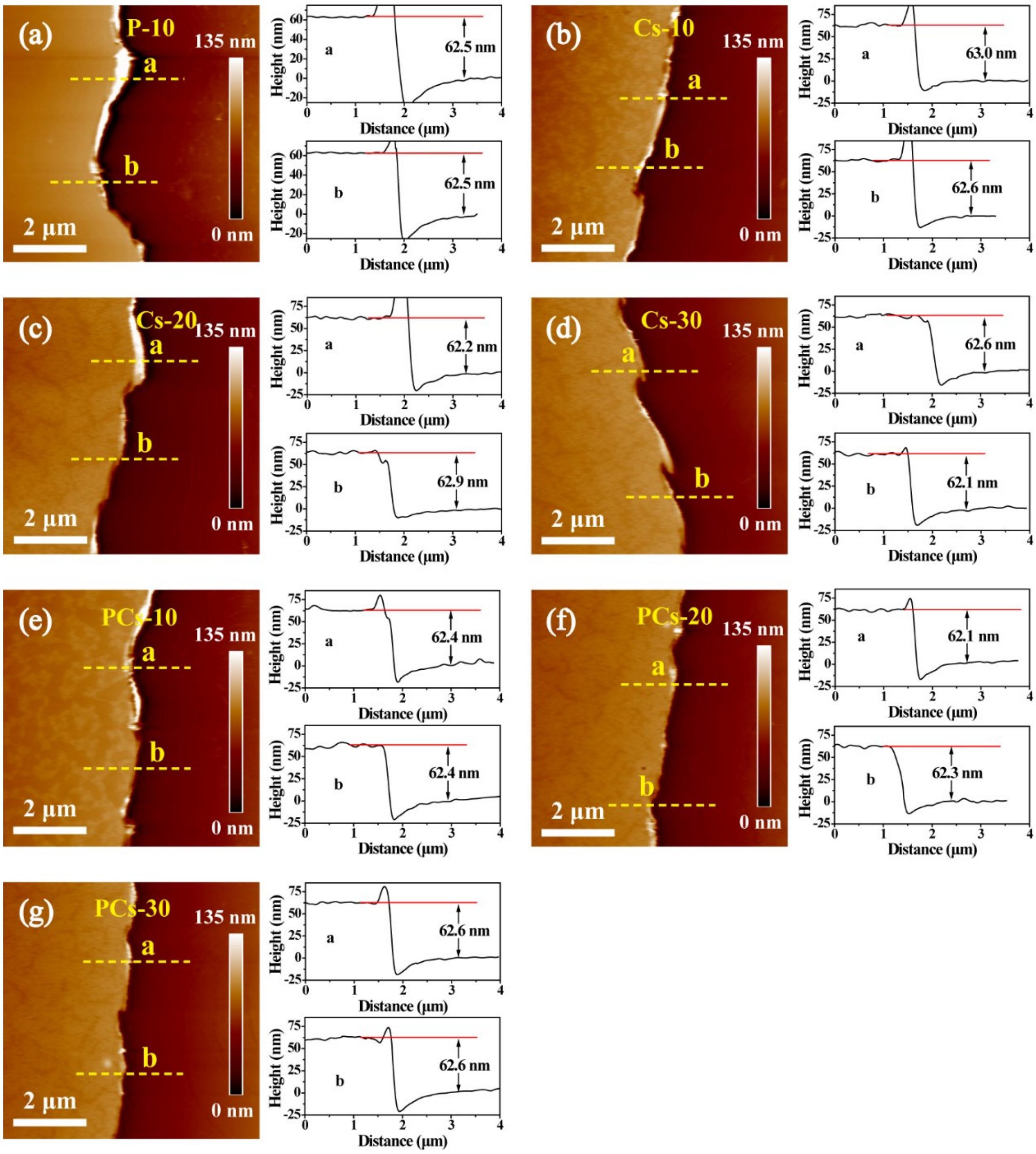

Fig. S1 AFM height images of (a) P-10, (b) Cs-10, (c) Cs-20, (d) Cs-30, (e) PCs-10, (f) PCs-20, and (g) PCs-30 films on SiO_2, corresponding cross-sectional height profiles of different composite films.

The films were slit by a needle and the thicknesses of different composite films on SiO_2 were measured by AFM. As shown in Fig. S1, the thicknesses of different composite layers are about 62−63 nm, which are not much different, eliminating the effect of thicknesses on memory windows.

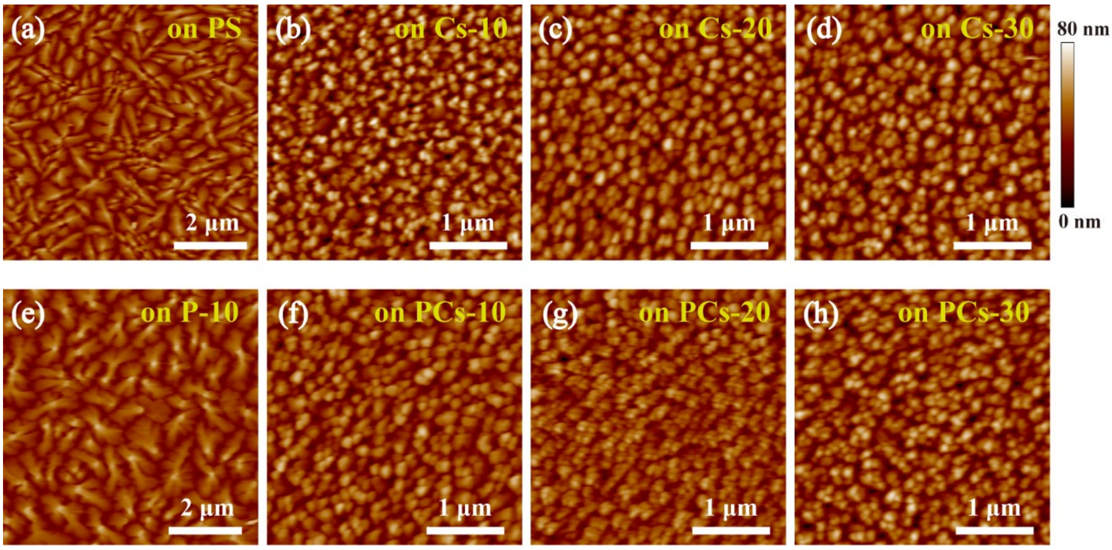

Fig. S2 AFM images of the pentacene grown on (a) PS, (b) Cs-10, (c) Cs-20, (d) Cs-30, (e) P-10, (f) PCs-10, (g) PCs-20, and (h) PCs-30 films.

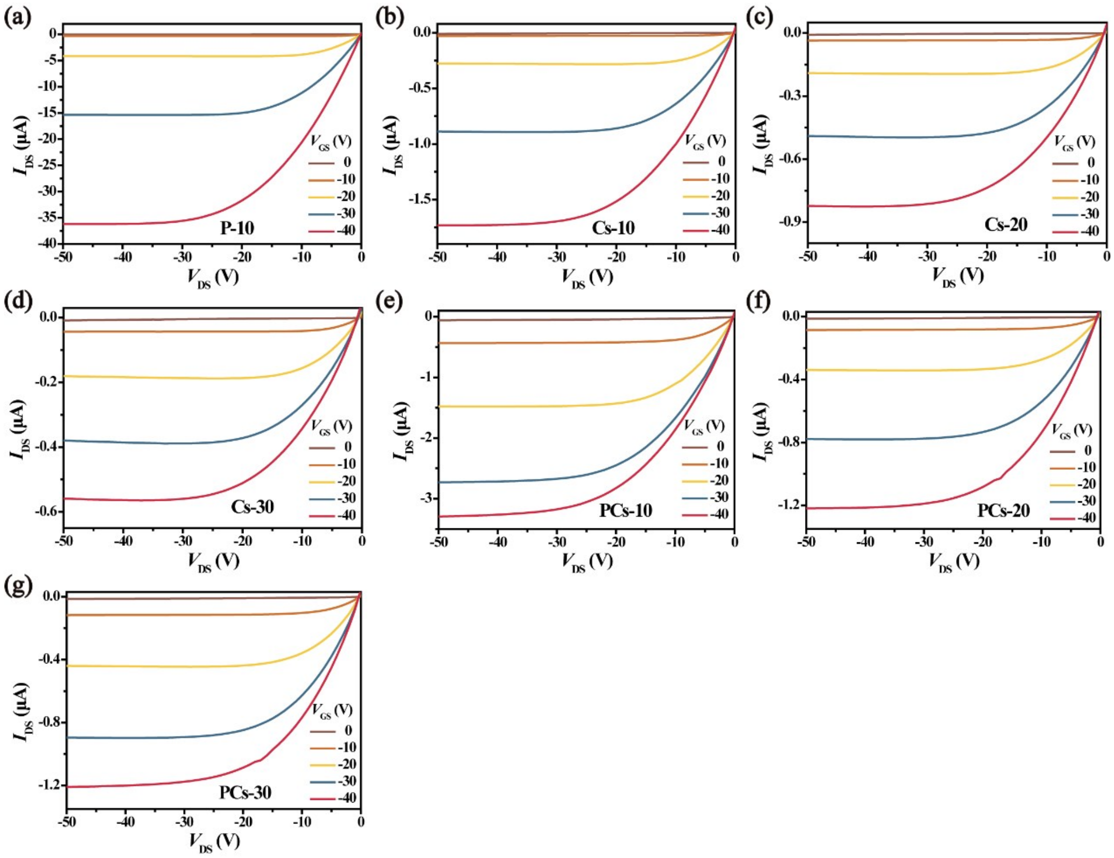

Fig. S3 Output characteristics of (a) P-10, (b) Cs-10, (c) Cs-20, (d) Cs-30, (e) PCs-10, (f) PCs-20, and (g) PCs-30 memory devices.

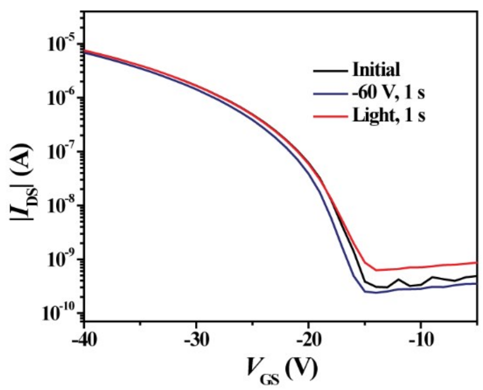

Fig. S4 Transfer characteristics of PS based device under different operations.

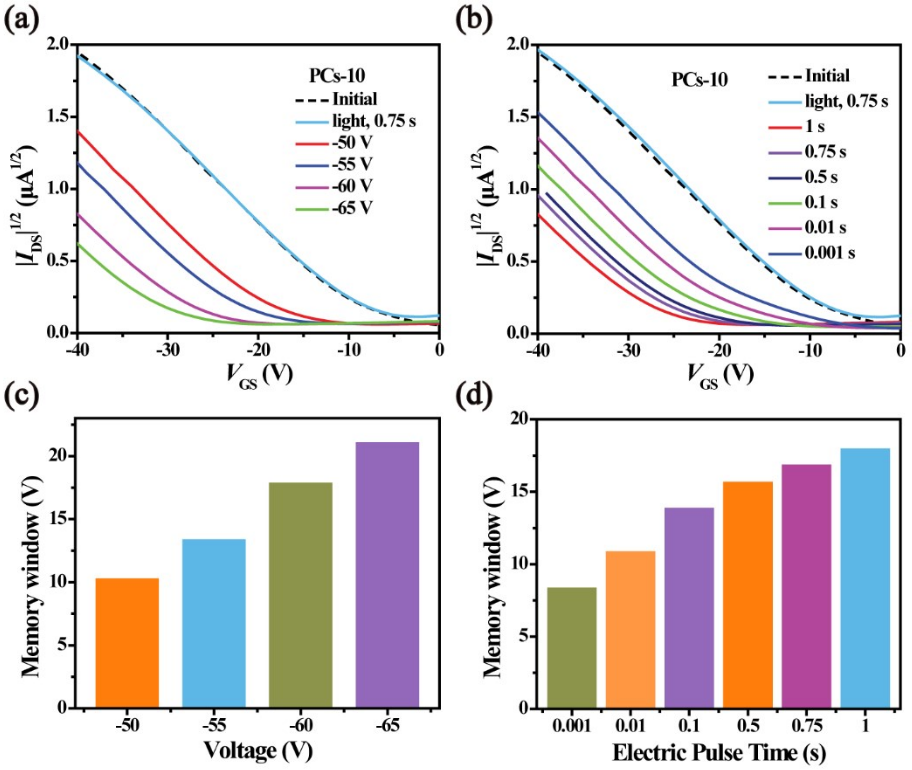

Fig. S5 Transfer characteristics of PCs-10 memory device under electric programming operations with different (a) gate biases for 1 s and (b) electric pulse time ($V_{GS} = -60$ V). Corresponding memory windows varied with the (c) programming voltages and (d) electric pulse time.

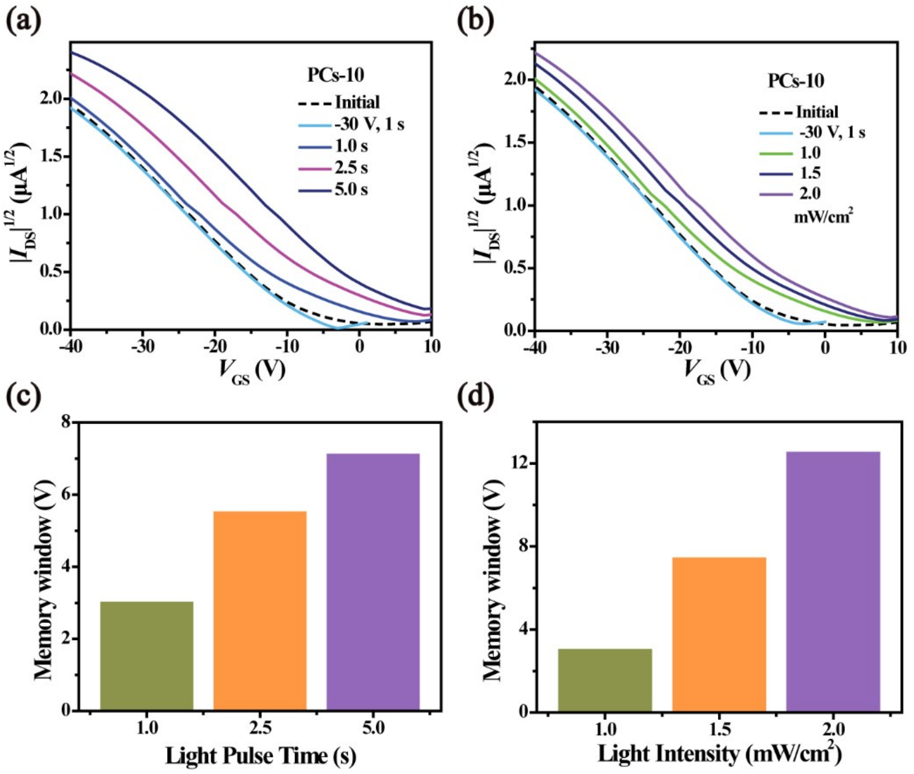

Fig. S6 Transfer characteristics of PCs-10 memory device under photoprogramming operations with different (a) illumination time (light intensity: 1 mW/cm^2) and (b) light intensities (illumination time: 1 s). Corresponding memory windows varied with the (c) illumination time and (d) light intensities.

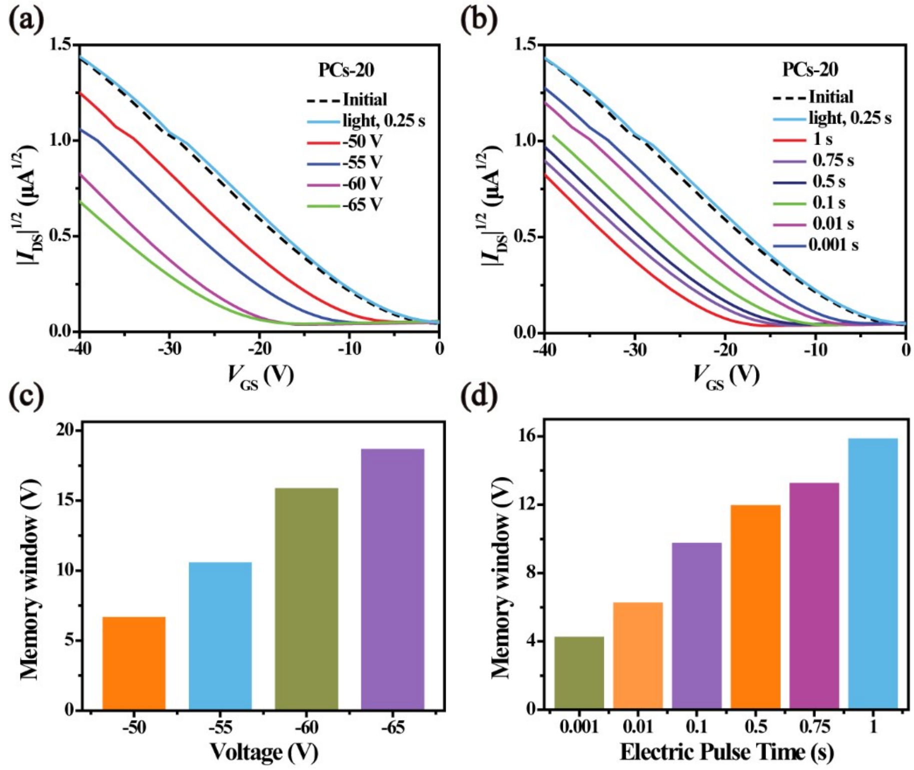

Fig. S7 Transfer characteristics of PCs-20 memory device under electric programming operations with different (a) gate biases for 1 s and (b) electric pulse time (V_{GS} = −60 V). Corresponding memory windows varied with the (c) programming voltages and (d) electric pulse time.

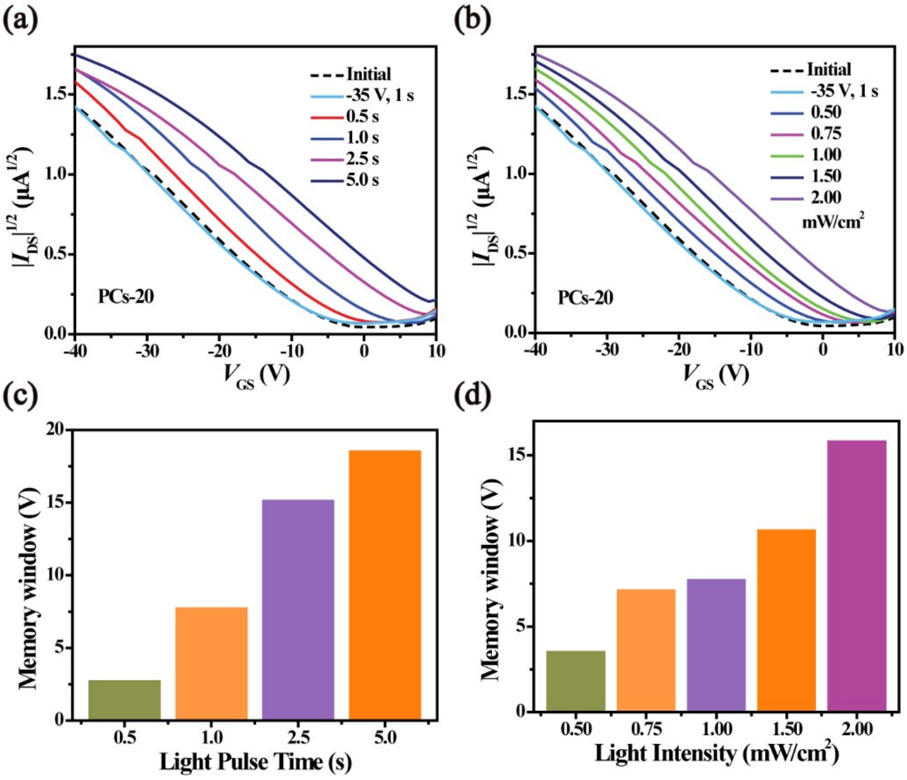

Fig. S8 Transfer characteristics of PCs-20 memory device under photoprogramming operations with different (a) illumination time (light intensity: 1 mW/cm^2) and (b) light intensities (illumination time: 1 s). Corresponding memory windows varied with the (c) illumination time and (d) light intensities.