Supporting Information

Improving the Current Stability of Perovskite Quantum Dot Phototransistors Utilizing the Ferrocene–Cyclodextrin Host–Guest Supramolecules as a Floating Gate Dielectric

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Table S1. Summary of the PL and TRPL parameters of PS and PSQD. Note that all samples have been deposited with BPE-PDI to form the bilayered films (polymer/BPE-PDI).

Sample	PLQY (%) [(a)]	A_1 (%) [(b)]	τ_1 (ns) [(b)]	A_2 (%) [(b)]	τ_2 (ns) [(b)]	τ_{avg} (ns) [(c)]
PS	12.95	9.89	0.79	90.11	0.30	1.55
PSQD	13.30	24.80	0.61	75.20	0.23	0.71

[(a)] Photoluminescence quantum yield excited by a 365-nm light source. [(b)] Biexponential function: I_f (t) = A_1 exp (–t/τ_1) + A_2 exp (–t/τ_2), where I_f (t) is the fluorescent intensity, A_1 and A_2 are the scaling constant, t is the fluorescent decay time, τ_1 and τ_2 are the fitted time constants, respectively. The TRPL measurement was conducted with a 375-nm laser. [(c)] The averaged lifetime (τ_{avg}) is calculated by $\tau_{avg} = (A_1 \times \tau_1^2 + A_2 \times \tau_2^2)/(A_1 \times \tau_1 + A_2 \times \tau_2)$.

Figure S1. Image of the CD@QD solution in chlorobenzene under 365-nm illumination.

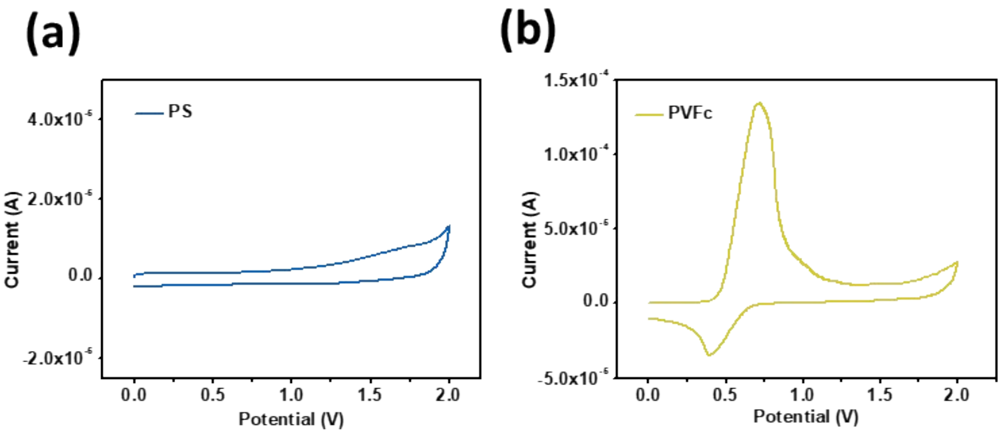

Figure S2. Cyclic voltammetry profiles of PS and PVFc polymers measured using an Ag/AgCl reference electrode, a Pt auxiliary electrode, and an ITO glass working electrode coated with the studied materials.

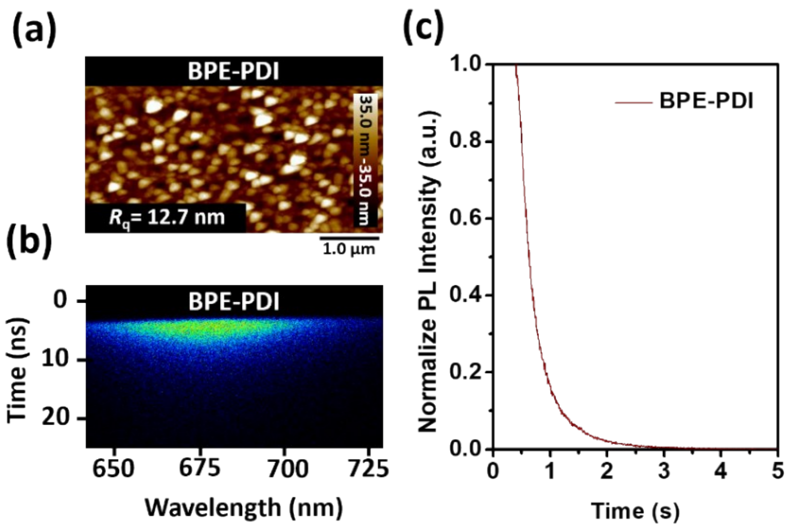

Figure S3. (a) AFM height images of BPE-PDI. (b) TR-PL 2D contour plots and (c) the corresponding 1D decay profiles of the BPE-PDI film under 375-nm laser excitation.

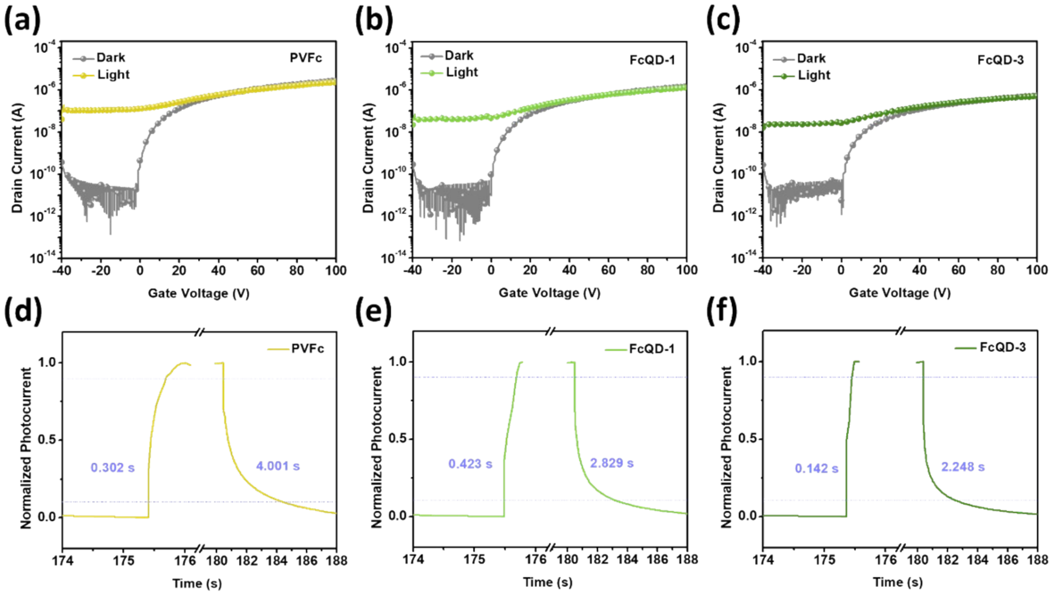

Figure S4. (a–c) Transfer curves and (d–f) transient response of the phototransistor detectors comprising (a,d) PVFc, (b,e) FcQD-1, and (c,f) FcQD-3. The transfer curves characteristics were measured in the dark and under light illumination. The measurements were conducted at a fixed V_d = 100 V with a 405 nm light (16.96 mW cm^{-2}).

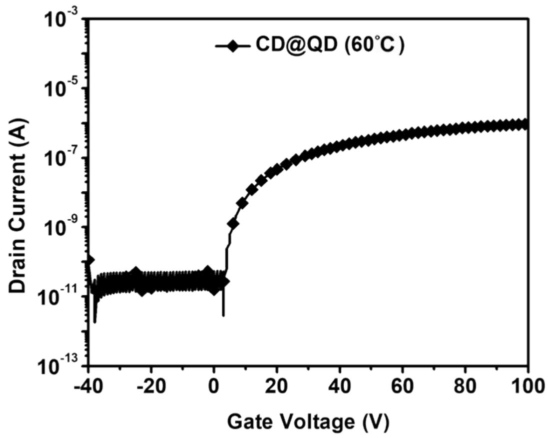

Figure S5. Transfer characteristics of the CD@QD phototransistor after thermal treatment at 60 °C. The drain current was measured under dark conditions at V_d = 100 V.

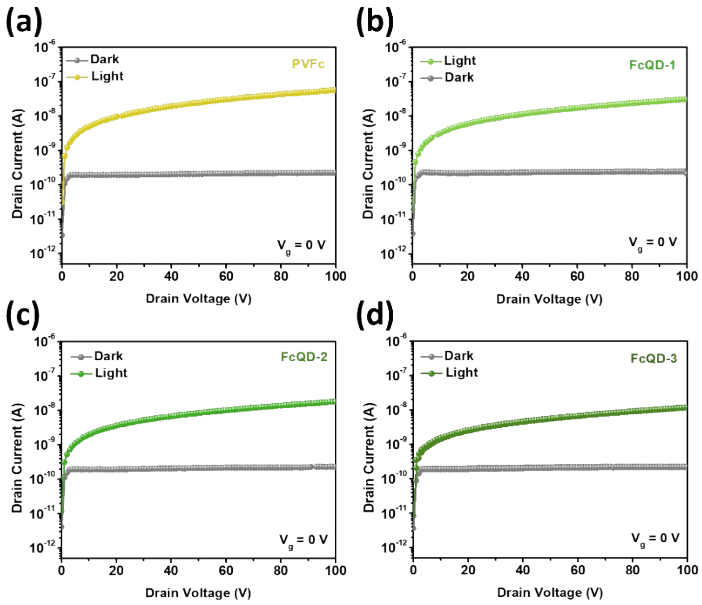

Figure S6. Output characteristics of the phototransistors based on (a) PVFc, (b) FcQD-1, (c) FcQD-2, and (d) FcQD-3. The V_d was swept from 0 to 100 V in the absence of a gate bias (V_g = 0 V) under 405-nm illumination (16.96 mW cm^{-2}).

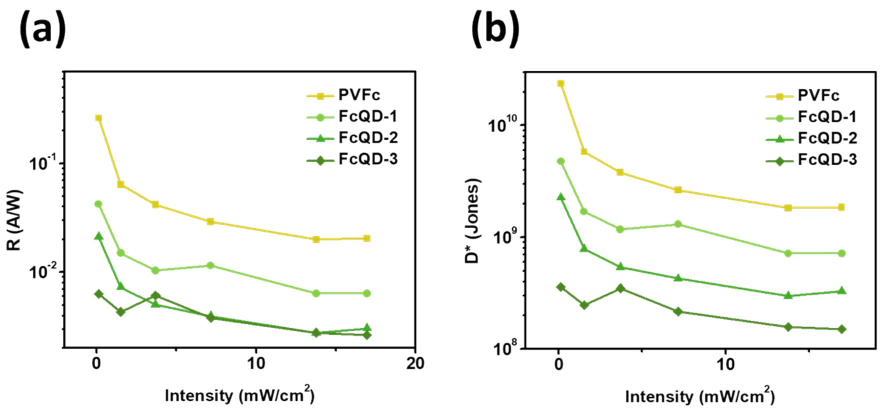

Figure S7. (a) Photoresponsivity and (b) specific detectivity of PVFc and CD@QD-PVFc photodetectors measured under various light intensities. The device parameters were determined from the temporal current characteristics at V_d = 100 V and V_g = 0 V.

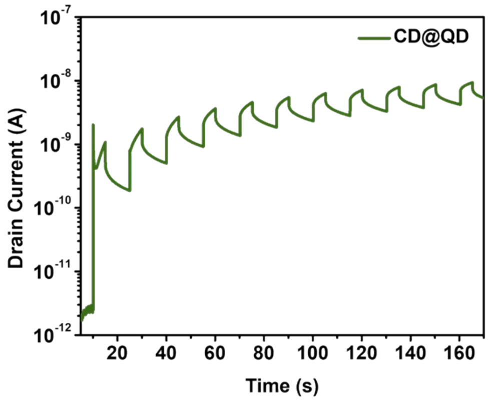

Figure S8. The endurance test of the CD@QD phototransistor, consisting of 10 cycles with 5 s of irradiation followed by 10 s of dark conditions. Note that the operating parameters in this test are V_d = 100 V and 405-nm light (16.96 mW cm^{-2}).

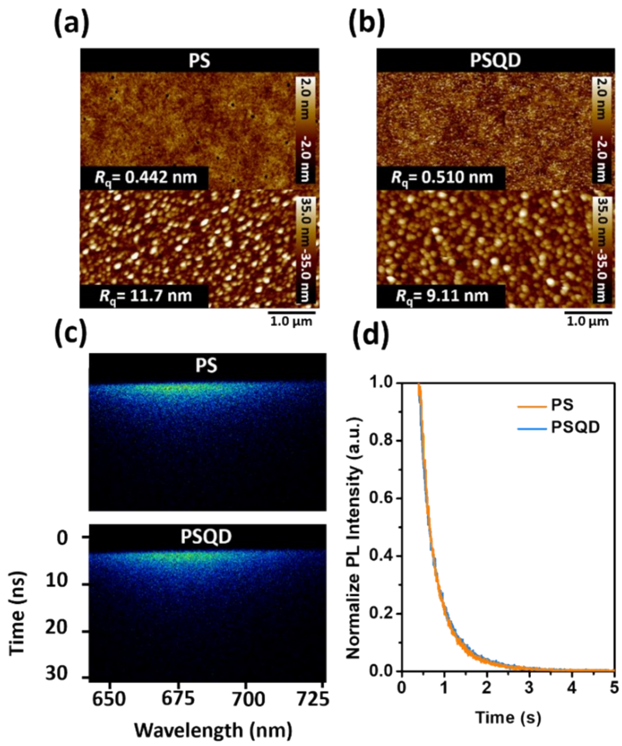

Figure S9. (a,b) AFM height images of PS and PSQD films. The lower part of each image shows the topography after thermal evaporation of BPE-PDI. (c) TR-PL 2D contour plots and (d) the corresponding 1D decay profiles of the bilayered films (polymer/BPE-PDI) under 375-nm laser excitation.

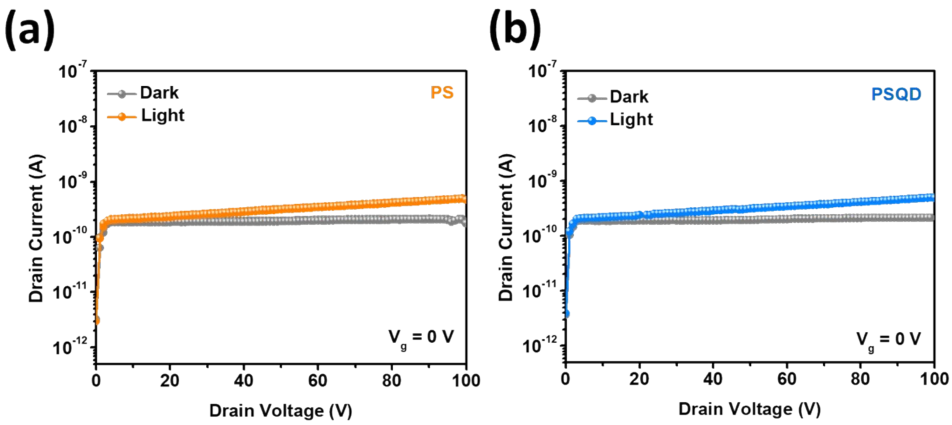

Figure S10. Output characteristics of phototransistors based on (a) PS and (b) PSQD. The V_d was swept from 0 to 100 V in the absence of a gate bias ($V_g = 0$ V) under 405-nm illumination (16.96 mW cm^{-2}).

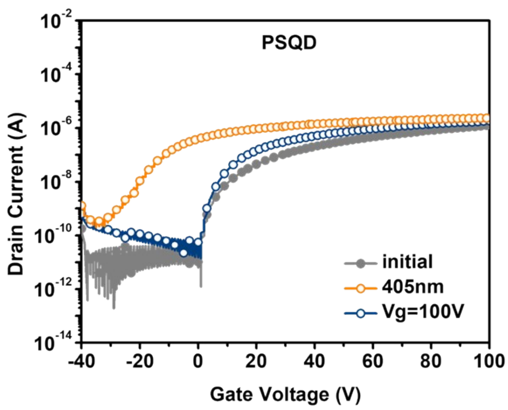

Figure S11. Transfer characteristics of the phototransistor device based on the PSQD hybrid film. The drain current was measured at V_d = 100 V. The photowriting was performed under 405 nm illumination (16.96 mW cm^{-2}), and the electrical erasure was achieved by applying V_g = 100 V for 1 s at V_d = 0 V.