Supporting Information

Surface Ligand Engineering Involving Fluorophenethyl ammonium for Stable and Strong Emission $CsPbBr_3$ Quantum Dots and High-Performance QLEDs

Qiang Zhang[a], Minghui Jiang[a], Guijun Yan[a], Yaqing Feng[a,b], Bao Zhang[a,b]*

a School of Chemical Engineering and Technology, Tianjin University, Tianjin 300350, China.

b Guangdong Laboratory of Chemistry and Fine Chemical Industry Jieyang Center, Guangdong Province, 522000, P. R. China.

E-mail address: baozhang@tju.edu.cn (Bao Zhang)

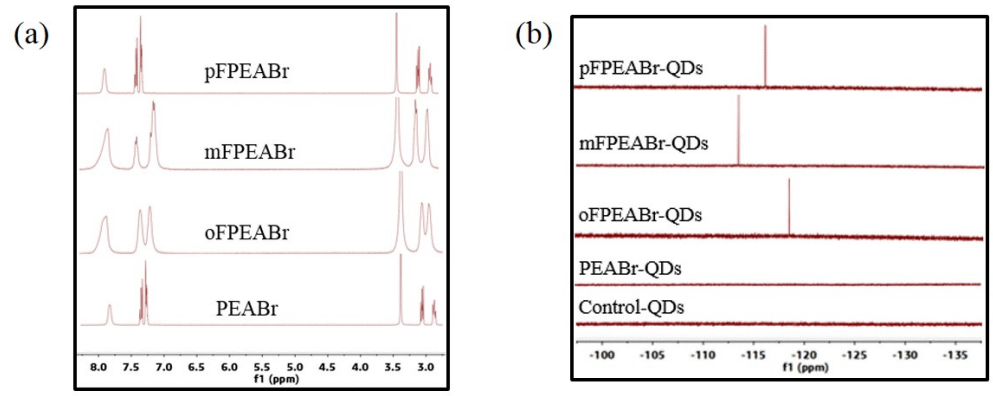

Figure S1. (a) ^{1}H-NMR spectra of PEABr, oFPEABr, mFPEABr and pFPEABr. (b) ^{19}F-NMR spectra of the $CsPbBr_3$ QDs and the different ligands modified $CsPbBr_3$ QDs.

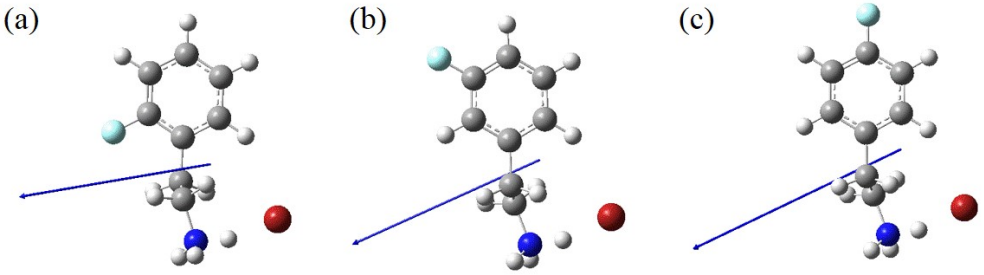

Figure S2. The direction and intensity of molecular dipole moments as indicated by the length of the arrows. (a-c)

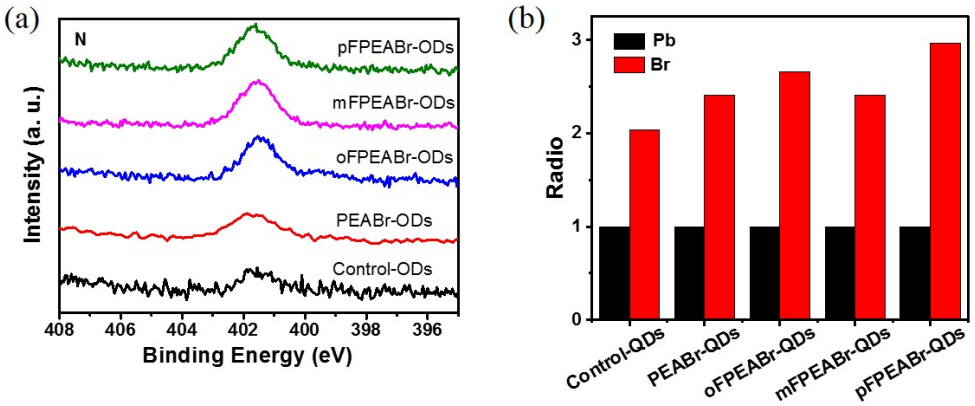

Figure S3. (a) N 1S, (b) The radio of Pb and Br caculated by XPS data of the $CsPbBr_3$ QDs and the different ligands modified $CsPbBr_3$ QDs.

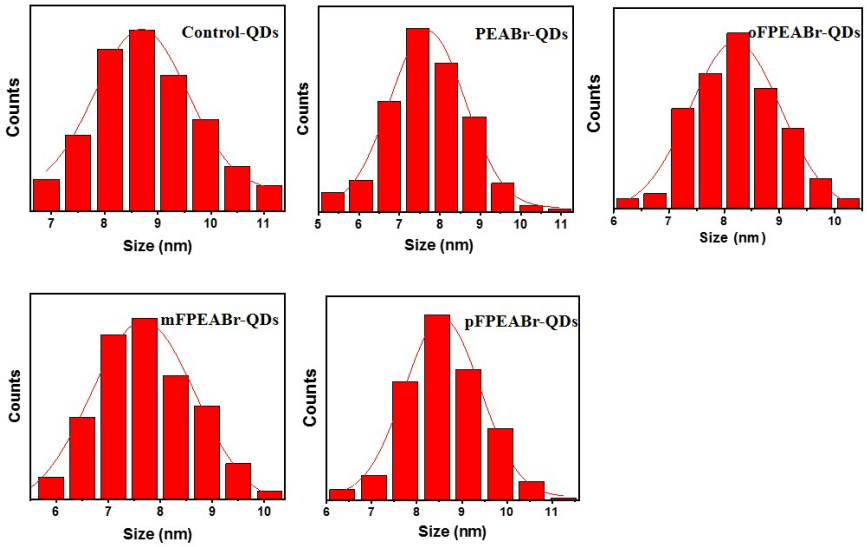

Figure S4. Size distribution histogram for the $CsPbBr_3$ QDs and the different ligands modified $CsPbBr_3$ QDs.

Table S1. The summary of PLQY, average lifetime (τ_{ave}), radiative recombination Life time (τ_r), radiative (k_r) and nonradiative (k_{nr}) decay rates of the $CsPbBr_3$ QDs and the different ligands modified $CsPbBr_3$ QDs. The τ_{ave}, τ_r, k_r and k_{nr} are calculated based on the following formulas: $\tau_{ave} = \frac{A_1\tau_1^2 + A_2\tau_2^2}{A_1\tau_1 + A_2\tau_2}$, $\tau_r = \frac{\tau_{ave}}{PLQY}$, $k_r = \frac{1}{\tau_r}$, $k_{nr} = \frac{1}{\tau_{ave}} - k_r$ (A1 and A2 are normalized coefficients)

Sample	PLQY(%)	τ_1 (ns)	τ_2 (ns)	τ_{ave} (ns)	τ_r (ns)	k_r(ns^{-1})	k_{nr}(ns^{-1})
Control-QDs	65.89	11.53	48.32	37.48	56.88	0.018	0.0091
PEABr-QDs	88.92	13.38	54.84	40.67	45.73	0.022	0.0027
oFPEABr-QDs	94.93	12.95	58.10	46.47	48.95	0.020	0.0011
mFPEABr-QDs	91	12.35	55.19	43.52	47.83	0.021	0.0021
pFPEABr-QDs	95.79	15.99	69.45	56.39	58.87	0.017	0.0007

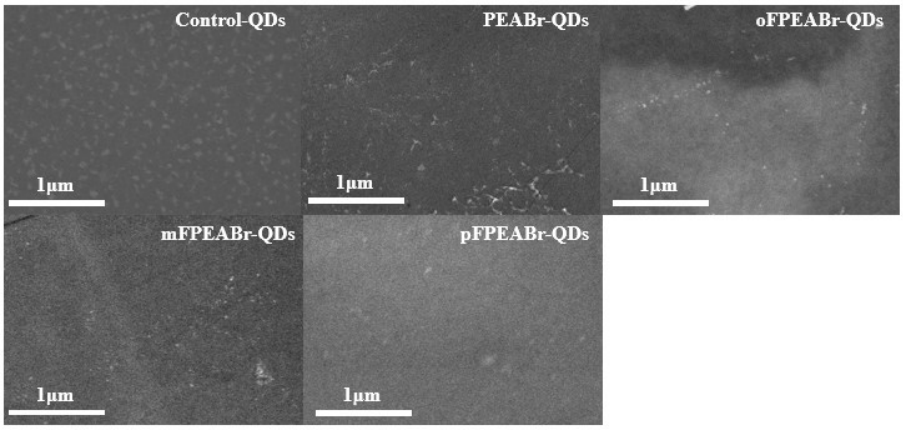

Figure S5. SEM images of the $CsPbBr_3$ QDs and the different ligands modified $CsPbBr_3$ QDs.

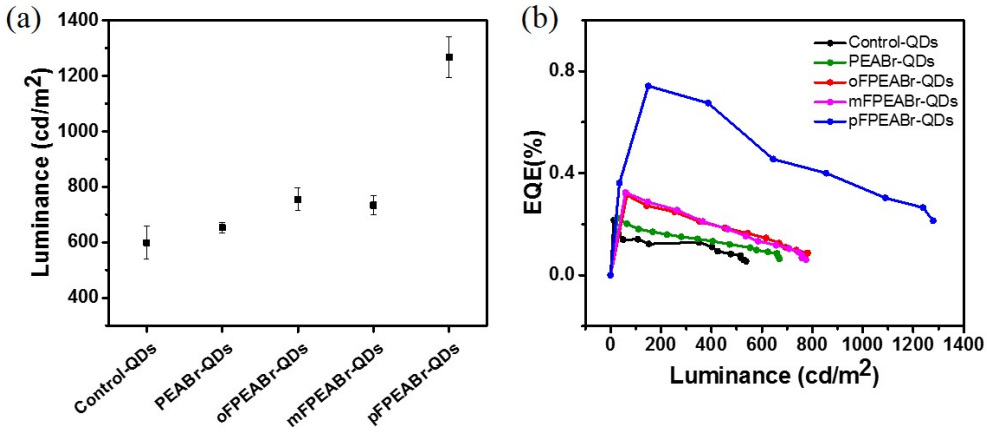

Figure S6. (a) Luminance, (b) EQE curves of the $CsPbBr_3$ QLEDs and the different ligands modified $CsPbBr_3$ QLEDs.