Electronic Supplementary Material (ESI) for RSC Advances.

Water-Assisted Synthesis of Highly Stable $CsPbX_3$ Perovskite Quantum Dots embedded in Zeolite-Y

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The fluorescence quantum yield of CsPbBr3-Y measures the absolute quantum yield using Fluorescence Master Systems (Horiba M470). The system consists of an excitation light source (450 nm), an integrating sphere, a multi-channel detector capable of simultaneous detection of multiple wavelengths, and test software. During the test, $CsPbBr_3$-Y powder is added into the sample cell for measurement, where the system will give the fluorescence quantum efficiency of the sample.

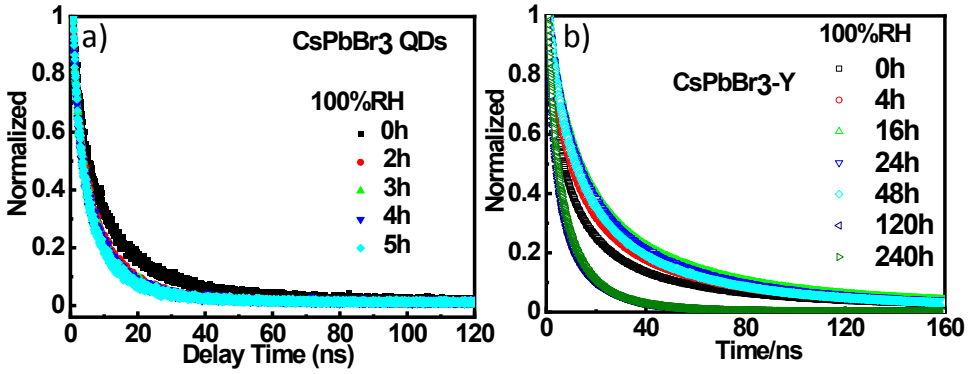

Figure S1. The emission decay curves of $CsPbBr_3$ ODs (a) and $CsPbBr_3$-Y (b) in 100% relative humidity.

Table S1 The emission lifetimes of $CsPbBr_3$ ODs in 100%RH

Time	0 h	2 h	3 h	4 h	5 h
Lifetime ns	10.5	7.1	6.7	6.5	5.9

Table S2 The emission lifetimes of $CsPbBr_3$-Y in 100%RH

Time	0 h	4 h	16 h	24 h	48 h	120 h	240 h
Lifetime ns	16.8	21.1	25.4	24.1	22.4	7.6	8.4

The X-ray diffraction (XRD) patterns of the $CsPb(Cl_{0.4}Br_{0.6})_3$-Y and $CsPb(Br_{0.6}I_{0.4})_3$-Y possess similar characteristic peaks as that of $CsPbBr_3$-Y, where the diffraction patterns of zeolite-Y can only be clearly observed, which is due to the much stronger diffraction peaks in in zeolite-Y than the QDs.

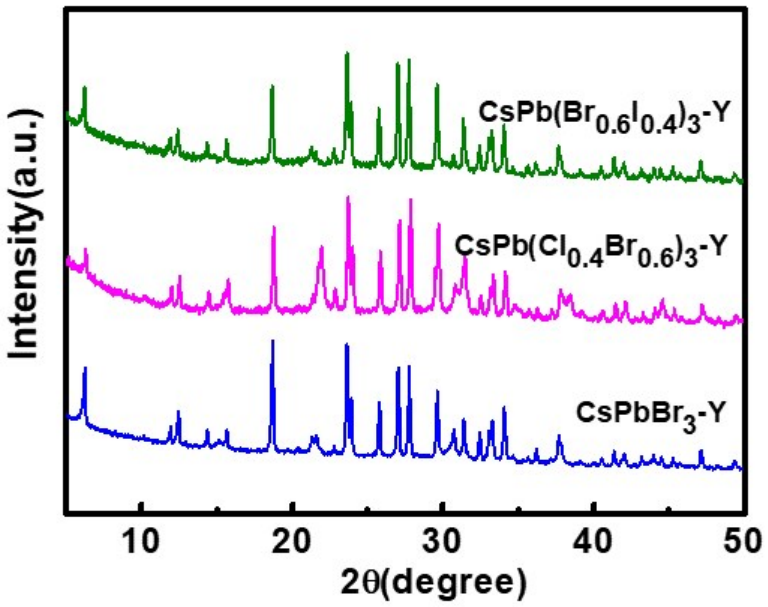

Figure S2. PXRD patterns of $CsPbBr_3$-Y, $CsPb(Cl_{0.4}Br_{0.6})_3$-Y, and $CsPb(Br_{0.6}I_{0.4})_3$-Y.

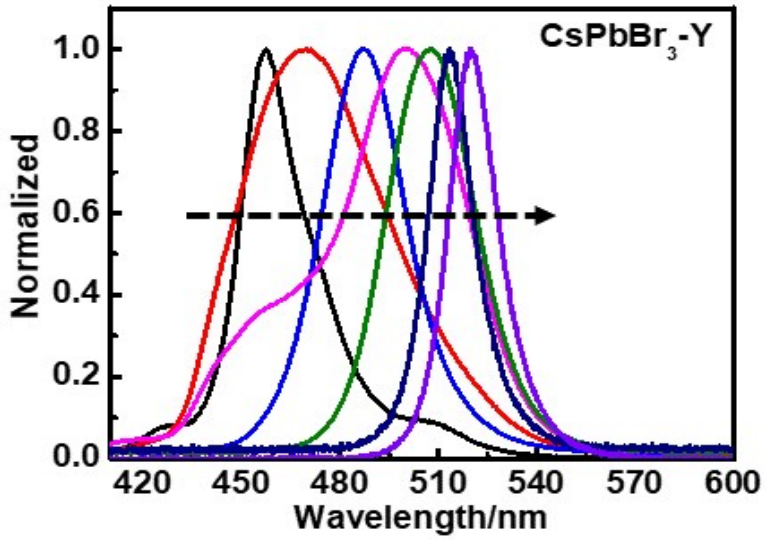

Figure S3. The emission spectra of $CsPbBr_3$-Y with different size.

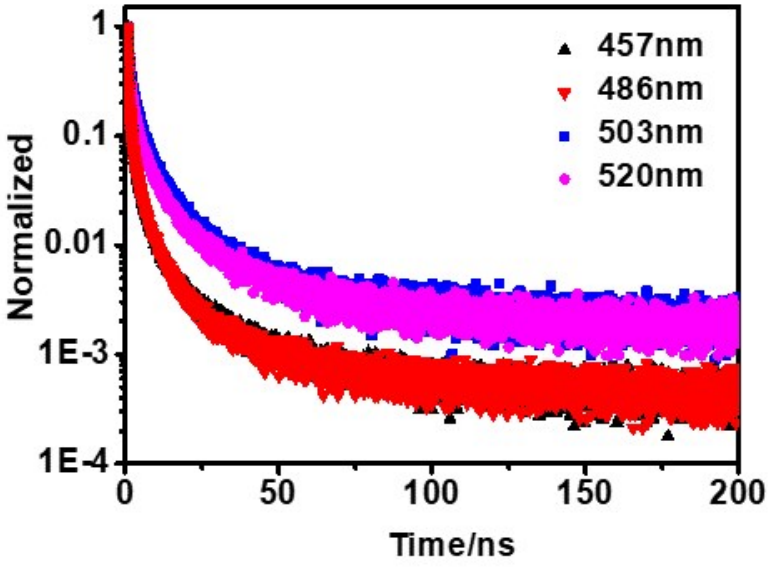

Figure S4. The emission decay curves of $CsPbBr_3$-Y with different sizes.

Table S3. The emission lifetimes of $CsPbBr_3$-Y with different sizes.

Emission	457 nm	486 nm	503 nm	520 nm

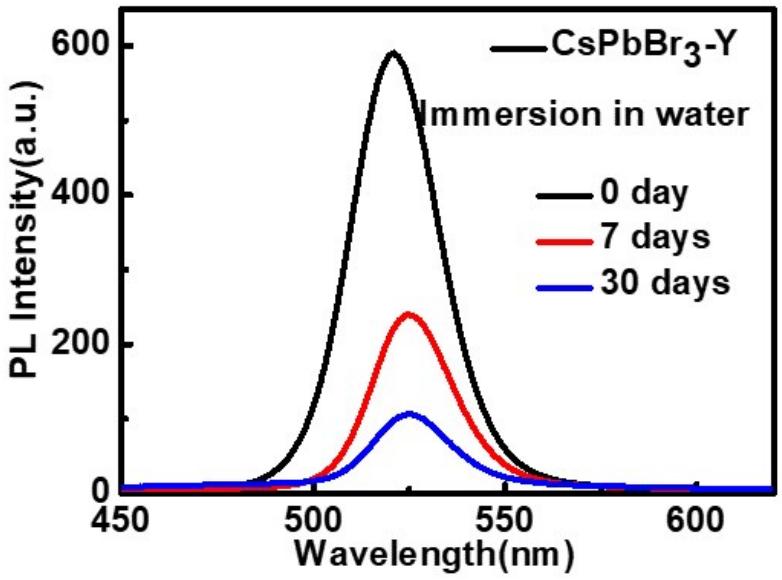

Figure S5. The emission spectra of $CsPbBr_3$-Y after being immersed in water.

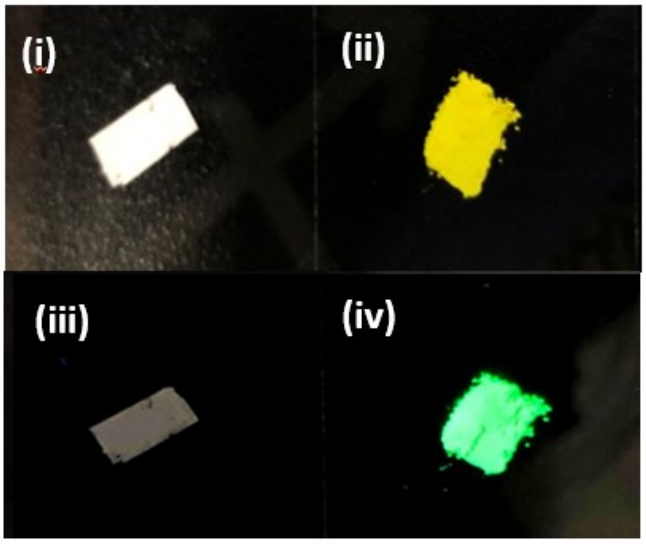

Figure S6. Cs_4PbBr-Y in sun light (i), $CsPbBr_3$ in sun light (ii), Cs_4PbBr_6-Y under UV(iii), $CsPbBr_3$ under UV(iv);

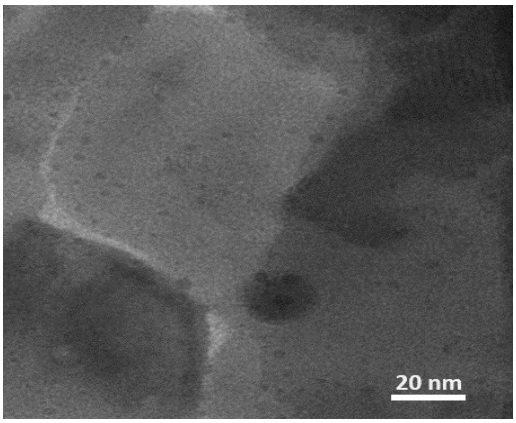

Figure S7. The TEM image of $CsPbBr_3$-Y（White arrow: Zeolite-Y；Black arrow: QDs. The size of QDs is about 2-5 nm.