

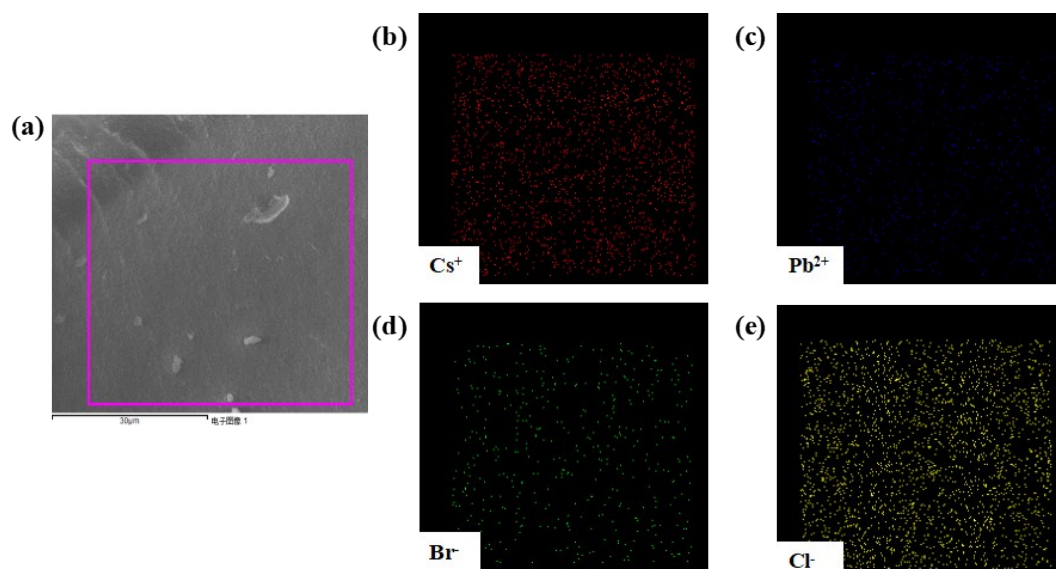
## Supporting information

### A Stimuli Responsive Material of Perovskite Quantum Dots Composited Nano-porous Glass

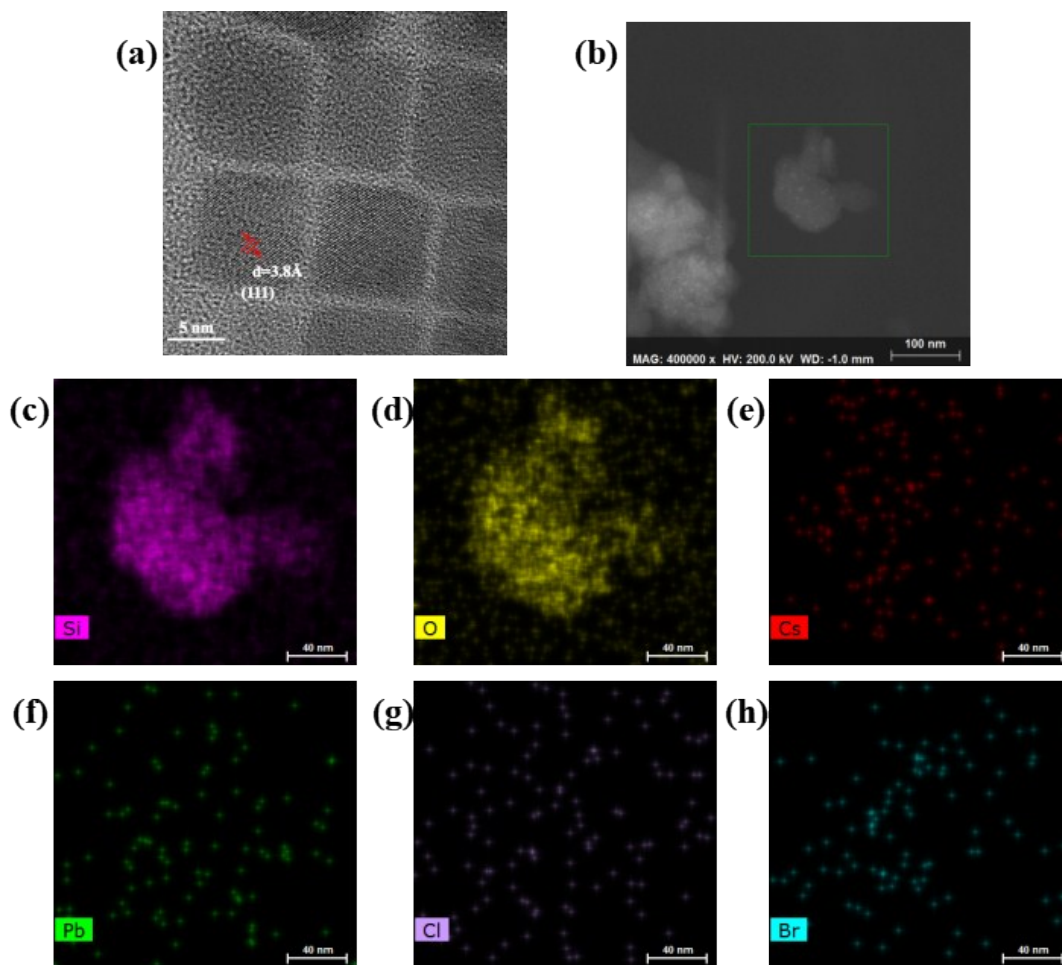
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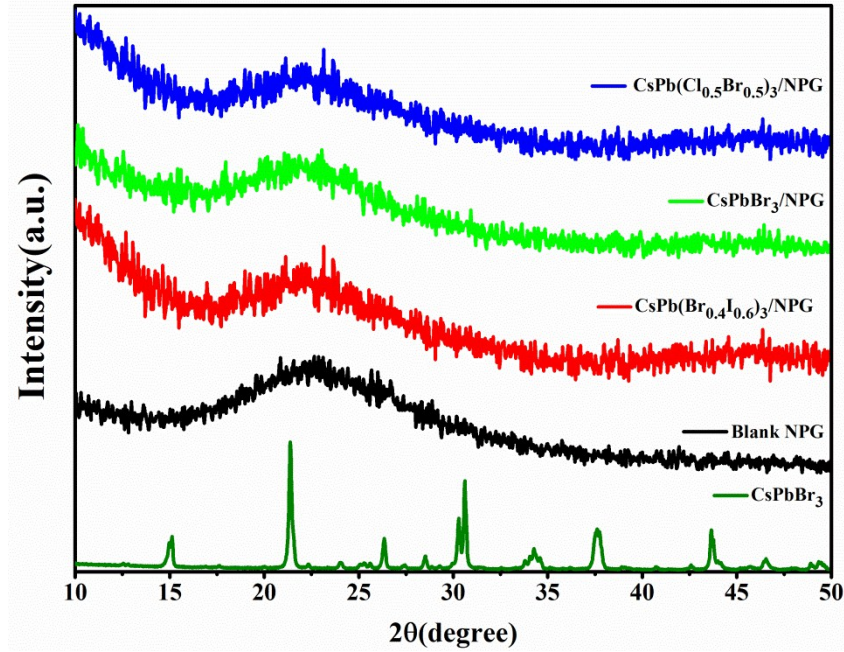
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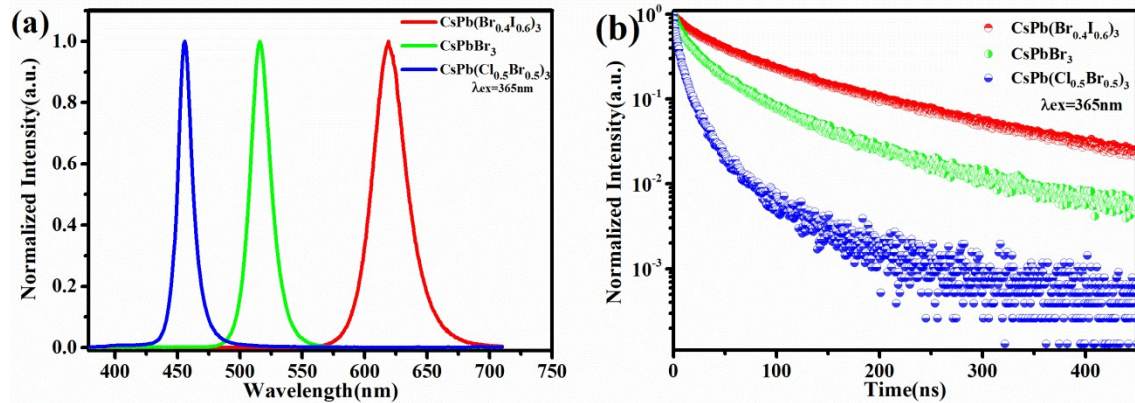
**Fig. S1** (a)-(e) Elemental mapping by SEM-EDS of the section of the bulk CsPb(Cl<sub>0.5</sub>Br<sub>0.5</sub>)<sub>3</sub>/NPG composite materials.



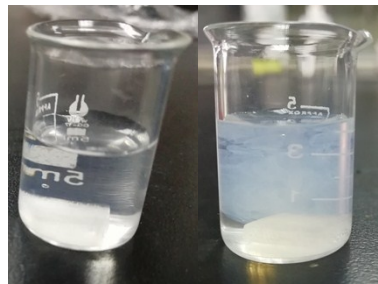
**Fig. S2** (a) The high resolution TEM image of bare CsPb(Cl<sub>0.5</sub>Br<sub>0.5</sub>)<sub>3</sub> QDs. (b) The dark field image of TEM. (c)-(h) Elemental mapping by energy-dispersive X-ray spectroscopy of transmission electron microscopy on the bulk CsPb(Cl<sub>0.5</sub>Br<sub>0.5</sub>)<sub>3</sub>/NPG composite materials.



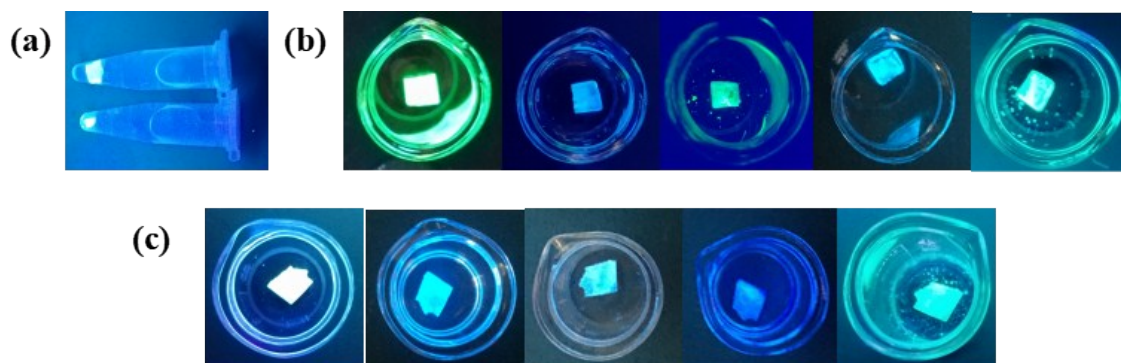
**Fig. S3** X-ray diffraction patterns of bare CsPbBr<sub>3</sub> QDs, blank NPG (the black line), bulk CsPb(Br<sub>0.4</sub>I<sub>0.6</sub>)<sub>3</sub>/NPG composite material (the red line), bulk CsPbBr<sub>3</sub>/NPG composite material (the green line), bulk CsPb(Cl<sub>0.5</sub>Br<sub>0.5</sub>)<sub>3</sub>/NPG composite material (the blue line)



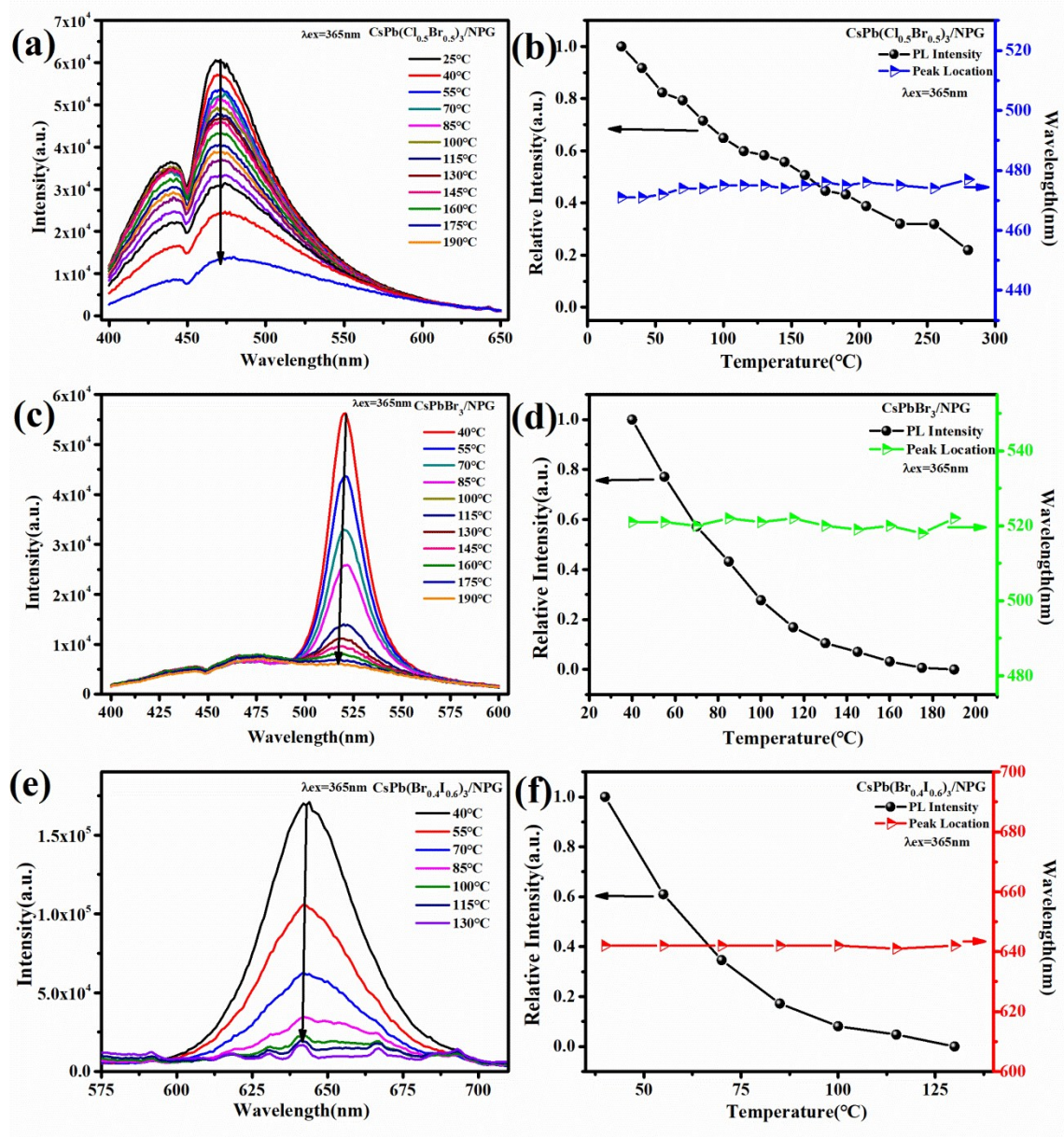
**Fig. S4** (a) Emission spectra and (b) Photoluminescence decay curves of bare CsPb(Cl<sub>0.5</sub>Br<sub>0.5</sub>)<sub>3</sub>, CsPbBr<sub>3</sub>, CsPb(Br<sub>0.4</sub>I<sub>0.6</sub>)<sub>3</sub> QDs.



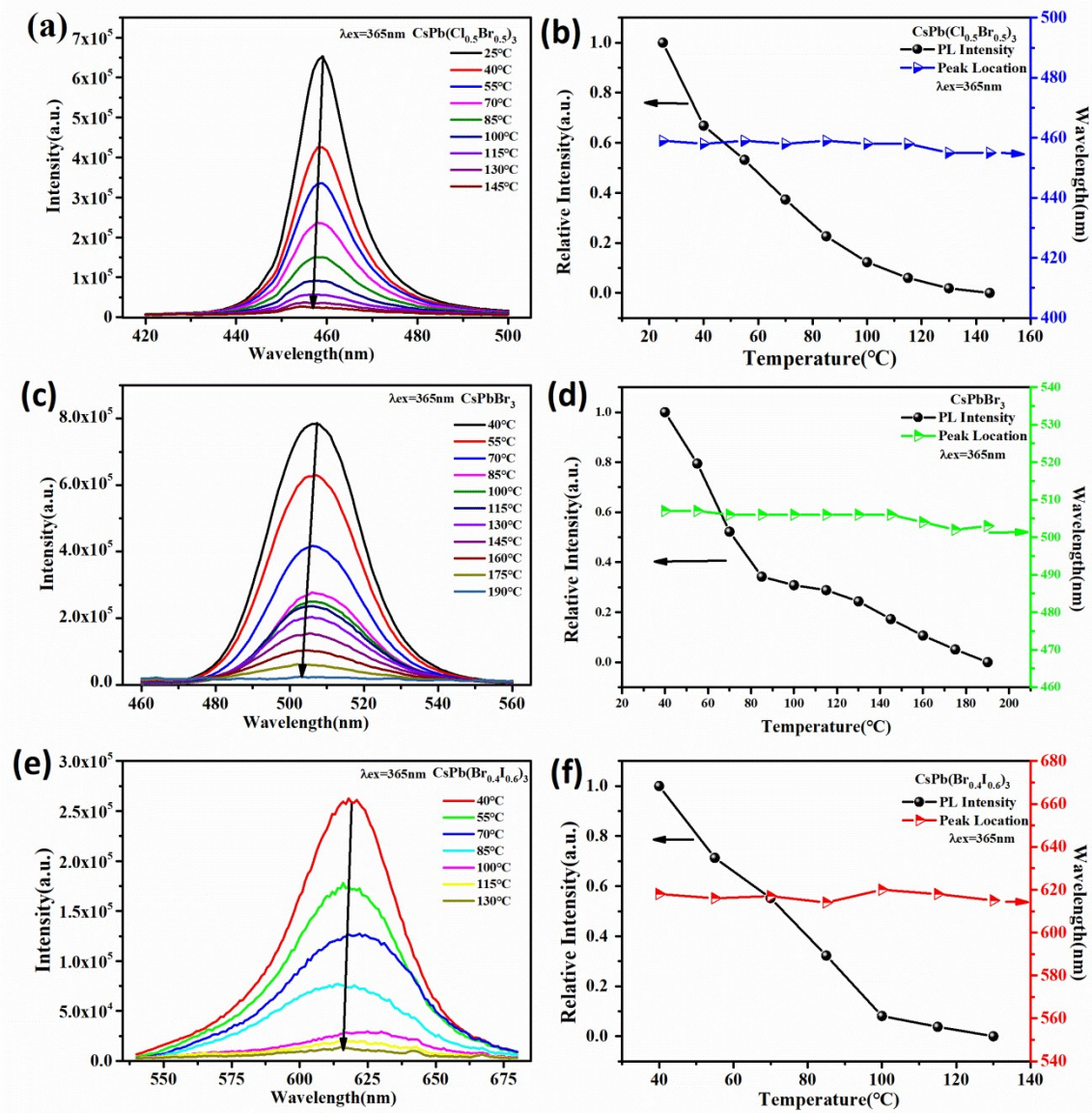
**Fig. S5** The photos of the deionized water with blank NPG (left) and after adding the nitric acid and the silver nitrate solution (right).



**Fig. S6** (a) The photographs of the bulk green and blue  $\text{CsPbX}_3/\text{NPG}$  composite materials after duration in water for at least 5 months under UV irradiation. (b) Reversible conversion of bulk  $\text{CsPbBr}_3/\text{NPG}$  composite materials at different steps (from the left to the right in sequence: without any solvents, in water, after immersing in toluene with addition of CsBr methanol, after immersing in toluene with addition of CsCl methanol, after immersing in toluene with addition of CsBr methanol). (c) Reversible conversion of bulk  $\text{CsPb}(\text{Cl}_{0.5}\text{Br}_{0.5})_3/\text{NPG}$  composite materials at different steps (from the left to the right in sequence: without any solvents, in water, after immersing in toluene with addition of CsBr methanol, in HCl solution, after immersing in toluene with addition of CsBr methanol).



**Fig. S7** (a)-(f) Temperature-dependent PL spectra upon excitation of 365 nm light, the PL intensity and the peak location of bulk CsPbX<sub>3</sub>/NPG composite materials.



**Fig. S8** (a)-(f) Temperature-dependent PL spectra upon excitation of 365 nm light, the PL intensity and the peak location of CsPbX<sub>3</sub>.

**Table S1** Compositions of CsPb(Cl<sub>0.5</sub>Br<sub>0.5</sub>)<sub>3</sub>/NPG composites

Sample	Elements	Contents (g/kg)
CsPb(Cl <sub>0.5</sub> Br <sub>0.5</sub> ) <sub>3</sub> /NPG	Cs	0.069
	Si	312.512
	Pb	0.557
	B	3.089
	Ca	0.050
	Al	4.333
	Na	4.127