Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting Information

Highly Stable $CsPbBr_3$-SiO_2 Glass Ceramic Film Sintered on Sapphire Plate for Laser-Driven Projection Displays

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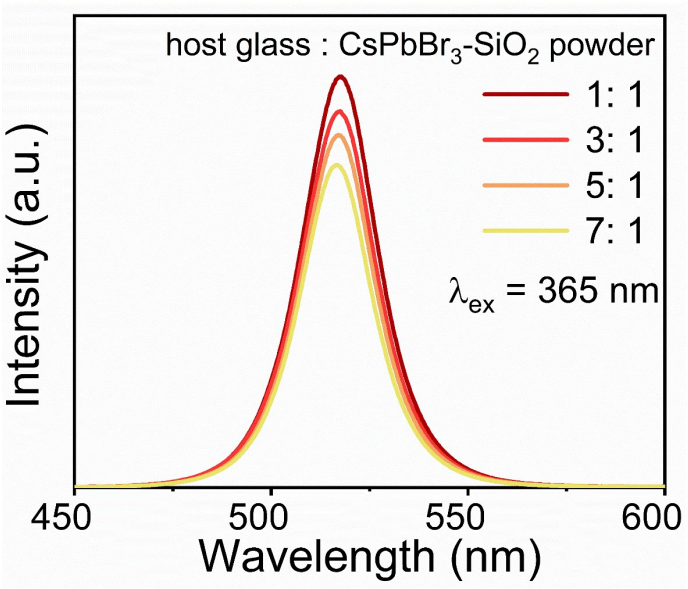

Fig. S1. The PL spectra of $CsPbBr_3$-SiO_2 film-on-SP with various ratio of host glass powder to $CsPbBr_3$-SiO_2 powder.

Note: Fig. S1 illustrated the effect of different glass powder contents on the luminous intensity of $CsPbBr_3$-SiO_2 film-on-SP. The ratios of the host glass to $CsPbBr_3$-SiO_2 powder were 1:1, 3:1, 5:1 and 7:1, respectively, and the rest of the preparation procedure was consistent with the synthesis of $CsPbBr_3$-SiO_2 film-on-SP in the experimental section. The results indicate that the increase of the non-luminescent host glass leads to the reduction of the luminescence centers and sacrifices the luminescence of the $CsPbBr_3$-SiO_2 film-on-SP. However, when the amount of host glass powder is low (1:1, 3:1), the $CsPbBr_3$-SiO_2 film easily peels off from the sapphire, since the softened glass is insufficient to bond all the $CsPbBr_3$-SiO_2 powder to the sapphire during high-temperature sintering. The final ratio of the host glass to $CsPbBr_3$-SiO_2 powder is

optimized to be 5:1, based on the comprehensive considerations the luminescent intensity of the $CsPbBr_3$-SiO_2 film-on-SP and the adhesion performance between sapphire and glass.

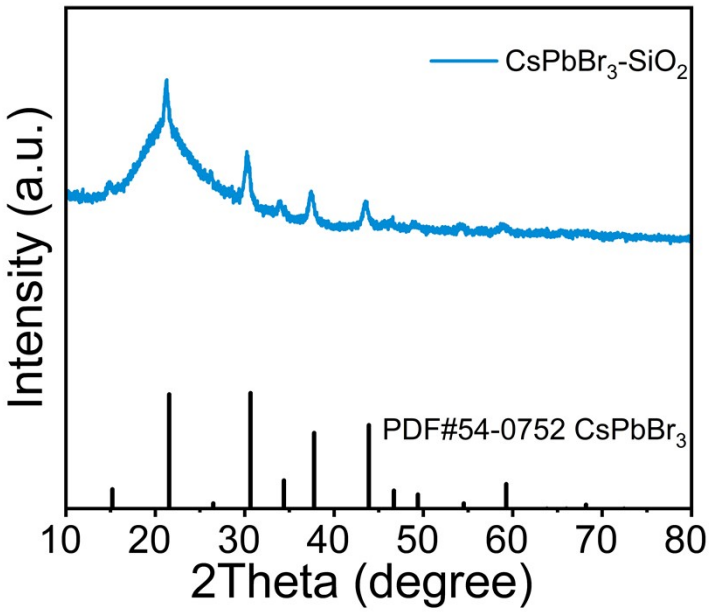

Fig. S2. XRD pattern of $CsPbBr_3$-SiO_2 sample.

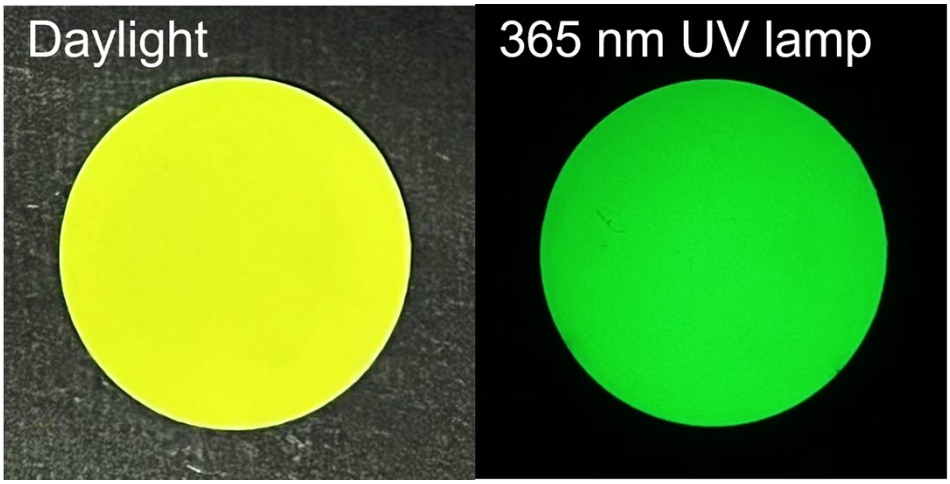

Fig. S3. Photos of $CsPbBr_3$-SiO_2 film-on-SP under daylight and 365 nm UV lamp.

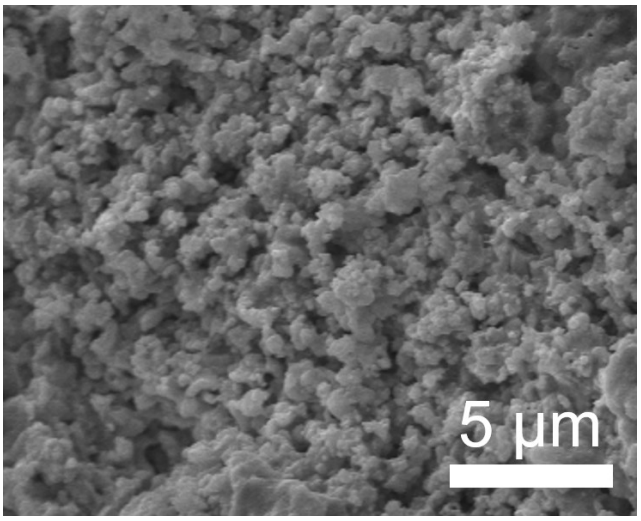

Fig. S4. SEM image of $CsPbBr_3$-SiO_2 powder.

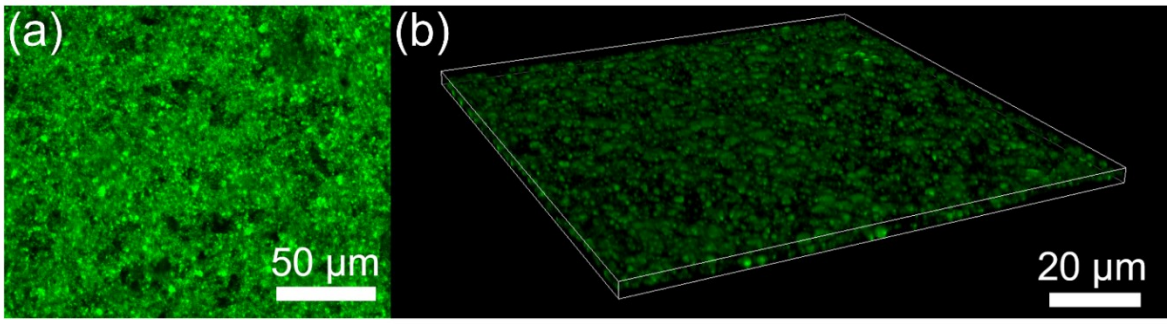

Fig. S5. (a) The surface fluorescence distribution image and (b) 3D reconstruction image of $CsPbBr_3$-SiO_2 film-on-SP.

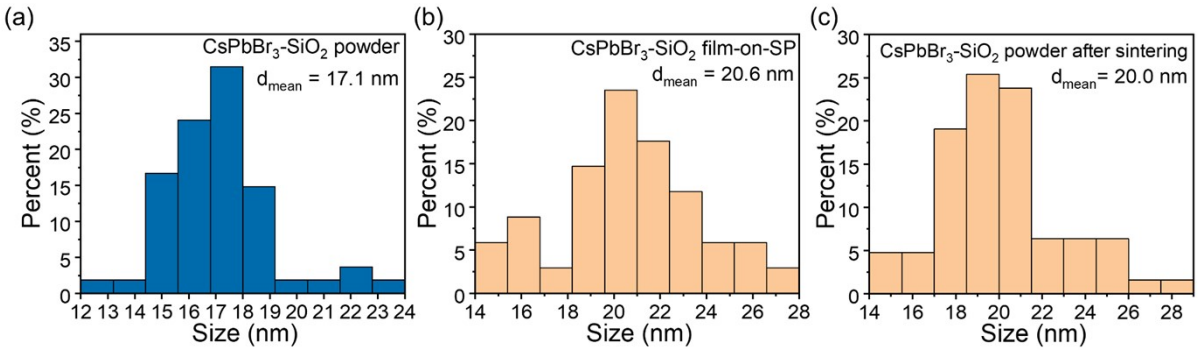

Fig. S6. (a) The size distribution of $CsPbBr_3$ NCs in $CsPbBr_3$-SiO_2 powder; the size distributions of $CsPbBr_3$ NCs in (b) $CsPbBr_3$-SiO_2 film-on-SP and (c) in $CsPbBr_3$-SiO_2 powder after sintering at 620 °C for 30 min.

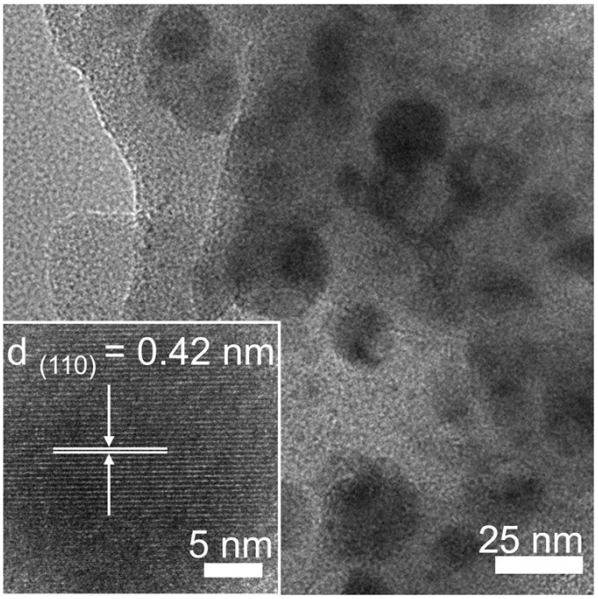

Fig. S7. TEM image of $CsPbBr_3$-SiO_2 powder sintered at 620 °C for 30 min.

Table S1. The calculated lifetimes of $CsPbBr_3$-SiO_2 powder and $CsPbBr_3$-SiO_2 film-on-SP.

Sample	τ_1 (ns)	Rel (%)	τ_2 (ns)	Rel (%)	τ_{avg} (ns)
$CsPbBr_3$-SiO_2	8.8288	47.48	46.4731	52.52	28.5983
$CsPbBr_3$-SiO_2 film-on-SP	7.9710	40.31	45.0487	59.69	30.1008

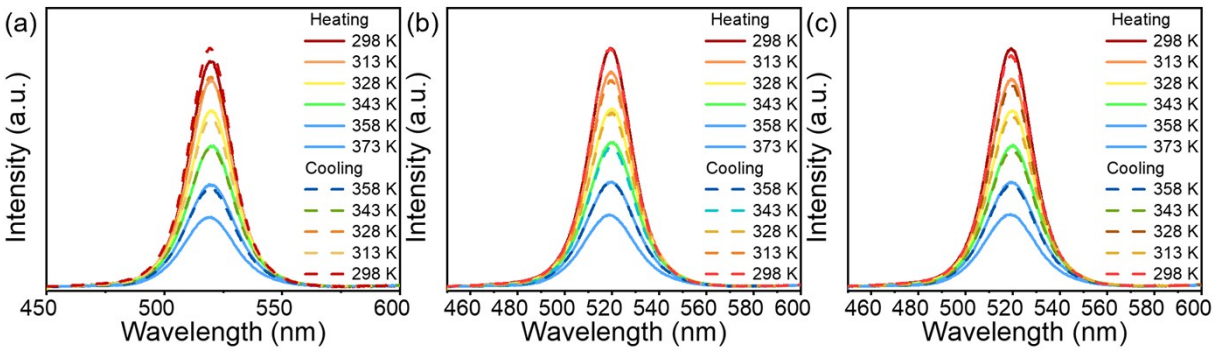

Fig. S8. PL spectra of $CsPbBr_3$-SiO_2 film-on-SP in the cycle of temperature from 298 K to 373 K (corresponding to the (a) first, (b) second, and (c) third cycle, respectively).

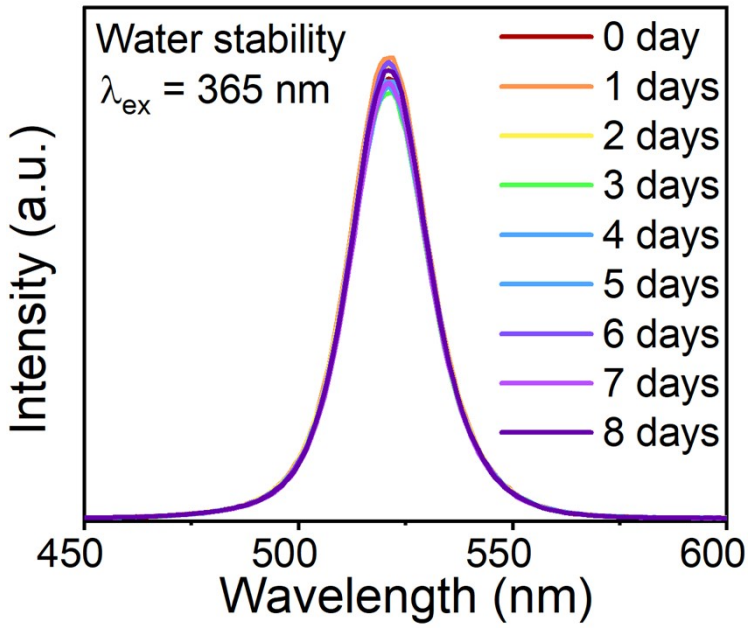

Fig. S9. PL spectra variation of $CsPbBr_3$-SiO_2 film-on-SP as a function of immering times in water.

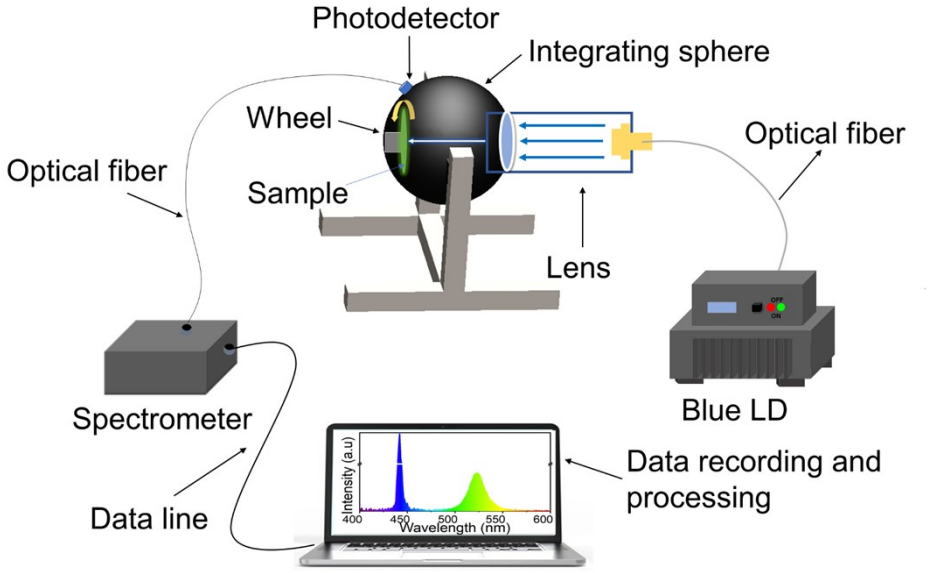

Fig. S10. Measurement system for "fluorescence wheel" based laser-driven lighting device with reflection mode.

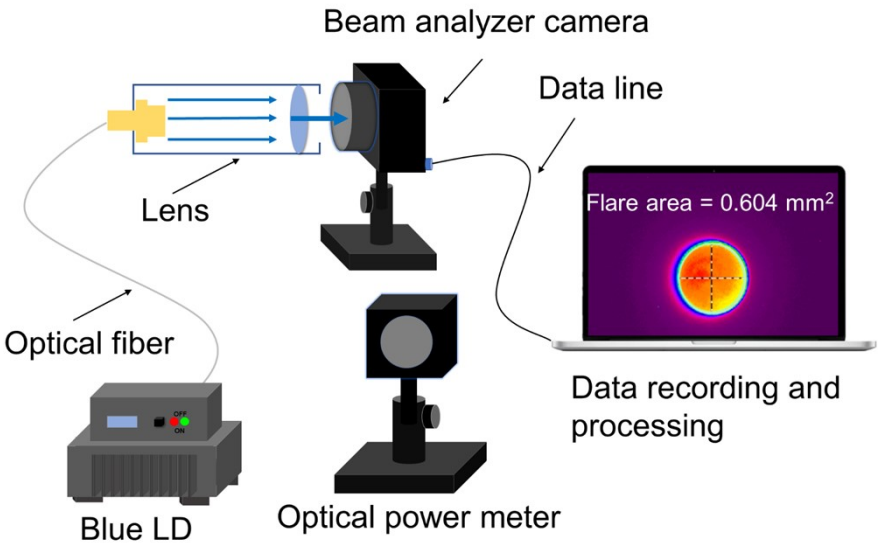

Fig. S11. Measurement system of blue laser power and spot size.

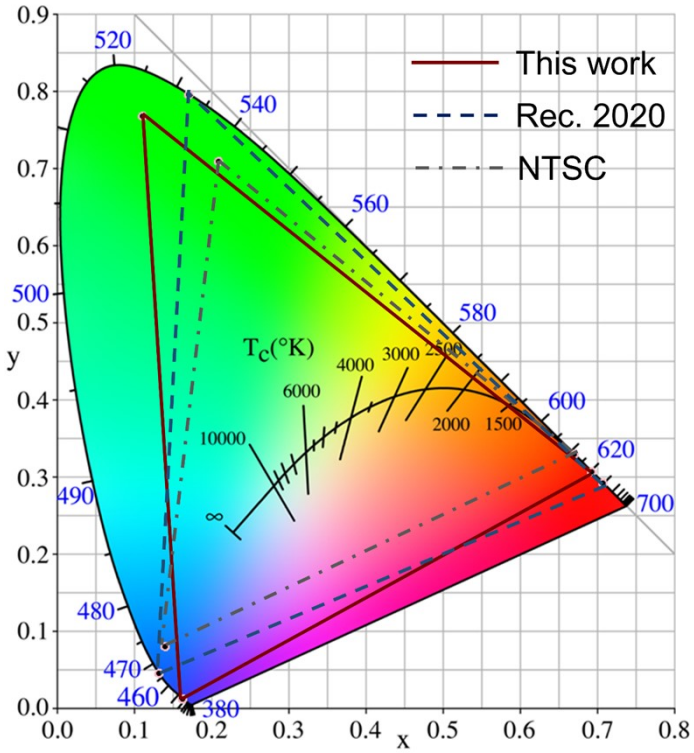

Fig. S12. CIE diagram showing the color coverage region of prototype lighting source in comparison with the NTSC standard and the Rec. 2020 standard.