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

Highly Efficient and Stable Cs_4PbBr_6@KBr Color Conversion Films Constructed through Inkjet Printing Technology

Yue Zhai[1], Kecheng Dai[1], Tongtong Xuan[2], Wenhao Bai[2], Shuchen Shi[2], Hong Zhang[1], Rongjun Xie[2]* and Le Wang[1]*

1. College of Optical and Electronic Technology, China Jiliang University, Hangzhou 310018, P. R. China;
2. State Key Laboratory of Physical Chemistry of Solid Surface, College of Materials, Xiamen University, Xiamen 361005, P. R. China

Corresponding Authors

*E-mail: rjxie@xmu.edu.cn, calla@cjlu.edu.cn

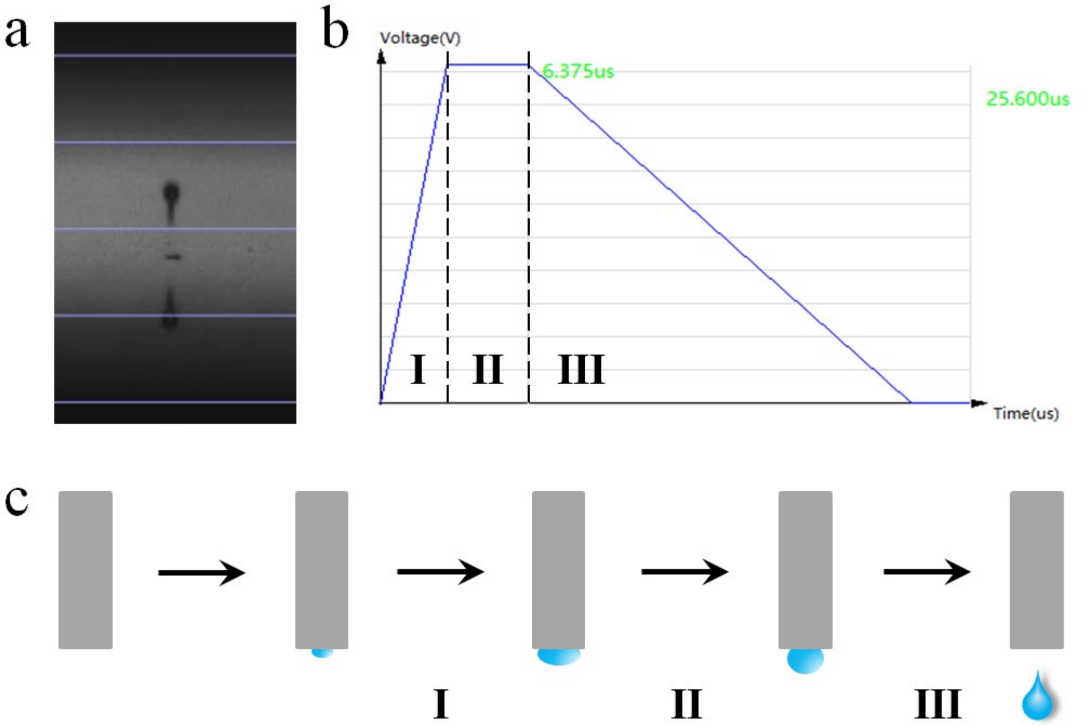

Figure S1. (a) Inkjet printing ink droplets; (b) Driving voltage diagrams and (c) Schematic diagram of droplet variation with driving voltage.

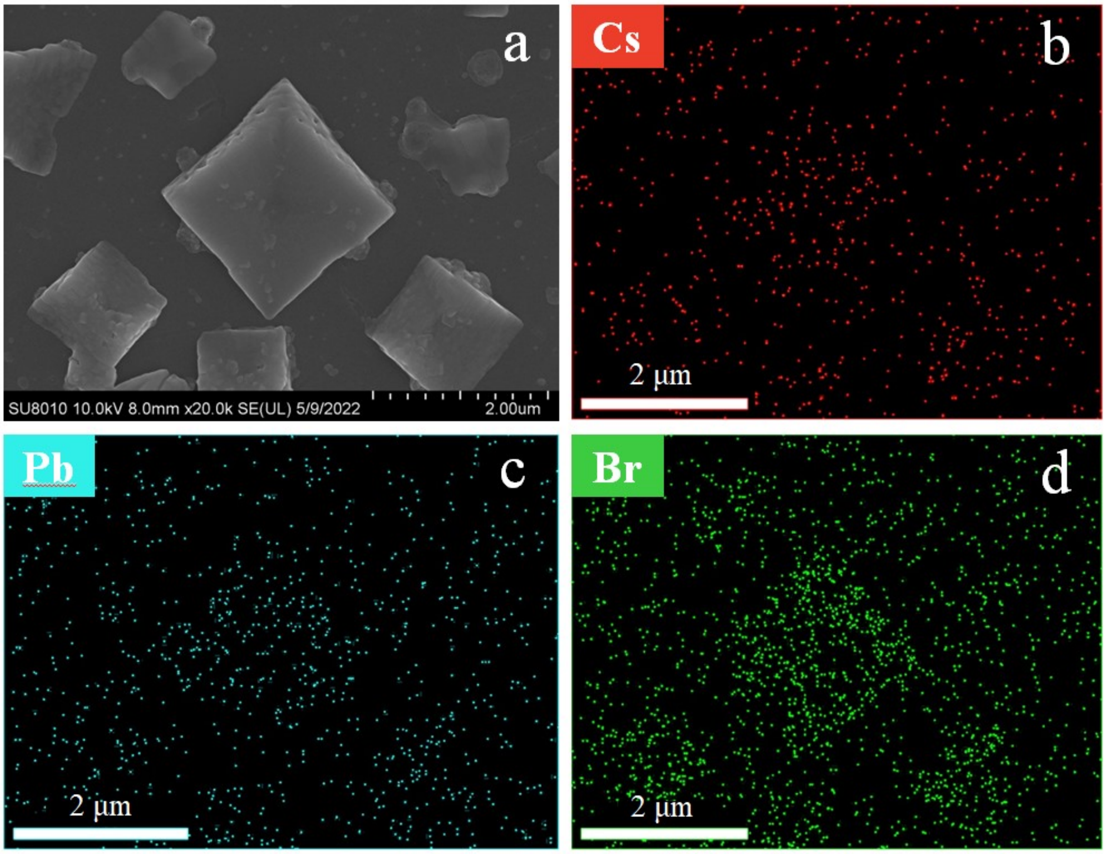

Figure S2 (a) SEM image and (b-d) the corresponding EDS elemental mapping images of perovskite prepared without introducing of KBr.

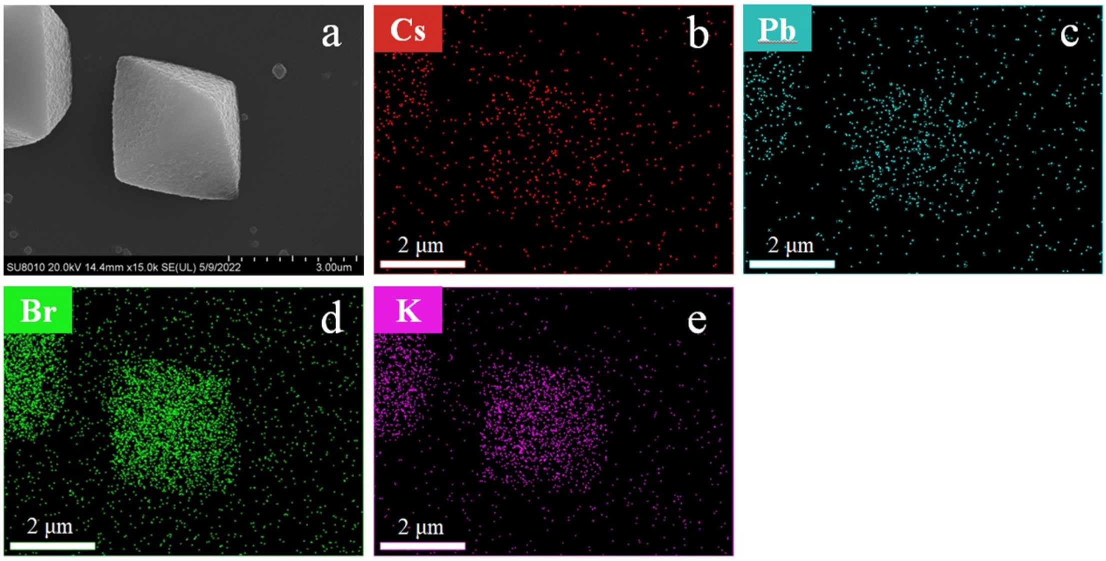

Figure S3 (a) SEM image and (b-e) the corresponding EDS elemental mapping images of Cs_4PbBr_6@KBr composite.

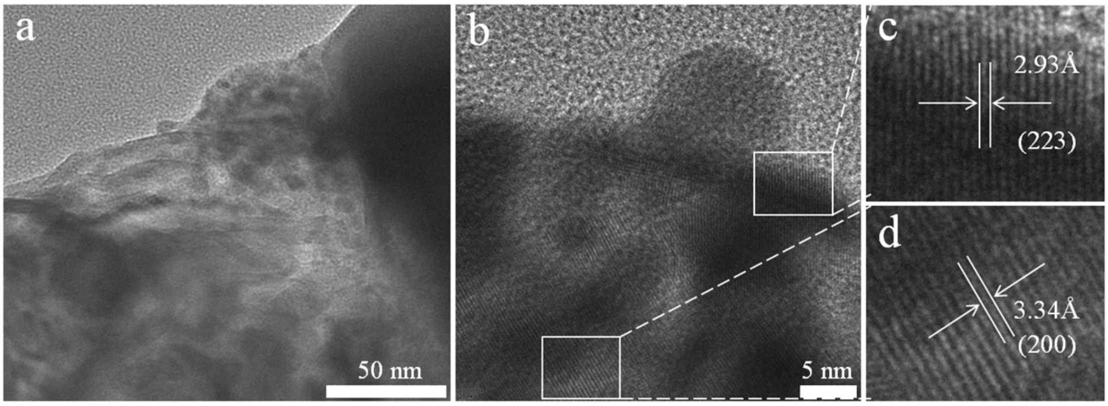

Figure S4 (a) TEM and (b-d) HR-TEM images of Cs_4PbBr_6@KBr composite.

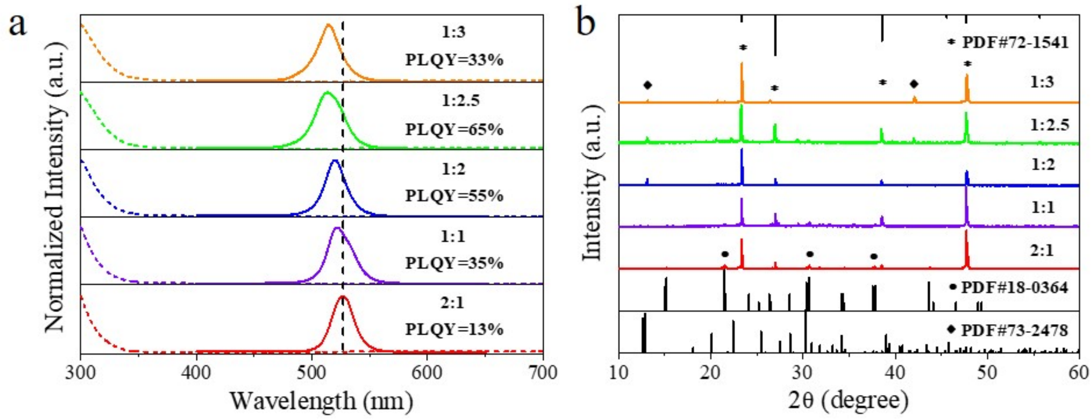

Figure S5. (a) UV-Vis absorption (dotted lines), photoluminescence spectra (solid lines) and (b) XRD patterns of KBr coated perovskite CCFs prepared with different $PbBr_2$ and CsBr ratios.

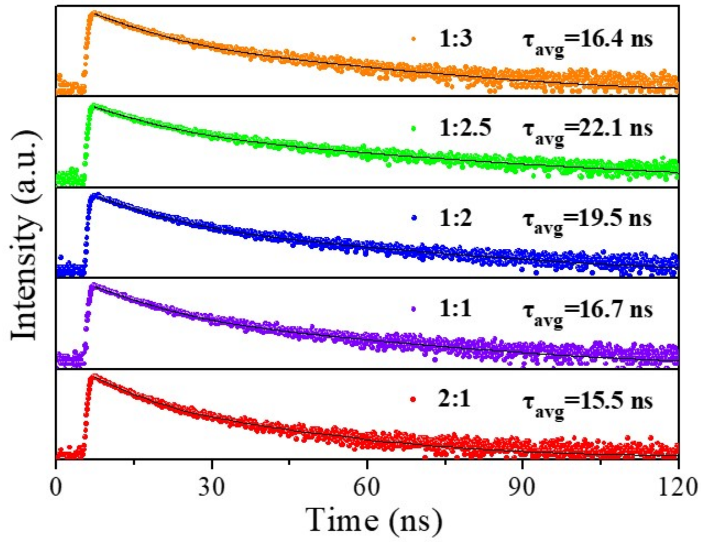

Figure S6 Photoluminescence decay curves of KBr coated perovskite CCFs printed with different ratio of $PbBr_2$ to CsBr.

Table S1 Emission decay curves fitting results of KBr coated perovskite CCFs with different ratio of $PbBr_2$ to CsBr

	τ_1 (ns)	A_1 (%)	τ_2 (ns)	A_2 (%)	τ_{avg} (ns)	non-radiative recombination rate (s^{-1})
2:1	3.9	49.25	17.9	50.75	15.5	5.6×10^7
1:1	5.9	55.89	20.6	44.11	16.7	3.9×10^7
1:2	6.2	45.62	22.6	54.38	19.5	2.3×10^7
1:2.5	6.3	39.66	24.7	60.34	22.1	1.6×10^7
1:3	5.0	38.98	18.4	61.02	16.4	4.1×10^7

Table S2 Emission decay curves fitting results of Cs_4PbBr_6@KBr CCFs with different substrate temperature

	τ_1 (ns)	A_1 (%)	τ_2 (ns)	A_2 (%)	τ_{avg} (ns)
50℃	6.5	40.33	21.3	59.67	18.8
60℃	6.3	39.66	24.7	60.34	22.1
70℃	6.2	25.41	28.9	74.59	27.4
80℃	6.8	30.45	32.9	69.55	30.7
90℃	6.8	24.59	33.5	75.41	31.8
100℃	7.0	20.49	35.9	79.51	34.5

Table S3 Summarized thermal stability of previously reported materials

Material	Temperature	Time	Stability	Reference
Cs_4PbBr_6@KBr CCFs	70 °C	16 h	PL intensity maintains about 65%	This Work
dual-phase Cs_4PbBr_6 MCs/$CsPbBr_3$ NCs composites film	373 K	240 min	PL intensity reduces to 80%	1
Cs_4PbBr_6 micro-disks (MDs)	85°C	6 h	PLQY remaines about 62.5%	2
Cs_4PbBr_6-Zn(moi)$_2$	100 °C	6 h	PL emission intensity maintains around 95%	3
$FAPbBr_3$/Cs4$PbBr_6$ NCs film	60 °C	96 h	PL intensity decreased by 45%	4
N-GQD/$CsPbBr_3$ composite	100 °C	2 h	PL emission intensity retains 10%	5
DDAB/$ZnBr_2$-treated $CsPbBr_3$ NCs	50 °C	60 min	PL intensity preserved ~90%	6
$CsPbBr_3$ PQDs film	100 °C	15 min	almost completely lose their PL	7

References

1. Q. Wang, W. Wu, R. Wu, S. Yang, Y. Wang, J. Wang, Z. Chai and Q. Han, *Journal of Colloid and Interface Science*, 2019, 554, 133-141.

2. H. H. Zhang, Q. Liao, Y. S. Wu, J. W. Chen, Q. G. Gao and H. B. Fu, *Physical*

Chemistry Chemical Physics, 2017, 19, 29092-29098.

3. X. X. Feng, P. X. Xu, J. L. Liu, X. Y. Zhao, J. Cao and J. C. Liu, *Inorganic Chemistry*, 2022, 61, 17590-17598.

4. Y. Zeng, W. Chen, Y. Deng, W. Gu, C. Wu, Y. Guo, P. Huang, F. Liu and H. Li, *ACS Applied Nano Materials*, 2022, 5, 9534-9543.

5. Z. Xue, H. Gao, W. Liu and X. Li, *ACS Applied Electronic Materials*, 2019, 1, 2244-2252.

6. Y. Zhang, G. Hou, Y. Wu, M. Chen, Y. Dai, S. Liu, Q. Zhao, H. Lin, J. Fang, C. Jing and J. Chu, *Langmuir*, 2023, 39, 6222-6230.

7. Y. Cai, L. Wang, T. Zhou, P. Zheng, Y. Li and R.-J. Xie, *Nanoscale*, 2018, 10, 21441-21450.