

The organic-perovskite host-dopant structure for full-color convention displays

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We have developed a color conversion film (CCF) based on an organic-perovskite host-dopant structure for use in color convention displays. The absorption coefficient of the host material DMP at 458nm is close to 2.0×10^5 , and the peak absorption closely matches the emission of the blue LED. As a dopant material, perovskite quantum dots (QDs) have the advantages of high photoluminescence quantum yield (PLQY), narrow emission width, and adjustable optical band gap, etc., which are promising for advanced displays. In the host-dopant system, DMP absorbs blue light and transfers energy to perovskite dopant materials that emit green or red light through fluorescence resonance energy transfer (FRET). The structure of organic-perovskite host-dopant structure can not only ensure the maximization of blue light absorption, but also prevent the aggregation of fluorescence quenching of the dopant. The thickness of the organic-organic host-dopant color conversion film can be controlled below 1.5 μm and can achieve more than 99% blue absorption. Through FERT, the perovskite nanocrystalline dopant material emits green and red light with high color purity to achieve Wide color gamut display.

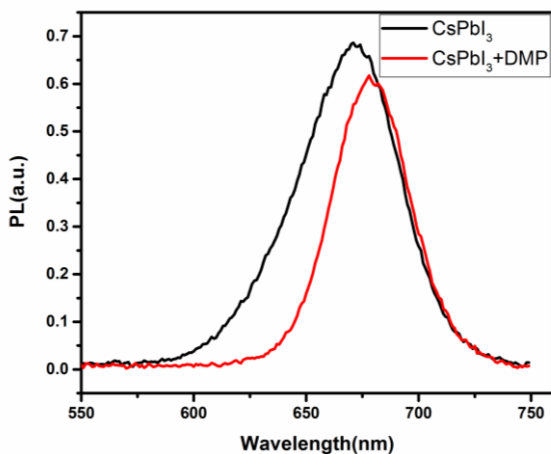


Fig. 1. PL spectra of CsPbI₃ and DMP mixed with CsPbI₃ solution

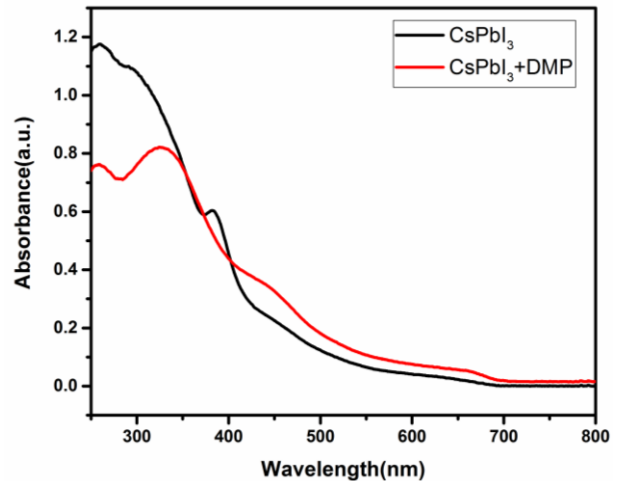


Fig. 2. Absorption spectra of CsPbI₃ and DMP mixed with CsPbI₃ solution

References

- [1] S. C. Dong, Y. B. Jiang, and C. W. Tang. *J. Soc. Inf. Disp.* (2021)
- [2] C. H. Bi, S. X. Wang, W. Wen, J. F. Yuan, G. Z. Cao, and J. J. Tian. *J. Phys. Chem. C.*, 122(9), 5151 (2018).