Supplementary Material

Enhanced blue emission from $CsPb(Br/Cl)_3$ perovskite nanocrystals by localized surface plasmon resonance of Au nanoparticles

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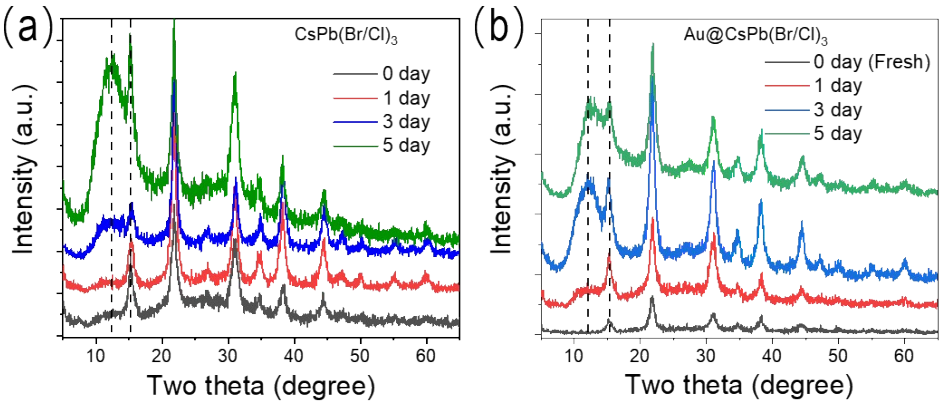

Figure S1. The time-evolution of the XRD patterns of (a) bare $CsPb(Br/Cl)_3$ NC films and (b) Au@$CsPb(Br/Cl)_3$ NC films exposed to the air for 0-5 days.

To determine the phase stability of Au@$CsPb(Br/Cl)_3$ NCs as a function of storage time in air, XRD is used to investigate the changes in the crystallinity and phase purity of bare $CsPb(Br/Cl)_3$ NCs and typical Au@$CsPb(Br/Cl)_3$ NCs prepared with 50 µl Au NPs in the initial solution. Figure S1 shows the time-evolution of the XRD patterns of those typical samples. The time evolution of the crystallinity and phase purity of bare $CsPb(Br/Cl)_3$ NC films are shown in Figure S1 (a). For the bare $CsPb(Br/Cl)_3$ NC films exposed to the air for 2 days, all diffraction peaks are closely similar to those of the fresh (0 day) bare $CsPb(Br/Cl)_3$ NC films, corresponding to the plane indices of the cubic phase (PDF#54-0752). However, after leaving sample in ambient for 3 days, a broad peak around 12^o appears, which was possibly due to the partial phase transition to air stable rhombohedral Cs_4PbBr_6 (ICSD #025124)[1]. From Figure S1(b), the crystallinity and phase purity of the Au@$CsPb(Br/Cl)_3$ NC films shows the similar result of a partial phase transition. That is, after 3 days, the XRD patterns show a broad

peak around 12°, indicating that there is a partial phase transition in Au@$CsPb(Br/Cl)_3$ NC film at room temperature. Obviously, the decoration of AuNPs did not improve the phase stability of $CsPb(Br/Cl)_3$.

References:

1 L. N. Quan, R. Quintero-bermudez, O. Voznyy, G. Walters, A. Jain, J. Z. Fan, X. Zheng, Z. Yang and E. H. Sargent, *Adv. Mater.*, 2017, **29**, 1605945.